Digital Technology Experiences of Children and Young People

Technical Report

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Prepared for:

The National Mental Health Commission

Siân McLean, Matthew Fuller-Tyszkiewicz, Jasmine Fardouly

Hanan Khalil, Kristelle Hudry, Adam Bourne, Piers Gooding, Sharon Horwood, Marcus Carter, Susan Sawyer, Hannah Jarman, Nandita Vijayakumar

An Dang, Joshua Finn, Ellen Richardson, Scott Fatt, Alexandra Aulich

Acknowledgement of Country

We acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Custodians the lands and waters on which we live, work and learn. We pay our respects to their clans, and to the elders past and present, and acknowledge their continuing connection to land, sea and community.

Recognition of Lived Experience

We recognise the individual and collective contributions of those with a lived and living experience of mental health challenges and suicide, and those who love, have loved and care for them. Each person's journey is unique and a valued contribution to Australia's commitment to mental health and suicide prevention systems reform.

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Project Team

Project Leads
A/Prof Siân McLean, La Trobe University
Prof Matthew Fuller-Tyszkiewicz, Deakin University
Dr Jasmine Fardouly, University of Sydney

Co-Investigators
Prof Adam Bourne, La Trobe University
Prof Marcus Carter, University of Sydney
A/Prof Piers Gooding, La Trobe University
Dr Sharon Horwood, Deakin University
A/Prof Kristelle Hudry, La Trobe University
Dr Hannah Jarman, Deakin University
Prof Hanan Khalil, La Trobe University
Prof Susan Sawyer, Murdoch Children's Institute
Dr Nandi Vijayakumar, Deakin University

Postdoctoral Research Fellows, Research Officer
Dr An Dang, La Trobe University
Dr Scott Fatt, University of Sydney
Ms Ellen Richardson, La Trobe University

Project Manager
Ms Alexandra Aulich, Project Manager, La Trobe University

Research Contributions
Ms Tayarna Bolger, Deakin University
Ms Sarah Bonavia, La Trobe University
Ms Megann Chivers, Deakin University
Ms Mikaela D'Angelo, La Trobe University
Mr Joshua Finn, La Trobe University
Ms Silvia Lin, Deakin University
Mr Callum McAllister, La Trobe University
Ms Ana Julia Rodrigues Ferreira, La Trobe University, University of Bath
Ms Caroline Sarna, La Trobe University
Dr Alexandra Street, La Trobe University
Ms Yujing Shen, University of Sydney

Chapter 1.

Project Consultation: Stakeholder and Expert Groups

Chapter 1. Project Consultation: Stakeholder and Expert Groups

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1.1 Background

Children, adolescents, and young adults, collectively referred to here as young people, have grown up immersed in a world of digital technologies. Digital technologies can be defined broadly and, for the purposes of this project, are considered to encompass a range of electronic tools, systems, devices, platforms, and resources that generate, store, share, and/or process data (Johnstone et al., 2022). Young people use digital technologies in many ways, with potential to play an integral role in their social lives, work, entertainment, and creative expression (Rideout et al., 2022). However, there are growing international concerns about how digital technology use may be linked with adverse mental health outcomes (e.g., Murthy, 2024). Whilst research findings to date have found some evidence of negative impacts of digital technology on young people's mental health, other evidence suggests neutral or even positive effects (Haddock et al., 2022; Valkenburg et al., 2022). These contradictory results arise – at least in part – from differences in methodology used across studies (Thimm-Kaiser & Keyes, 2025), suggesting a need for more nuanced investigations of the links between digital technology and young people's mental health, focusing on specific features of digital technology, mechanisms of effects, and the range of negative and positive mental health outcomes.

The types of digital technologies – and their respective features – with which young people engage are dynamic, shifting over time and across generations according to technological advancements and sociocultural norms (Rideout et al., 2022). Accordingly, collaborative research designs are needed to ensure that the constructs of digital technology that are targeted within research projects are contemporary and relevant. Collaborative research design can also help clarify which constructs of negative and positive mental wellbeing that young people think are most relevant to digital technology use and should be prioritised in research. This is particularly the case for younger children, such as those of primary school age, whose experiences have rarely been considered in the existing research. As such, little is known about which types of digital technologies and features are most used by children.

Similarly, certain subgroups of young people, such as neurodivergent and/or LGBTQA+ youth, may use digital technologies in unique ways. These demographic groups report increased prevalence of both mental health difficulties (Hill et al., 2021; Lai et al., 2019) and digital technology engagement (Cardy et al., 2023; McInroy et al., 2019). Consequently, it is important to engage these groups in consultation for future research priority setting. Collaborative research designs (e.g., co-design, consumer and community involvement through consultation) can help clarify which aspects of digital technology and mental health/wellbeing should be prioritised for different demographics of young people.

In this project, we aimed to better understand which constructs relating to digital technologies and mental health were considered priorities for future research across relevant stakeholder groups, including children, adolescents, young adults, parents of young children, and digital technology and mental health experts. Specifically, we aimed to clarify:

- The digital technologies used by children and young people and to prioritise those that should be examined in future research.

- The most relevant positive and negative mental health correlates and outcomes of digital technology use and to prioritise those that should be examined in future research.
- Potential mechanisms and mediators of the relationship between digital technology and mental health to be examined in future research.
- Identify feasible assessment methods and tools to assess the frequency and extent of engagement with digital technologies for use in future research.

To achieve these aims, we conducted two mixed-methods consultation studies with key stakeholders: 1) a consultation group and online survey with expert researchers and clinicians in related fields, and 2) consultation groups and online surveys with children, adolescents, young adults, and parents of young children, including additional consultation groups specifically for adolescents and young adults who self-identified as either LGBTQA+ or neurodivergent.

Study 1

1.2 Methods

1.2.1 Participants

The consultation group of 10 experts included 1) researchers in the fields of mental health, child and adolescent health and development, social media, digital technology, gaming, law, and research methodologies; and 2) clinicians in the fields of psychology and paediatrics. Participants were all members of the research team for this project.

1.2.2 Procedure

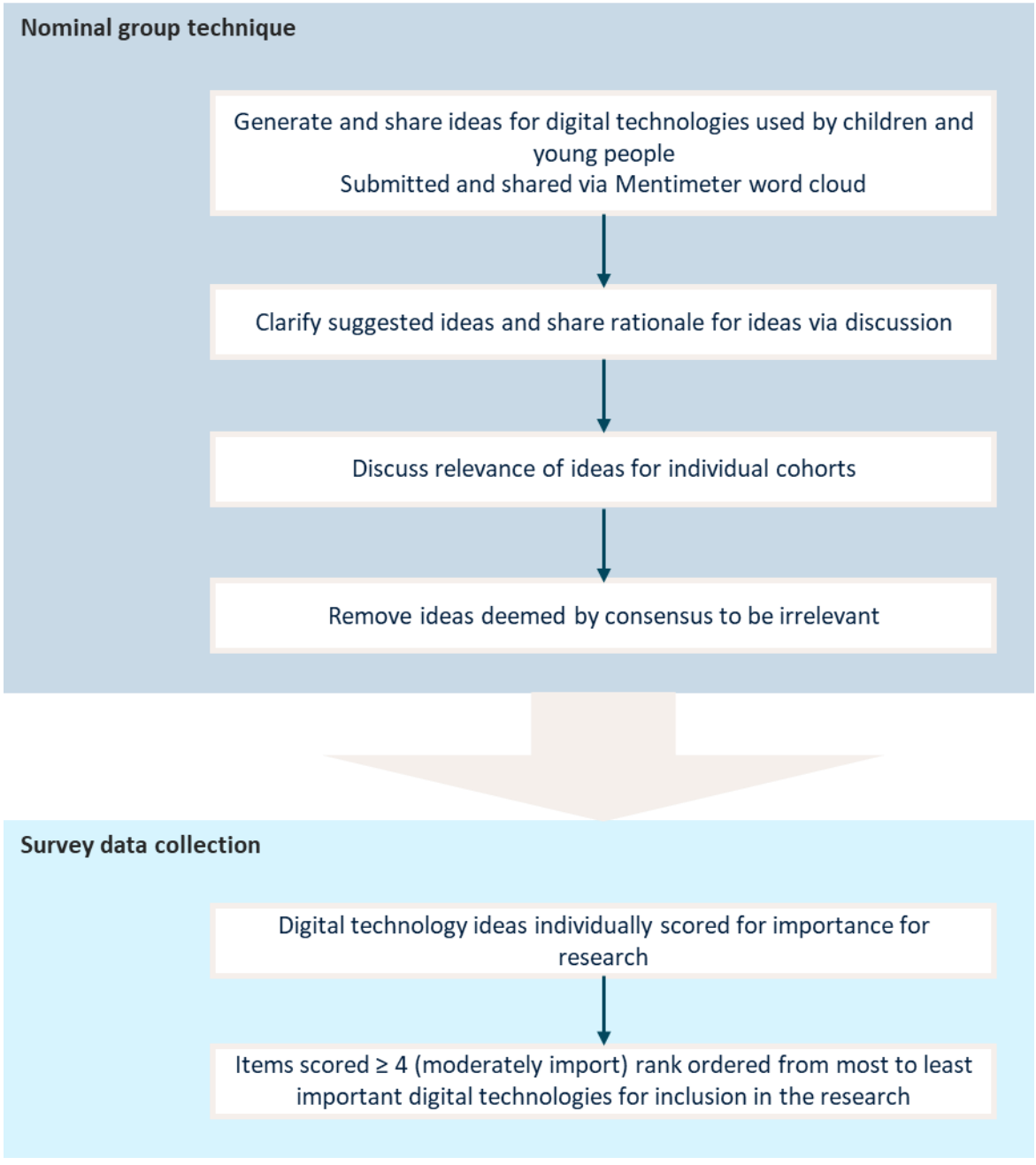
Ethics approval was not required for Study 1 as the consultation group comprised participants contributing their professional expertise for the purpose of guiding the study design and inclusions. Accordingly, ethics approval was not sought and participants were not required to provide written consent to participate.

A single semi-structured consultation group session using the nominal group technique (Manera et al., 2019) was held with the expert participants. The nominal group technique is a consensus method and was used in this project to identify research priorities for the topic areas under investigation in subsequent project stages. This included identifying the 1) digital technologies, 2) features and affordances, 3) positive, 4) negative, and 5) neutral impacts of digital technology use on mental health and wellbeing, and 6) mechanisms linking digital technology use and mental health considered most relevant for young people and which should therefore be prioritised in the future research that comprises the larger project. The session ran for approximately 90-minutes and was conducted online via Zoom with two facilitators (SM and SF). The project manager (AA) was also present to support the running of the session.

The nominal group technique has several phases aimed at promoting diverse ideas and input from all group members (Manera et al., 2019). As shown in Figure 1.1, participants engaged in a structured, facilitated discussion to 1) individually generate, share, and record ideas, 2) clarify suggestions including through discussion of the rationale underlying suggestions, and 3) consider whether any suggestions were not relevant for the target populations to be included in

the future research. The final phase, in which proposed ideas were scored via a survey to generate a priority ordered list of research inclusions, is discussed in more detail below.

Figure 1.1. *Procedure for expert group consultation.*



During the consultation session, for each of the six topic areas, participants were first asked to brainstorm ideas and submit these as text using a collaborative digital word cloud via Mentimeter technology. This technology was used to enable efficient idea generation and sharing within the group format. Figure 1.2 shows an example word cloud generated for the digital technologies topic.

The primary facilitator then led discussion about the generated ideas, including clarification of any vague responses, points of similarity/difference between ideas, and points of relevance/irrelevance for specific demographic groups. During this discussion, participants

could also propose further ideas to add to the word cloud. Discussion of each topic concluded when no further ideas were forthcoming, all participants understood each suggestion, and any ideas identified as potentially relevant were considered and consensus decisions as to their retention or exclusion at this phase were made.

Figure 1.2. *Mentimeter word cloud from ideas generated for digital technologies by expert group.*

Following the consultation group, the second facilitator collated all confirmed ideas and incorporated them into a QuestionPro survey. Participants were then invited to complete the online survey to generate quantitative data identifying which ideas within each research topic should be prioritised for future research. To reduce participant burden and redundancy between responses, similar ideas were synthesised into broader categories (e.g., “Instagram”, “TikTok”, and “YouTube” synthesised into “image/video-based social media”). These categories were derived from the discussions within the consultation group and further discussions amongst a subsection of the research team (SF, AD, ER, SM, JF, MFT). For simplicity, ideas and categories are referred to hereafter as ideas.

In the survey, participants were asked to rate each idea on a 5-point response scale regarding the importance of its inclusion for future research (1 = Not at all important, 2 = Marginally important, 3 = Somewhat important, 4 = Moderately important, 5 = Very important). Participants were also asked to rank order the top 10 most important ideas to be included for future research for each topic. Only ideas rated by participants as moderately important or very important were available to them for rank ordering within the survey. Mean importance ratings were calculated for each item. A modified Borda count was used to combine participants’ rankings by assigning more points to higher-ranked ideas. These points were summed across participants to identify shared priorities while reducing the influence of extreme views. The resulting top-ranked items were reviewed to finalise inclusion. The online survey also asked about methods for tracking the

frequency and extent of use of digital technologies by young people. These data are not reported here but will be reported in Chapter 4: Cross-sectional Survey and Interviews.

1.2.3 Results

The expert co-design session identified 14 possible digital technologies, 24 features, 26 affordances, 14 positive mental health outcomes, 17 negative mental health outcomes, and 57 mechanisms. The top 10 ranked ideas (using the modified Borda count) for each topic area are presented along with their mean ratings in Table 1.1.

Table 1.1. *Top 10 priorities (using the modified Borda count) for each topic area from the expert survey.*

Digital Technologies	Mean (SD)	Priority Ranking
Social media	5.0 (0.00)	1
Smart phone	4.8 (0.42)	2
Social games - gaming consoles/devices, and platforms	4.4 (0.84)	3
Artificial Intelligence	3.6 (1.58)	4
Streaming Platforms/Services	4.1 (0.99)	5
Apps	3.7 (1.57)	5
Online forums	3.5 (1.43)	7
Single-player games - gaming consoles/devices, and platforms	3.7 (1.42)	8
Wearable Devices	3.2 (1.62)	8
Online marketplaces	2.5 (1.27)	10

Features (of Digital Technologies)	Mean (SD)	Priority Ranking
Addictive /persuasive design	4.5 (1.27)	1
Recommendation systems/Algorithms	4.4 (1.01)	2
Advertising	4.2 (1.23)	3
Infinite scroll	4.3 (0.67)	4
Likes	4.0 (1.05)	5
Content viewing	4.3 (0.71)	6
Endless access	4.4 (0.70)	7
Comments	3.8 (1.55)	8
Idealised content (exposure/viewing)	4.3 (0.87)	9
Filters	3.9 (1.20)	10

Affordances (of Digital Technology Use)	Mean (SD)	Priority Ranking
Social connection and community	4.8 (0.63)	1
Exploration (sexuality/identity)	4.3 (0.48)	2
Social norms	4.7 (0.67)	3
Exposure to diversity	4.5 (0.71)	4
Self-presentation (e.g., best/idealised self)	4.1 (0.99)	5
Entertainment / play	3.9 (0.88)	5

Group affiliation/subcultures	4.4 (0.70)	7
Doom scrolling	4.3 (1.06)	8
Checking/monitoring/pickups	4.1 (0.99)	9
Community	4.4 (1.07)	10

Positive Mental Health Experiences	**Mean (SD)**	**Priority Ranking**
Wellbeing	4.4 (0.97)	1
Positive mood	4.3 (1.16)	2
Resilience	3.9 (1.20)	3
Identity (clarification/confirmation of identity)	4.1 (1.29)	4
Support	4.3 (0.67)	5
Life satisfaction	4.1 (1.10)	5
Self-esteem	3.7 (1.16)	7
Learning/knowledge	4.2 (0.92)	8
Joy	3.9 (1.29)	9
Body appreciation	3.5 (1.51)	9

Negative Mental Health Experiences	**Mean (SD)**	**Priority Ranking**
Loneliness	4.6 (0.70)	1
Anxiety (including social anxiety)	4.3 (0.95)	2
Body dissatisfaction/body image concerns	4.3 (0.82)	3
Depression	4.2 (0.92)	4
Self-harm and suicide	4.7 (0.67)	5
Poor self-regulation	3.9 (0.99)	6
Sexualisation	4.6 (0.52)	7
Eating disorders/ disordered eating	4.2 (0.92)	7
Sexual harm	4.4 (0.84)	9
Social media addiction	4.4 (0.97)	10

Mechanisms	**Mean (SD)**	**Priority Ranking**
Displacement of other activities/processes	4.2 (1.03)	1
Bullying	4.2 (1.03)	2
Access to support and resources	4.5 (0.85)	3
Social comparison	4.2 (0.79)	4
Social support/connection	4.7 (0.48)	5
Digital literacy	3.6 (1.08)	6
Exposure to harmful/hateful content	4.3 (0.82)	7
Discovery/exploration	3.8 (0.63)	8
Sleep	4.1 (0.99)	9
Idealisation/internalisation of ideals	4.0 (0.82)	9

Study 2

1.3 Methods

1.3.1 Participants

Participants for Study 2 (our stakeholder consultation) were children, adolescents, young adults, and parents from the community. There were nine consultation groups, including:

- **Parents**: 1x group of parents of children aged 5-12 years.
- **Children (aged 10-12 years):** 1x group.
- **Adolescents (aged 13-17 years):** 1x group of adolescents, 1x group of neurodivergent adolescents, and 1x group of LGBTQA+ adolescents.
- **Young adults (aged 18-25 years):** 2x two groups of young adults, 1x group of neurodivergent young adults, and 1x group of LGBTQA+ young adults.

The proposed sample size for the consultation sessions reflected requirements for use of the nominal group technique and qualitative analyses. It is recommended to conduct the nominal group technique with 6-8 participants per group (Manera et al., 2019). However, as the technique can be used with groups of fewer than six participants, we planned to form smaller groups for our child and adolescent participants as younger participants may need more time to formulate responses due to their developmental stage. We originally intended to run two adolescent groups (i.e., 10 planned groups); however, we were only able to recruit enough participants for one group. The overall sample size across the 10 planned groups was considered appropriate to generate sufficient data richness for qualitative data analysis. Moreover, the lived experience of participants was also expected to enhance the information power of the qualitative data, meaning that gathering the minimum sample size, or even slightly smaller groups than planned, can still provide valuable insights.

Participants were recruited via social media advertising, and the research team's existing contact lists and pre-existing advisory groups relevant for each demographic group. Potential participants were invited to submit an expression of interest (EOI) to participate in the consultation sessions. The EOI surveys included information about the study and collected demographic data to determine eligibility. To be eligible, participants needed to be in the relevant age group, use at least one form of digital technology, and live in Australia. For parents, the inclusion criteria needed to be met for at least one of their children. Participants could also indicate that they identified LGBTQA+ and/or neurodivergent. Ineligible respondents were notified immediately within the screening survey. The EOI survey also included free-text responses (e.g., "why you are interested in being a member of this Co-design Forum Discussion group"), which were used to identify potential spam/bot responses. The research team reviewed each EOI to determine who would be invited to participate in the consultation groups, with an aim to maximise demographic variability across the groups. A total of 219 EOIs were received, 68 people were invited to participate, and a final sample of $N = 52$ participated across the nine consultation groups.

1.3.2 Demographic profile of the participants

As shown in Table 1.2, males and females were recruited across all age groups, though there was a higher representation of females, specifically of parents and in the young adult groups. Participants represented young people aged 5-25 years, although we were unable to recruit any young people who were 12 years or 18 years old. Parent participants' ages ranged from 35 to 41. All states and territories were represented except Western Australia and the Northern Territory, with most participants from Victoria (55%) or NSW (33%). All participants lived in major cities (87%) or inner regional areas (13%). The most common ethnicity was White (44%), followed by Asian (34%), Mixed (10%), Middle Eastern (8%), and Aboriginal and/or Torres Strait Islander (4%). Amongst the young adult and parent groups, there was an overrepresentation of participants who were studying/studied at university/higher education (91.7%, 100%, respectively) versus Australian census data (Australian Bureau of Statistics, 2025).

Table 1.2. *Demographic characteristics of stakeholder consultation group participants.*

Group	N	Age range*	Gender
Parents of children aged 5-12	8	5 - 10*	75% women; 25% men^
Children aged 10-12	6	10 - 11	50% girls; 50% boys
Adolescents aged 13-17	7	14 - 17	57% girls; 43% boys
Neurodivergent adolescents aged 13-17	5	13 - 16	40% girls; 60% boys
LGBTQA+ adolescents aged 13-17	2	14 - 15	100% transgender
Young adults aged 18-25	11	19 - 25	82% women; 9% men; 9% non-binary
Neurodivergent young adults aged 18-25	6	19 - 25	55% women; 16% men; 16% male-non-binary-trans; 16% not indicated
LGBTQA+ young adults aged 18-25	7	19 - 24	14% women; 29% transgender men; 29% non-binary; 14% transgender-non-binary men; 14% agender

*Note. N = participant numbers per group; * age range of the children of parent participants; ^ gender of the parent participants*

1.5.3 Procedure

The study was approved by the La Trobe University Human Research Ethics Committee (approval number HEC25177). The research was conducted in accordance with the Declaration of Helsinki and all participants (and/or their parent/guardian if under the age of 18 years) provided informed consent prior to participation.

Each semi-structured consultation group ran for approximately 90 minutes via Zoom with two facilitators. One facilitator led the discussion and the second facilitator attended to technical requirements and supported participants engaging with the technology of the Zoom room and Mentimeter interface.

Similar to Study 1, the nominal group technique (Manera et al., 2019), as described above, was used to guide the group discussion and data collection processes. For each topic area, participants first individually brainstormed responses via a Mentimeter word cloud, followed by a facilitated discussion about similarities/differences between the ideas and the relevance of

each idea (see Appendix 1.A for the full question guide). At the end of the discussion period within the group session, participants were asked to complete an online survey, rating and voting for whether each of the generated ideas should be included in future research.

The topic on mechanisms was deemed a technical topic that was likely to be less well understood by non-experts and so it was not included for these consultation groups. Similarly, the concept of features was considered overly complex for the child group and so was not included. Instead, to ensure that data were collected on the ways in which young people and parents of children perceived digital technology use and mental health to be linked, the group discussion explored the reasons participants thought that positive and negative mental outcomes should be included in research on the impacts of digital technology use. These responses are explored in our qualitative analyses below.

Prior to the stakeholder consultation sessions, a pilot consultation group was conducted with a small group of young adults to trial the procedure and seek feedback on the questions, format, and timing. We received feedback that the topic area of neutral experiences was confusing because no experience was considered neutral for all people at all times, and so this topic was omitted for the stakeholder consultation sessions. This also allowed for greater discussion time for the four remaining topic areas: 1) digital technologies, 2) features, 3) positive experiences with digital technology, and 4) negative experiences with digital technology.

The word cloud prompts, discussion prompts, and survey questions used in the consultation groups were the same across demographic groups, except for minor changes in wording (e.g., "people your age", "LGBTQA+ people your age", "children aged 5-12"). To elicit a broader range of responses and reduce the likelihood of sharing of direct personal experiences, participants were encouraged to think not just about their own experiences but also about the experiences of their friends and peers. The pilot group also gave feedback on ways to make the groups more engaging for young people, leading to wording changes for some of the prompt questions, increased time for participant introductions to encourage participants to actively engage in the discussion (e.g., use of an ice-breaker activity), and limiting time spent "sharing screen" by the facilitator - which was seen as disruptive to the flow of discussion.

The online survey, in which participants provided ratings and rankings of importance of ideas generated by discussion, was conducted via QuestionPro, a secure online survey platform. Participants were asked to rate each idea on a 5-point response scale regarding its inclusion for future research (1 = Definitely remove, 2 = Probably remove, 3 = Not sure, 4 = Probably keep, 5 = Definitely keep) and to vote on their top 5 ideas for each topic area. To reduce time burden and redundancy, similar ideas were synthesised by the facilitators into broader categories (e.g., "Instagram", "TikTok", and "YouTube" synthesised into "image/video-based social media") based on the findings from Study 1 and discussion within the consultation group itself. Thus, the survey items were specific to the ideas generated within each group, rather than a standardised list. After completing the survey, participants were thanked for their time, provided information for relevant supports in the event of any distress, and informed that they would receive a digital gift card ($20 for children; $50 for adolescents and young people; $100 for parents) within the next two weeks as a thank you for their participation.

1.4 Analyses

The study was a mixed-methods design, including both qualitative and quantitative analyses. Each consultation group was audio- and video-recorded and then transcribed using Zoom's features. The transcripts were then checked against the audio recordings and edited where necessary by two researchers, at which stage the live text chats were also integrated into the transcripts.

1.4.1 Quantitative Analysis

The online survey responses were analysed via descriptive statistics, including mean ratings and vote percentages for each idea. Responses from the two young adult groups were combined when both groups identified a similar idea. However, when an idea was identified by only one young adult group, mean ratings and vote percentages were calculated exclusively using that group's data. Within each topic area (digital technologies, features, positive experiences, negative experiences), the ideas were ranked for each consultation group based on their vote percentage. For ideas with the same vote percentage, mean ratings were used to determine the ranking.

We have reported the top 10 ranked ideas for each topic area and each individual consultation group in Appendices 1.B – 1.I. However, we were also interested in whether priority rankings were similar between the different consultation groups for a particular age cohort (i.e., children, adolescents, young adults). Although the ideas generated, and thus voted on/rated, for each group were slightly different, AD, ER, SF, SM, JF, and MFT discussed and identified broader categories of similar ideas which allowed for these comparisons to be made between groups (e.g., comparing "being made fun of" [children] and "cyberbullying [parents of children]). We have presented Tables 1.3 – 1.5 comparing the top 5 highest-ranked ideas across each of the children groups, adolescent groups, and young adult groups, respectively.

1.4.2 Qualitative Analysis

An inductive-deductive approach was employed, drawing on principles from reflexive thematic analysis (Braun & Clarke, 2019, 2022). This allowed for the development of rich and meaningful codes directly from the data, while also using existing theory and concepts as a lens to interpret and make sense of data. Reflexive thematic analysis was chosen based on its flexible and versatile process, interpretative approach, and potential to support identifying patterns (theme, categories) across the data (Braun & Clarke, 2020, 2022).

Coding was carried out at both semantic (i.e., descriptive/ surface) and latent (i.e., conceptual/implicit) levels (Braun & Clarke, 2022). The coding process centred on capturing the links or mechanisms that participants described as shaping their mental health experiences from digital technology use, in either positive or negative ways, to develop a defined list to inform later stages of the project. Mechanisms were defined by the researchers as mediators in the relationship between digital technology and mental health/wellbeing outcomes, based on the participants' beliefs and perceptions rather than prior research. The purpose of the thematic analysis was to explore these potential mechanisms and why or how they linked the relationship between digital technologies and wellbeing outcomes, according to participant perceptions.

Qualitative data analysis was conducted by two researchers (AS and ER) through the data familiarisation and coding stages; the theme development stage was conducted by ER with oversight from MC. Through the coding process, AS and ER refined the initial set of codes to ensure alignment with the research aims (i.e., identifying mechanisms/ mediators), and reduce redundancy or overlap. This included incorporating more of the 'why' into the definition of mechanisms, similar to what was presented to participants (e.g., "Why do you think digital technology impacts [outcome]?") and removing codes that more closely resembled moderators rather than mediators. Theme development focused on narratively explaining why or how the mechanisms (the codes) were linked to the relationship between digital technology and mental wellbeing and focused on an inductive approach led by participant responses.

1.5 Results

1.5.1 Quantitative analyses

Children Aged 5-12 years

The child group (with participants aged 10-12 years) identified 13 digital technologies, 8 positive mental health experiences, and 15 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.B. The parent group identified 14 digital technologies, 12 features, 15 positive mental health experiences, and 22 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.C. Table 1.3 presents the ideas which received a top 5 priority ranking for either the children or the parent group.

Table 1.3. *Ideas which received a top 5 ranking for either the child or the parent consultation groups.*

	Priority Ranking	
Digital Technologies	**Children***	**Parents of Children**
Creative Gaming (Roblox, Minecraft…)	1	1
Gaming consoles and devices (Xbox…)	1	5
Hand-held devices (phones, tablets, iPads…)	(6)	2
Movie/TV	(6)	3
Long-form video (YouTube Kids, YouTube)	(9)	3
Messenger apps (Messenger, WhatsApp, Microsoft teams…)	1	(8)
Short-video social media (Instagram, TikTok, YouTube shorts…)	1	-
Multiplayer games (FPS…)	1	-

Features (of Digital Technologies)	**Children**	**Parents of Children**
Scrolling down/swipe	-	1
Photo filters/effects	-	2
Skip ads/skip button on YouTube	-	3
Microphone	-	4

Reward system (unicorn, badges)	-	5

Positive Experiences	Children	Parents of Children
Social connection, social bonding/socialising	2	5
Sense of accomplishment	(6)	5
Enjoyment	1	(7)
Learning or educational engagement and research	-	1
Access to Information /exploring information	-	2
Creativity and self-expression	-	3
Increase problem solving skills	-	4
Zone out/escape reality	5	-

Negative Experiences	Children	Parents of Children
Inappropriate or harmful content (e.g., adult themes)	1	2
Cyberbullying	2	3
Anger	(6)	5
Addiction	-	1
Lack of exercises or physical activities (sedentary lifestyle)	-	4
Online disputes	4	-

Note. Priority rankings were determined first according to vote percentage, then mean rating score. This table presents the five highest ranked ideas for each topic area for each consultation group. If a group voted separately on two similar ideas (e.g., "enjoyment" and "fun"), only the priority ranking for the highest scoring idea has been reported. Priority rankings outside of the top 5 have been included in brackets for ideas that were ranked in the top 5 for another group in that same age demographic. * The children consultation group did not discuss "features" and were not asked to "rate" the responses, only to select their top 5.

Adolescents Aged 13-17 years

The adolescent group identified 12 digital technologies, 11 features, 13 positive mental health experiences, and 13 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.D. The neurodivergent adolescent group identified 11 digital technologies, 9 features, 6 positive mental health experiences, and 6 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.E. The LGBTQA+ adolescent group identified 6 digital technologies, 8 features, 6 positive mental health experiences, and 5 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.F. Due to the low number of LGBTQA+ adolescent participants (*n* = 2), participants were asked to select only their top 3 ideas, rather than a top 5, as fewer ideas had been generated by the two participants than were typically generated in groups with a

higher number of participants. Table 1.4 presents the ideas which received a top 5 priority ranking for any of the adolescent groups.

Table 1.4. *Ideas which received a top 5 ranking for any of the adolescent consultation groups.*

	Priority Ranking		
Digital Technologies	**Adolescents**	**ND Adolescents**	**LGBTQA+ Adolescents**
Image/video-based social media	1	1	1
Hand-held devices	2	2	5
Interest-based Forum (e.g., Discord)	4	3	2
Messenger apps	3	(7)	-
Search engines	5	(9)	-
Audio devices	-	4	(6)
Desktop devices	(12)	5	-
Artificial intelligence	(6)	-	-
Features (of Digital Technologies)	**Adolescents**	**ND Adolescents**	**LGBTQA+ Adolescents**
Chat/messaging	3	1	1
Comments, Respond	2	3	-
Likes, Dislikes, Emojis, React	1	(6)	-
Share	5	2	-
Short-form video	-	5	4
Posting	(8)	-	5
Do not disturb	-	4	-
Positive Experiences	**Adolescents**	**ND Adolescents**	**LGBTQA+ Adolescents**
Connection	1	1	2
Entertainment, Fun	3	3	(6)
Research, learning, education	(10)	2	5
Cooling off, switching off, Relief, Relaxing	5	-	1
Interests	(12)	4	-
News	2	-	-
Convenience	-	(6)	-
Negative Experiences	**Adolescents**	**ND Adolescents**	**LGBTQA+ Adolescents**
Addiction	(10)	2	2
Bullying, hate	1	3	-
Misinformation	(12)	-	1
Isolation	(9)	5	-
Cancel culture	2	-	-

Insecurities	3	-	-
Extreme views	4	-	-
Over consumerism	5	-	-
Risk taking	(8)	-	-
Poor oversight/moderation	-	1	-
Being too anonymous	-	-	4

Note. ND = neurodivergent. Priority rankings were determined first according to vote percentage, then mean rating score. This table presents the five highest ranked ideas for each topic area for each consultation group. If a group voted separately on two similar ideas (e.g., "enjoyment" and "fun"), only the priority ranking for the highest scoring idea has been reported. Priority rankings *outside of the top 5* have been included in brackets for ideas that were ranked in the top 5 for another group in that same age demographic.

Young Adults Aged 18-25 years

The two young adult groups together identified 21 digital technologies (9 in both groups, 12 in one group only), 18 features (6 in both groups, 12 in one group only), 19 positive mental health experiences (6 in both groups, 13 in one group only), and 15 negative mental health experiences (7 in both groups, 8 in one group only). The 10 highest ranked ideas for each topic are presented in Appendix 1.G. The neurodivergent young adult group identified 23 digital technologies, 18 features, 18 positive mental health experiences, and 28 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.H. The LGBTQA+ young adult group identified 18 digital technologies, 18 features, 11 positive mental health experiences, and 22 negative mental health experiences, with the 10 highest ranked ideas for each topic presented in Appendix 1.I. Table 1.5 presents the ideas which received a top 5 priority ranking for any of the young adult groups.

Table 1.5. *Ideas which received a top 5 ranking for any of the young adult consultation groups.*

Digital Technologies	**Young Adults**	**ND Young Adults**	**LGBTQA+ Young Adults**
Image/video-based social media	1[a]	1	3
Hand-held devices	3[a]	2	1
Text-based social media	(6[a])	2	(6)
Gaming platforms	4[c]	(9)	5
Artificial intelligence	2[c]	-	2
Messenger apps	(7[a])	5	-
Productivity-based apps	5[b]	(7)	-

Features (of Digital Technologies)	**Young Adults**	**ND Young Adults**	**LGBTQA+ Young Adults**
Endless scrolling/automatic scrolling	1[a]	3	5
Communication (Chat, group chats)	3[a]	2	4
Algorithm	2[c]	4	2
Share	(6[a])	1	(14)

Reactions (e.g., like) and comments	(6[a])	(6)	1
Posting	5[b]	-	(8)
Block, report	(13[a])	-	5
Favourite/Save	-	5	-

Positive Experiences	**Young Adults**	**ND Young Adults**	**LGBTQA+ Young Adults**
Social connection	1[a]	1	1
Assistance	(10[b])	3	2
Education, learning	5[a]	(7)	(7)
Sharing ideas, activism	(6[a])	(14)	2
Hobbies and interests	-	2	5
Entertainment and fun	(9[a])	5	-
Self-expression	2[c]	(7)	-
Relaxation, distraction	3[a]	-	-
News	4[b]	-	-

Negative Experiences	**Young Adults**	**ND Young Adults**	**LGBTQA+ Young Adults**
Loss of time, addiction, distraction	2[a]	1	2
Overstimulation, constant connection	(8[a])	4	5
Bullying, hate, discrimination, gender-based violence	(7[a])	5	(9)
Fear of missing out	5[a]	(7)	(19)
Misinformation	(6[a])	-	1
Exposure to negative news	-	(11)	3
Comparison	1[b]	(17)	-
Materialism	(9[a])	3	-
Body image concerns	4[a]	-	-
Unsafe interactions with strangers	3[c]	-	(6)
Echo chamber	(10[c])	-	4

Note. ND = neurodivergent. Priority rankings were determined first according to vote percentage, then mean rating score. This table presents the five highest ranked ideas for each topic area for each consultation group. If a group voted separately on two similar ideas (e.g., "enjoyment" and "fun"), only the priority ranking for the highest scoring idea has been reported. Priority rankings outside of the top 5 have been included in brackets for ideas that were ranked in the top 5 for another group in that same age demographic. [a]Responses from the two sessions with 18-25-year-olds combined. [b]Responses from Group 1 only; [c]responses from group 2 only.

1.5.2 Qualitative results

Using reflexive thematic analysis, a total of seven themes were developed to a) identify perceived links between digital technology use and mental health (discussed as mediators or mechanisms underlying these relationships in the expert group) and b) explore how and why

these mechanisms contribute to this relationship and why they are key contributing factors to overall outcomes. Participant data were de-identified and each was assigned a code (e.g., 'P1')[1]. Direct quotes from participants below are presented with only minor edits for grammatical clarity.

Theme 1. Social Influence

This theme captures young people's experiences of digital technologies as socially evaluative spaces in which social commentary, comparisons, and perceived norms shape attitudes, behaviours, and mental health. Participants discussed how digital technology facilitates greater visibility of what people (both friends and strangers) are doing, and how this can shift attitudes and behaviours; "...people go in the comment sections and see what other people are saying, and their opinion is actually influenced by the people that are commenting...." (P3, 13-17 adolescent).

Young people identified several mechanisms relating to social influence, such as social comparison ("You're also anxious and stressed because you frequently compare and say that, I'm not there yet, at this stage of my life, and everyone else seems to be living it up on social media." [P5, 18-25 neurodivergent adult]) and the promotion of unrealistic/idealised standards ("Celebrities have hidden their surgeries. So people think that this sculpted body is obtainable and get insecure that they can't achieve this look." [P3, 18-25 adult G1]). Participants also noted how digital technology is often used to shape and enhance one's self-presentation to align more closely with social norms (e.g., "I think that with women, the culture of sharing photos, and being curious about other people's lives is possibly a bit more pronounced." [P3, 13-17 adolescent]). These mechanisms were often, but not always, discussed as leading to negative mental health outcomes.

Sub-theme 1.1. Pressure/expectations

A sub-theme of this social influence was how participants often reported a sense of social pressure attached to their digital engagement. Participants expressed feelings of pressure being both explicit and/or implicit as well as external and/or internal. They discussed mechanisms such as a pressure to stay active online (e.g., "...I think there is a real expectation to have a certain kind of digital presence." [P1, 18-25 LGBTQA+ adult]), pressure to keep up with trends (e.g., "...there's just so many people that as soon as the trend changes to the next thing, then suddenly all of them have it." [P1, 18-25 neurodivergent adult]), and pressure to align with the majority opinion (e.g., "...you might say something on social media, and you could end up with so many people responding to your comment being like, 'no, that's wrong'." [P1, 13-17 adolescent]).

Participants also discussed how these pressures to stay engaged online can facilitate a fear of missing out ("...you just become thinking that maybe you're the only one missing out..." [P5, 18-25 neurodivergent adult]). These mechanisms were frequently linked to feelings of anxiety or stress.

[1] Participant quotes are presented with their participant number alongside their consultation group identifier; the 18-25 cohort were split across two groups represented as 18-25 adults G1 and 18-25 adults G2.

The constantly evolving social expectations of the online space were also discussed as a key mechanism by which digital technology use can lead to negative mental health outcomes for young people:

> It's sort of, like, an entire other world of social etiquette and expectations... [but] there's no consistent idea of what those actually are. For example, people just use social media differently, like some people will like every story you post, some people don't at all, and it's sort of inconsistent, and I think that can be a source of anxiety, because it makes it even more sort of unclear, I guess, what's going on with social stuff. (P3, 18-25 adult G2)

Theme 2. Unlimited Connection

The ability and opportunities to connect through digital technology to an extent not previously available was discussed as an important facilitator of positive wellbeing. Participants commented that there are no limits or boundaries on how they connect, where they connect, or who they can connect with via digital technology, creating a sense of unlimited connection; "You're just not limited by geography in what's going on." (P1, 18-25 neurodivergent adult). Mechanisms related to maintaining, developing and enhancing personal connections were central within this theme (e.g., "...it's a good way to communicate, keep in touch with friends" [P3, 18-25 adult G1]; "...you have these people that have mutual interests, but [who you otherwise would] not be able to come into contact with..."[P3, 13-17 general]). This was particularly important for young people who may typically be at a disadvantage when communicating:

> When you're talking face to face you have to kind of say words on the spot, it's not online where it's just a text like, you've got time to reply when you're texting. You've got time to think what you're gonna say. (P2, 13-17 neurodivergent adolescent)

Digital technologies were also seen as tools for connection which can then provide new avenues for joy and entertainment. Participants discussed being able to connect not only directly but also indirectly with other online users.

> "There's also watching people... just watching people have fun is entertaining, watching people do the same thing you did, but differently... It's like you play this game and now you watch other people play this game, and you can see the differences in the decisions they made, and that for me, that is entertaining." (P2, 13-17 LGBTQA+ adolescent)

Online communities allowed young people to find like-minded others, which may be more difficult in offline interactions; "I know there are people who don't have an accepting family and allowing them to talk to people who do accept them is really, really important." (P1, 13-17 LGBTQA+). This connection also allows access to support and services that might otherwise be inaccessible:

> Another thing is that it's made telehealth and like online counselling more accessible. Because I know, for example, if you're depressed, it's going to be a lot harder for you to actually get up and go to counselling instead of just opening your laptop. Same with like, if you have mobility issues, or if you don't have a car or that sort of thing. (P3, 18-25 adult G1)

Theme 3. Digital saturation and overload

In theme three, participants discussed how aspects of digital technology which might otherwise be positive could quickly become "too much" and overwhelming, leading to negative outcomes. Participants discussed feeling there were too many things to keep on top of (e.g., "Oh, I think we're getting too much entertainment out of it. Because, like, there's so many forms, videos, uh videos, education, reels and, and so many other types of content that keeps us entertained." [P1, 18-25 adult G1]). They also discussed how the unlimited connection digital technology affords feel like being "bombarded" with content, information, and platforms (e.g., "...group chats can be really overwhelming and like, 'Oh, look! Oh, my god cute dog! Oh, my gosh, look! Oh, my god, sparkling rainbow!' everything." [P2, 13-17 neurodivergent adolescent]). Another commonly expressed explanation for why digital technology can be overwhelming related to being exposed to an unmanageable quantity of information:

> ...And I think if people are spending kind of, you know, all day on their phone, especially consuming short form content and just taking in a lot of information. I don't think the brain is supposed to take in that much information per day, and then, especially if you're sort of cut off from the people around you, and you don't really have a lot of people to talk about that information with, I can't imagine that the long-term impacts of that are very good. (P3, 18-25 adult G2)

This sentiment was particularly expressed by the 18-25 age groups, who expressed that being exposed to the "24-hour news cycle" was a real drain on their mental health (e.g., "...having that endless feed of *that*, just constantly whenever you pick up your phone and go into an app, it can just, drain you." [P3, 18-25 LGBTQA+ adult]). An adjacent idea was that many online conversations that quickly devolve into a "negativity spiral" can also be perceived as relentless:

> Constant exposure to things that are activating/rage-inducing feels sucky, especially for a community that has plenty of struggles in our regular life - is it actually helping us to tap into that anger/negative feeling all the time? Like, is it doing any good, or mostly just making us feel bad with nowhere to put that bad energy? (P1, 18-25 LGBTQA+ adult)

Theme 4. Identity and self-development

This theme captures how digital technologies were perceived as spaces where people could potentially explore, express, and develop their sense of self and identity, which was seen as protective for emotional wellbeing. In relation to development this was tied to opportunities for growth and achievement, eliciting a variety of positive emotions ("you feel happy and good when you get a reward, or win." [P3, 10-12 child]).

Participants discussed different ways in which digital technology is an important tool to support the development and expression of a strong personal identity for today's young people:

> ...like people know [classmate] literally for using her social media platforms... like she uses the features to encapsulate her view or stance on something like she does it all the time, and it's really impactful, because now she's known for that. (P5, 13-17 adolescent)

Importantly, mechanisms afforded by digital technology such as self-expression, were discussed as key links in the relationship between digital technology and positive wellbeing ("...sometimes

in real life you're limited by the people around you, in how much you can authentically express yourself." [P2, 18-25 adult G2]).

Furthermore, young people – particularly those from marginalised populations - valued features that allowed them to curate and control their online self-presentation, offering a safe space to explore their developing sense of self and identity (e.g., "I have a completely different identity on the Internet than what I present in real life to protect myself." [P1, 13-17 LGBTQA+ adolescent]).

Theme 5. The 'virtual' vs the 'real' world

The fifth theme focused on how experiences in the virtual world can overlap with, displace, and interfere with young people's offline lives, potentially leading to negative tangible and emotional consequences. Participants expressed beliefs that there was a 'virtual' versus 'real' world, and that when the virtual replaced reality, it could have negative impacts on young people's daily life and wellbeing; "...the addiction is leading towards so many negative things like loss of appetite, insomnia, you know, the school grades are affecting, so personal life is affecting, isolated, away from parents, away from siblings and less socializing." (P2, parent of 5-12). Participants also discussed how the virtual world could still have real world consequences, such as by putting them at financial risk (e.g., "...people can spend actual, like real money, to be able to lose money and gamble." [P4, 13-17 adolescent]) or deteriorating functioning ("When you're spending all of your time online using that specific set of social skills, your real-life social skills can atrophy quite quickly." [P5, 18-25 LGBTQA+ adult]).

Participants also raised how digital technology can be an inferior replacement to real-world processes (e.g., "I think it [digital technology] is an easy way to feel like you are doing things and being involved but it's not the same." [P1, 18-25 neurodivergent adult]). This extended to sentiments that the convenience offered by digital technology could be detrimental in the long-term and that people may become susceptible to an "over-reliance" on technology.

> ...But if you have ChatGPT doing all the reading for you, or summarizing for you... You may achieve very high score during that semester, but after that it's just like... you don't have, like the emotional or the connection with the material for a very long time. (P1, 18-25 adult G1).

Young people expressed that even with the positives that digital technology can bring, the physical world needed to remain as their priority (e.g., "You can also go too far with [spending time online]. And you can't escape from reality entirely... It's important to help and... not be so escaped that you can't bring yourself back down." (P2, 13-17 LGBTQA+ adolescent).

Theme 6. Online facilitated exposure

Participants discussed how, often due to the unlimited connection it offers, digital technology also facilitates exposure to ideas and content that young people may have otherwise not been exposed to. For example, within their physical communities young people may only be exposed to people similar to themselves, but the internet and particularly social media allows people to interact with a diverse range of people outside of that existing community (e.g., "Sometimes your first instance of interacting with a queer person or someone with mental health issues for example, is actually seeing someone from that space talking about their lived experience and

representing themselves." [P4, 18-25 LGBTQA+]). It also creates an avenue for being exposed to new things that they may otherwise have never known about (e.g., "...there's a lot of opportunity on social media to find new things that you've never done before..." [P2, 13-17 general]). Participants also discussed about how digital technologies have become the main way in which young people are exposed to a range of new ideas and perspectives (e.g., "There are a lot of people who might never have the opportunity to access information about queer people, especially, but really any kind of issue social justice stuff, [without digit tech]." [P1, 18-25 LGBTQA+"].

Sub-theme 6.1: Exposure to harm

While exposure was otherwise discussed as a neutral-to-good experience, there were significant beliefs about how digital technology can lead to negative mental health outcomes through exposure to harmful content and hurtful experiences. Participants spoke about the potential for both direct harm and passively witnessing harm or negative behaviours. This included discussions about online bullying and harassment, which was prevalent across age groups, but differed in presentation for pre-adolescents (e.g., "...they start bullying you for being like lower than them on a [game] level, or a little bit badder at the game than them." [P4, 10-12 child]) compared to young adults ("But people definitely abuse [dating apps] to sexually harass people and do like unwanted things to people, and that's really bad, or like it's used to facilitate in real life violence as well." [P2, 18-25 neurodivergent adult]). Young people were also concerned about experiencing stress or trauma vicariously through 'trauma-dumping', for example:

> I've had, like, random people just reach out to me and just share their whole life story unprompted. And that has an effect on my mental health, because then, you know, I'm 18 years old, and suddenly I feel responsible for the mental health of this, like, 28-year-old woman going through a divorce, or whatever, which can feel really stressful and overwhelming. (P2, 18-25 adult G2)

General beliefs were expressed that the internet exposed people to a variety of potentially dangerous or anti-social behaviours; "...most social media sites, even the best ones, have a scarily large population of people either being mean or just... doing stupid stuff or watching stupid things that is not good for them or good for anyone." (P1, 13-17 neurodivergent). In several cases, discussions of exposure to harm aligned with recognition of anonymity as an affordance of digital technology; in that the dangers could be elevated when "you don't know who you could be talking to" (P5, 13-17 adolescent). There was a shared sentiment across groups that "People are nasty on the internet :(" (P2, 18-25 adult G2), and this can have serious negative impacts on mental health. Specific concerns were also raised about young people's exposure to risky or harmful behaviours (e.g., "I think technology can be bad - some games and apps contain features that resemble gambling, violence, etc." [P6, parent of 5-12]).

Theme 7. Turning your brain off

The seventh theme focused on how digital technology can facilitate mindless behaviour that requires minimal internal resources, allowing temporary disengagement from cognitive and emotional demands; "you get to turn your brain off" (P3, 18-25 adult G1). Participants discussed various features (e.g., algorithms) of digital technologies which promote this passive

engagement; "Like you go on TikTok, you know that you're probably gonna see stuff you like, cause your algorithm, and it doesn't require anything from you like, you can just sit there and scroll." (P2, 13-17 adolescent).

Participants sometimes described this process as beneficial for mental health, particularly when used as a low-effort coping strategy for stress (e.g., "if you have a long day, and you just wanna sit at home with the TV on, and then just watch some Netflix show just to pass the time" [P1, 18-25 adult G1]; "It's what I do when I just really need a break. I just scroll until I feel better." [P1, 13-17 LGBTQA+ adolescent]). However, there was also some discussion about this coping strategy having detrimental impacts on young people's mental health, such as from zoning out of for too long or becoming detached (e.g., "For the zoning out of life, sometimes when you zone out of life for a bit too long, after that you might feel lonely and forget about everything you did before." [P1, 10-12 child]). Similarly:

> I feel like liking things on social media is really, I don't know what the word is, but it's very detached? Like if you're scrolling through your For You page, or like, Discover page, or whatever, you just like things without thinking a lot of the time. (P1, 13-17 adolescent)

This detachment was also associated with losing a sense of time (e.g., "You can't even pinpoint how long or like what you even spent your time on when you were on the app for supposedly 2 hours and 30 minutes, it doesn't connect in your head." [P6, 18-25 LGBTQA+ adult]). This was particularly linked to impacts on concentration and disruption of other activities. Moreover, the passivity of digital technology engagement was perceived to make active choices that would have long-term benefits for young people feel more difficult to enact; "It's the easiest thing to do, which just stops people from doing other things... You don't have to make any decisions you just start doing that instead." (P1, 18-25 neurodivergent adult).

1.6 Finalising the included constructs for the DigiT Project

Two online meetings were conducted with SM, JF, MFT, SF, AD, and ER to compare the findings from Studies 1 and 2, and to make a finalised list of constructs which could feasibly be included in the subsequent stages of the broader DigiT Project – including the systematic literature reviews, longitudinal data analyses, and cross-sectional survey. The discussion in the meetings, led by SM, aimed to identify the most important ideas by comparing quantitative rankings across the two studies and the mechanisms identified in the qualitative analyses of Study 2. The group also clarified the categorisation for some of the constructs. This was mostly related to differentiating between mechanisms, affordances, and mental health experiences, which were often grouped together in the stakeholders' responses in Study 2 (e.g., changing "social connection" from a positive mental health experience to a mechanism).

There was a high level of overlap in the findings between the expert and stakeholder groups, with the finalised list of included constructs reported in Table 1.6. The few differences observed between the findings from each study revealed important context for understanding how experiences varied across demographic cohorts. For example, gaming was identified as a relevant and important digital technology for young people across all ages, but creative and educational games were seen as more relevant for younger children whilst social gaming

platforms were more relevant for adolescents and young adults. Additionally, social connection was identified as a relevant and important mechanism for young people across all ages, but the role of acceptance and validation online was described as particularly important in the LGBTQA+ stakeholder groups.

Table 1.6. *Finalised list of the included constructs for the subsequent stages of the DigiT Project.*

Digital Technologies	**Notes for Specific Cohorts**
Phones (handheld, portable device)	Tablets particularly relevant for 5-12 year olds
Social media - general	
Social media - image based (still and video)	
Long form video	
Short form video	
Gaming	Educational games particularly relevant for 5-12 year olds
Messenger systems/apps	
Artificial intelligence	
Type of content engaged with (e.g., idealised) & viewing versus creating content	
Interest-based forums (e.g., Discord, Reddit)	Particularly relevant for 13-17 year olds and neurodivergent and LGBTQA+ groups
Features (of Digital Technologies)	**Notes for Specific Cohorts**
Chat/messaging	
Addictive/persuasive design, e.g., reward systems, infinite scroll, automatic scrolling	
Algorithms	
Advertising	
Likes (dislikes/reactions)	Less relevant for 5-12 year olds
Comments	Less relevant for 5-12 year olds
Sharing	Less relevant for 5-12 year olds
Posting	Less relevant for 5-12 year olds
Beauty filters/appearance editing	
Filters for fun	
Affordances	**Notes for Specific Cohorts**
Access (e.g., information, resources, social connection)	
Initiating and generating actions (e.g., content creation, uploading content)	
Sharing and disseminating information developed by others	
Interacting (e.g., social connection, competition)	
Self-presentation, including representation and anonymity	
Performance	
Mechanisms	**Notes for Specific Cohorts**
Social support, connection, and social capital	
Social comparison	

Displacement of other activities/processes (e.g., sleep)	
Hateful content (e.g., passive *exposure,* personally directed violence, harassment, and abuse, discrimination and marginalisation, harmful gendered beliefs)	
Exposure to beneficial content (e.g., diversity)	
Bullying/cyberbullying, exclusion, and ostracism	
Access to support and resources	
Misinformation	
Discovery and exploration	
Idealised content and internalisation of ideals	
Constant connection (e.g., doom scrolling, checking, monitoring, pickups)	
Pressure (e.g., peer pressure; pressure to be active; and to keep up with trends)	
Social norms and group subcultures	
Self-expression and creativity	
Fear of negative evaluation	
Acceptance and validation	Particularly relevant for LGBTQA+ young people
Polarisation (e.g., echo chambers, group mentality)	
Fear of missing out	
Fun, entertainment, humour, play	
Coping strategies, relaxing, de-stressing, escape, distraction, procrastination	
Skill development	Particularly for 10-12 year olds
Accessibility (e.g., for disability or other needs)	Particularly relevant for neurodivergent young people
Sexualisation, sexual behaviours, and sexual harm	
Addiction	
Positive Mental Health Experiences	**Notes for Specific Cohorts**
Wellbeing and life satisfaction	
Positive mood and positive emotions (e.g., joy)	
Identity	
Self-esteem	
Body appreciation	
Negative Mental Health Experiences	**Notes for Specific Cohorts**
Loneliness and isolation	
Anxiety	
Body dissatisfaction	
Depressed mood	
Self harm, suicidal ideation, and hopelessness	
Eating disorders and disordered eating	
Aggression and anger	Particularly relevant for 5-12 year olds

1.7 Summary/Conclusion

The two studies presented in this chapter provide clear guidance on which constructs related to digital technologies and young people's mental health should be prioritised for future research in the Australian context. Through a series of consultation sessions with key stakeholder groups, supported by both qualitative and quantitative data analyses, we identified the digital technologies, features and affordances, positive and negative mental health experiences, and mechanisms which were considered most relevant for children, adolescents, and young adults (summarised in Table 1.6).

The findings address several key gaps in our understanding of how different groups of young people engage with digital technologies and how these interactions may impact their mental health. Limited research has focused on younger children to date, and our results highlight distinct patterns of use in this age group – such as higher relevance of gaming, digital tablets, and long-form video content compared with usage patterns by adolescents and young adults. Further, although research has typically focused on negative impacts, the stakeholders identified several positive experiences – such as social connection, enjoyment, and learning – which they consistently rated as very important for future research. The consultation groups with neurodivergent and LGBTQA+ young people also identified constructs particularly relevant for these higher-risk populations, such as using digital technology for assistance and connecting with like-minded people.

Together, these findings provide a strong foundation for the subsequent stages of this project. They offer confidence that the digital technology and mental health constructs included in the systematic literature reviews, longitudinal data analyses, and the cross-sectional survey and interviews are genuinely relevant to young people across diverse ages, genders, and higher-risk populations. Critically, they underscore the need for nuanced research questions which investigate specific features, affordances, mechanisms, and moderating factors, rather than treating digital technology as homogenously linked with young people's mental health.

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Appendices

Appendix A: Stakeholder Consultation Sessions Question Guide

The co-design forums use the nominal group technique which follows four phases:

1. Silent generation of ideas
2. Recording of ideas
3. Discussion of ideas
4. Individual scoring/voting to prioritise ideas

All versions follow the same core structure, with adjustments to language and procedures to ensure appropriateness and accessibility for each group. To facilitate review, departures from the Adults (18–25 years) version are indicated using coloured text in red.

For forums involving LGBTQA+ identifying youth and neurodivergent youth aged 13–25 years, language was adapted to refer explicitly to "LGBTQA+-identifying young people" and "neurodivergent people your age," respectively.

Adults: 18-25 year olds

This is an indicative guide. Additional questions and prompts might be asked, depending on the response of the participants.

- **Verbal consent; restate group conduct guidelines**
- **Introduction and warm-up**
    - *Let's start by going around and introducing ourselves. Please share your first name and a "show & tell" – grab something that's within arm's reach that represents something about your or your day and tell us about it*
- **Exploring Digital Technology Use:**
    - *We want to start by asking you to identify the digital technologies that are used by people your age. We've got a rather wordy definition of digital technology that we are using* [shown on screen/in chat] *but essentially we are talking about the digital tools, systems, and devices used for accessing, uploading, and sharing digital content, including things like social media and gaming*
    - *What are the most common digital technologies used by people your age?*

Participants will initially generate responses through online polling function* [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- *What types of features of those technologies do young people use the most?*

Prompt (if required): For example, for social media we might think of features such as following others' accounts, posting comments, etc

Participants will share responses through online polling function [3-5 minutes]

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- **Clarifying suggestions and exploring underlying rationale regarding experiences of digital technology use**
    - *Let's talk through the ideas you generated about types and ways that young people use digital technology. Are there technologies or features on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that the ideas should be included in our list of relevant technologies for young people?* [questions presented in brief on screen to facilitate discussion]

Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

- **Prioritising digital technologies for inclusion in future research**
    - *We are now going to ask you to score the ideas that you have generated today – both the digital technologies and features – so we can prioritise which ideas should be included in our future research. If an idea is prioritised, we will keep investigating it in the research we plan to do so we can try to understand how use of that technology or feature is related to mental health and wellbeing outcomes.*
    - *We want to ask you to indicate your priority preferences in two ways. First, please score each suggestion that we have retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*
    - *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*

Suggestions to be presented via online polling and each item rated by participants

Anonymous aggregate scores presented to the group

- **Positive experiences of digital technology use**
    - *What are the good things about using those digital technologies/platforms for people's mental health and wellbeing?*

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- **Negative experiences of digital technology use**

- What are the downsides for people's mental health and wellbeing of using digital technologies/platforms that you are aware of?

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- **Neutral experiences of digital technology use**
  - *Are there any mental health or wellbeing effects of digital technology/platform use that are basically neutral? If so, what areas of mental health or wellbeing are not positively or negatively impacted by digital technology use?*

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- **Clarifying suggestions and exploring underlying rationale for ideas regarding positive, negative, and neutral mental health and wellbeing experiences of using digital technology**
  - *Let's talk through these ideas. Are there mental health and wellbeing outcomes on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that they should be included in our future research on mental health and wellbeing impacts of digital technology use for young people?* [questions presented in brief on screen to facilitate discussion]
    - Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives
- **Prioritising mental health/wellbeing outcomes for inclusion in the research**
  - *We are now going to ask you to score the ideas that you have generated today for the range of mental health and wellbeing outcomes experienced from use of digital technologies so we can prioritise which ideas should be included in our future research. If an idea is prioritised, we will keep investigating it in the research we plan to do and try and understand how use of that mental health or wellbeing experience is related to using digital technologies among young people.*
  - *Again, we want to ask you to indicate your priority preferences in two ways. First, please score each idea that we retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*
  - *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*
    - Ideas to be presented via online polling and each item rated by participants
    - Anonymous aggregate scores presented to the group

- **Generating question ideas for survey research**

Now that we have a clear sense of priorities for inclusion in our future research on digital technology and mental health and wellbeing, we'd like to spend a bit of time getting creative.

Can you please create one or two questions that you think we really need to ask young people about what's harmful or helpful about digital technology use – these could focus on specific areas mental health and wellbeing or on the types and ways of using digital technology, or both.

Participants provide their responses through Mentimeter

- **Assessing use of digital technologies in the research**
    - *To finish up, we want to ask your ideas for how we can best assess how much time people spend using digital technologies, and which platforms, devices, and services they use. We want to do this accurately and collect objective data on use. If we ask young people to enter information in a survey of their use, what would be a simple way that they could provide this information?*

* Online polling will facilitate efficient collection and accurate recording of multiple responses from participants.

Adults: parents of children aged 5-12 years

This is an indicative guide. Additional questions and prompts might be asked, depending on the response of the participants.

1. **Verbal consent; restate group conduct guidelines**
2. **Introduction and warm-up**
    - *Let's start by going around and introducing ourselves. Please share your first name and a "show & tell" – grab something that's within arm's reach that represents something about your or your day and tell us about it*
3. **Exploring Digital Technology Use:**
    - *We want to start by asking you to identify the digital technologies that are used by 5–12-year-old children. We've got a rather wordy definition of digital technology that we are using* [shown on screen/in chat] *but essentially we are talking about the digital tools, systems, and devices used for accessing, uploading, and sharing digital content, including things like social media and gaming, and accessing content online.*
    - *What are the most common digital technologies used by 5-12 year old children?*

Participants will initially generate responses through online polling function* [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

- *What types of features of those technologies do children use the most?*

Prompt (if required): For example, for social media we might think of features such as following others' accounts, posting comments, etc

Participants will share responses through online polling function [3-5 minutes]

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

4. **Clarifying suggestions and exploring underlying rationale regarding experiences of digital technology use**

    - *Let's talk through the ideas you generated about types and ways that young children use digital technology. Are there technologies or features on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that the ideas should be included in our list of relevant technologies for children in this age group?* [questions presented in brief on screen to facilitate discussion]

Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

5. **Prioritising digital technologies for inclusion in future research**

    - *We are now going to ask you to score the ideas that you have generated today – both the digital technologies and features – so we can prioritise which ideas should be included in our future research. If an idea is prioritised, we will keep investigating it in the research we plan to do so we can try to understand how use of that technology or feature is related to mental health and wellbeing outcomes for children aged 5-12.*

    - *We want to ask you to indicate your priority preferences in two ways. First, please score each suggestion that we have retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*

    - *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*

Suggestions to be presented via online polling and each item rated by participants

Anonymous aggregate scores presented to the group

6. **Positive experiences of digital technology use**

    - *What are the good things about using those digital technologies/platforms for 5-12-year olds' mental health and wellbeing?*

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

7. **Negative experiences of digital technology use**

- What are the downsides for young children's mental health and wellbeing of using digital technologies/platforms that you are aware of?

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

8. **Neutral experiences of digital technology use**

- *Are there any mental health or wellbeing effects of digital technology/platform use that are basically neutral for young children? If so, what areas of children's mental health or wellbeing are not positively or negatively impacted by digital technology use?*

Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen

Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

9. **Clarifying suggestions and exploring underlying rationale for ideas regarding positive, negative, and neutral mental health and wellbeing experiences of using digital technology**

- *Let's talk through these ideas. Are there mental health and wellbeing outcomes on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that they should be included in our future research on mental health and wellbeing impacts of digital technology use for children aged 5-12?* [questions presented in brief on screen to facilitate discussion]

- Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

10. **Prioritising mental health/wellbeing outcomes for inclusion in the research**

- *We are now going to ask you to score the ideas that you have generated today for the range of mental health and wellbeing outcomes experienced from use of digital technologies so we can prioritise which ideas should be included in our future research. If an idea is prioritised, we will keep investigating it in the research we plan to do and try and understand how use of that mental health or wellbeing experience is related to using digital technologies among young children.*

- *We want to ask you to indicate your priority preferences in two ways. First, please score each idea that we retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*
- *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*

- Ideas to be presented via online polling and each item rated by participants
- Anonymous aggregate scores presented to the group

11. **Generating question ideas for survey research**

- *Now that we have a clear sense of priorities for inclusion in our future research on digital technology and mental health and wellbeing, we'd like to spend a bit of time getting creative.*
- *Can you create one or two questions that you think we really need to ask young people about what's harmful or helpful about digital technology use – these could focus on specific areas mental health and wellbeing or on the types and ways of using digital technology, or both.*

Participants provide their responses through Mentimeter

12. **Assessing use of digital technologies in the research**

- *To finish up, we want to ask your ideas for how we can best assess how much time children aged 5-12 spend using digital technologies, and which platforms, devices, and services they use. We want to do this accurately and collect objective data on use. If we ask parents to enter information in a survey of their children's use, what would be a simple way that they could provide this information?*

* Online polling will facilitate efficient collection and accurate recording of multiple responses from participants.

Children (10-12 years)

This is an indicative guide. Additional questions and prompts might be asked, depending on the response of the participants.

1. **Verbal consent; restate group conduct guidelines**
2. **Introduction and warm-up**

- *Let's start by going around and introducing ourselves. Please share your first name and tell us if you could have a superpower, what would you choose?*

3. **Exploring Digital Technology Use:**

- *We want to start by talking about the types of digital technology that kids your age use. Digital technology means computers, tablets, phones, and other devices used to do things like play games, send messages, watch videos, or find and share information.*
- *Can you please tell us about the different digital technologies used by children your age?*

Prompt (if required): What about things like smartphones, YouTube, games like Minecraft (for younger children)

Visual prompts (e.g., pictures of different types of technology) will be used to aid engagement and contributions

Children will share responses verbally with each participant being asked to contribute until all ideas have been stated and no new ideas are generated

Facilitators will record the ideas and show them on screen

- *How do children your age use those technologies, what sort of things do they do with them?*

Prompt (if required): For example, if you know kids that play things like Minecraft, do they play online and connect with people they don't know, or just play privately? When kids use YouTube, do they subscribe to channels, or just watch things more randomly? Do kids you know have YouTube channels that they run and post videos to?

Children will share responses verbally with each being asked to contribute until all ideas have been stated and no new ideas are generated

Facilitators will record the ideas and show them on screen

4. **Clarifying suggestions and exploring underlying rationale regarding experiences of digital technology use**

   - *Let's talk through the ideas you generated about the types and ways that kids your age use digital technology.*
   - *Let's take a closer look at the ideas you have suggested. Is there anything that's missing from here? Is there anything that you think shouldn't be included on the list because maybe kids don't really use them very much, or don't really use the technologies in the way that's been suggested?*

Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

5. **Prioritising digital technologies for inclusion in future research**

   - *What we want to do now is ask you to choose which digital technologies you think are the most important for kids your age. This will help us shape our future research by knowing which types of technologies we should ask kids and their parents about.*
   - *From the ideas that we have already talked about, can you please select five that you think are the most important for kids your age. You don't have to put these in any particular order, just choose your top 5 overall.*

Suggestions to be presented via online polling* and each item rated by participants

Anonymous aggregate selections for top 5 presented to the group

Thanks everyone for making your selections. What we can see on screen now are the selections of the group as a whole for the top 5. What do we think of the ones that made it to the top 5?

6. **Positive experiences of digital technology use**

   - *If we think about the digital technologies that you have told us about that kids your age use, what are the good things about using those digital technologies for how kids feel about themselves?*

Children will share responses verbally with each participant being asked to contribute until all ideas have been stated and no new ideas are generated

Facilitators will record the ideas and show them on screen

7. **Negative experiences of digital technology use**

- Are there any downsides or bad things about using digital technologies for kids your age? Can you tell us about the bad things about using technology for how kids feel about themselves?

Children will share responses verbally with each participant being asked to contribute until all ideas have been stated and no new ideas are generated

Facilitators will record the ideas and show them on screen

8. **Clarifying suggestions and exploring underlying rationale for ideas regarding positive, negative, and neutral mental health and wellbeing experiences of using digital technology**

- *Let's take a closer look at the ideas you have suggested about how using digital technologies make kids feel. Are there any ideas that don't make sense and we need to work out what they mean? Is there anything that you think shouldn't be included on the list because maybe they don't happen very often or don't really have much of a strong effect? Is there anything that's missing from here?* [questions presented in brief on screen to facilitate discussion]

Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

9. **Prioritising mental health/wellbeing outcomes for inclusion in the research**

- *What we want to do now is ask you to choose the top five ideas that you have generated today about the ways that using digital technologies makes kids feel. We'll do two different selections, one for how digital technologies help kids feel good, and one for how digital technologies make kids feel bad, or the downsides. The choices you make will help us shape our future research by knowing which types of feelings and effects we should ask kids and their parents about.*

- *You don't have to put these in any particular order, just choose your top 5 overall.*
  - "Good" and "bad" ideas to be presented via online polling and items selected rated by participants
  - Anonymous aggregate selections for top 5 presented to the group

- *Thanks everyone for making your selections. What we can see on screen now are the selections of the group as a whole for the top 5. What do we think of the ones that made it to the top 5?*

* Online polling will facilitate efficient collection and accurate recording of multiple responses from participants

Adolescents (13-17 years)

This is an indicative guide. Additional questions and prompts might be asked, depending on the response of the participants.

1. **Verbal consent; restate group conduct guidelines**
2. **Introduction and warm-up**
    - *Let's start by going around and introducing ourselves. Please share your first name and a "show & tell" – grab something that's within arm's reach that represents something about your or your day and tell us about it*
3. **Exploring Digital Technology Use:**
    - *We want to start by asking you to identify the digital technologies that are used by people your age. The definition of digital technology that we are using is a bit wordy* [shown on screen/in chat] *but basically we are talking about the digital tools, systems, and devices used for accessing, uploading, and sharing digital content, including things like social media and gaming, and accessing content online.*
    - *What are the most common digital technologies used by 13 - 17 year old young people?*
        a. Participants will initially generate responses through online polling function* [3-5 minutes]; responses are then shown onscreen
        b. Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated
    - *What types of features of those technologies do people your age use the most?*
        c. Prompt (if required): For example, for social media we might think of features such as following others' accounts, posting comments, etc
        d. Participants will share responses through online polling function [3-5 minutes]
        e. Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated
4. **Clarifying suggestions and exploring underlying rationale regarding experiences of digital technology use**
    - *Let's talk through the ideas you generated about types and ways that young people use digital technology. Are there technologies or features on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that the ideas should be included in our list of relevant technologies for people your age?* [questions presented in brief on screen to facilitate discussion]
        f. Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives
5. **Prioritising digital technologies for inclusion in future research**
    1. *We are now going to ask you to score the ideas that you have generated today – both the digital technologies and features – so we can prioritise which ideas should be included in our*

future research. If an idea is prioritised, we will keep investigating it in the research we plan to do so we can try to understand how use of that technology or feature is related to mental health and wellbeing outcomes for young people aged 13-17.

2. *We want to ask you to indicate your priority preferences in two ways. First, please score each suggestion that we have retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*
3. *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*

    g. Suggestions to be presented via online polling and each item rated by participants
    h. Anonymous aggregate scores presented to the group

6. **Positive experiences of digital technology use**

    1. *What are the good things about using those digital technologies/platforms for 13-17-year olds' mental health and wellbeing?*

        i. Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen
        j. Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

7. **Negative experiences of digital technology use**

    1. What are the downsides for young people's mental health and wellbeing of using digital technologies/platforms that you are aware of?

        k. Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen
        l. Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

8. **Neutral experiences of digital technology use**

    1. *Are there any mental health or wellbeing effects of digital technology/platform use that are basically neutral for young people? If so, what areas of teenagers' mental health or wellbeing are not positively or negatively impacted by digital technology use?*

        m. Participants will initially generate responses through online polling function [3-5 minutes]; responses are then shown onscreen
        n. Participants are then asked to add any other ideas verbally until all ideas have been stated and no new ideas are generated

9. **Clarifying suggestions and exploring underlying rationale for ideas regarding positive, negative, and neutral mental health and wellbeing experiences of using digital technology**

    - *Let's talk through these ideas. Are there mental health and wellbeing outcomes on our list that we don't fully understand, or are not clear about, or think shouldn't be included here? What are the reasons that they should be included in our future research on mental health*

and wellbeing impacts of digital technology use for young people aged 13-17? [questions presented in brief on screen to facilitate discussion]

- Group discussion to clarify and express opinions of the ideas, and explore rationale underlying participant's perspectives

10. **Prioritising mental health/wellbeing outcomes for inclusion in the research**

    1. *We are now going to ask you to score the ideas that you have generated today for the range of mental health and wellbeing outcomes experienced from use of digital technologies so we can prioritise which ideas should be included in our future research. If an idea is prioritised, we will keep investigating it in the research we plan to do and try and understand how use of that mental health or wellbeing experience is related to using digital technologies among young people your age.*
    2. *We want to ask you to indicate your priority preferences in two ways. First, please score each idea that we retained from our earlier discussion, using scores of 1 to 5, where 1 would mean that the suggestion should definitely be discarded and 5 would mean that the suggestion should definitely be kept in the future research.*
    3. *Second, please select your top 5 priorities for inclusion in the research. You don't have to put these in any particular order, just choose your top 5 overall.*

    - Ideas to be presented via online polling and each item rated by participants
    - Anonymous aggregate scores presented to the group

11. **Generating question ideas for survey research**

    - *Now that we have a clear sense of priorities for inclusion in our future research on digital technology and mental health and wellbeing, we'd like to spend a bit of time getting creative.*
    - *Can you create one or two questions that you think we really need to ask young people about what's harmful or helpful about digital technology use – these could focus on specific areas mental health and wellbeing or on the types and ways of using digital technology, or both.*

        o. Participants provide their responses through Mentimeter

12. **Assessing use of digital technologies in the research**

    - *To finish up, we want to ask your ideas for how we can best measure how much time people aged 13-17 spend using digital technologies, and which platforms, devices, and services they use. Rather than relying on people's memory for how much time they spend on digital technology, we want to tap into ways of measuring technology use that is more factual. If we ask young people your age to enter information in a survey of their digital technology use, what would be a simple way that they could provide this information?*

* Online polling will facilitate efficient collection and accurate recording of multiple responses from participants.

Appendix B: Top 10 Priority Rankings for Children Aged 5-12 years

Digital Technologies	Vote %	Priority Ranking
Gaming devices (Xbox, Switch, PS5...)	66.7	1
Short-video social media (Instagram, TikTok, Youtube shorts...)	66.7	1
Messenger apps (Messenger, Whatsapp, Microsoft teams...)	66.7	1
Online virtual world games (Roblox, Minecraft, toca boca...)	66.7	1
Multiplayer games (fps games...)	66.7	1
Desktop devices (laptops, computers...)	33.3	6
Hand-held devices (phones, tablets, Ipads...)	33.3	6
Movie/TV apps (Netflix, Disney+...)	33.3	6
Longer video content (Youtube...)	16.7	9
Artificial intelligence (Chatgpt...)	16.7	9
Photo-based social media (Snapchat...)	16.7	9
Individual gaming (simulator games, phone app games...)	16.7	9
Positive Mental Health Experiences	**Vote %**	**Priority Ranking**
Makes you happy/feels good to use	100.0	1
Fun/laughing	83.3	2
Connecting/talking to friends/staying in touch	83.3	2
Sending and receiving funny things	83.3	2
Zone out of life/escape reality	50.0	5
Winning (e.g. games)	33.3	6
Become part of a community	33.3	6
Stop tantrums	16.7	8
Negative Mental Health Experiences	**Vote %**	**Priority Ranking**
Bad stuff being posted	66.7	1
Being made fun of	50.0	2
Bullying	50.0	2
Getting kicked out of the game	33.3	4
Having an online fight	33.3	4
Starts tantrums	16.7	6
Being banned	16.7	6
Glitching/tech issues	16.7	6
People being unfriendly	16.7	6
Getting kicked out of group chats	16.7	6
Rage quitting	16.7	6

Appendix C: Top 10 Priority Rankings for Parents of Children Aged 5-12 years

Digital Technologies	Mean (SD)	Vote %	Priority Ranking
Creative Gaming (Roblox, Minecraft...)	4.1 (1.6)	87.5	1
Hand-held devices (iPhone, iPad, tablets...)	4.4 (1.2)	62.5	2
Smart TV	4.1 (1.1)	62.5	3
Long-form video (YouTube Kids, YouTube)	4.1 (1.1)	62.5	3
Gaming consoles and devices (Xbox)	3.6 (1.3)	62.5	5
ChatGPT	4.0 (1.2)	37.5	6
Movie/TV streaming	4.1 (0.6)	25	7
Messenger apps (Messenger)	3.4 (1.4)	25	8
Google	3.1 (1.5)	25	9
Online learning program/apps (e.g., Mathletics, Reading Eggs)	4.0 (1.2)	12.5	10
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Scrolling down/swipe	4.1 (1.0)	87.5	1
Photo filters/effects	3.6 (1.5)	75	2
Skip ads/skip button on YouTube	4.1 (1.2)	62.5	3
Microphone	3.4 (1.3)	62.5	4
Reward system (unicorn, badges)	4.5 (0.8)	50	5
Communication (message, video calls)	4.3 (1.2)	50	6
Touch based controls	3.5 (1.4)	37.5	7
Paywall	2.9 (1.2)	25	8
Avatar	3.9 (1.2)	12.5	9
Emoji/GIF	3.6 (1.5)	12.5	10
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Learning or educational engagement and research	4.1 (1.1)	75	1
Access to information /exploring information	4.1 (1.2)	62.5	2
Creativity and self-expression	4.0 (1.2)	62.5	3
Increase problem solving skills	4.0 (1.6)	50	4
Social connection, social bonding/socialising	4.1 (1.2)	37.5	5
Sense of accomplishment	4.1 (1.1)	37.5	5
Entertainment	3.9 (1.1)	37.5	7
Digital innovation	3.9 (1.4)	37.5	7
Leaning opportunity for emotion regulation	3.5 (1.4)	37.5	9

Emotional support (e.g., relaxation, downtime)	4.0 (1.1)	25	10
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Addiction	4.9 (0.4)	87.5	1
Inappropriate or harmful content (e.g., adult themes)	4.3 (0.9)	62.5	2
Cyberbullying	4.6 (0.7)	50	3
Lack of exercises or physical activities (sedentary lifestyle)	4.3 (0.9)	37.5	4
Aggression (anger issues)	4.1 (0.8)	37.5	5
Emotional dysregulation	3.9 (1.0)	37.5	6
Poor sleep (including insomnia)	4.0 (0.8)	25	7
Disconnection or isolation	3.9 (0.8)	25	8
Social pressure	3.5 (1.8)	25	9
Antisocial behaviours	3.4 (1.7)	25	10

Appendix D: Top 10 Priority Rankings for Adolescents Aged 13-17 years

Digital Technologies	Mean (SD)	Vote %	Priority Ranking
Image/video-based social media (Instagram, TikTok, Snapchat, Pinterest...)	4.7 (0.5)	100	1
Hand-held devices (phones, tablets...)	4.1 (1.5)	85.7	2
Messenger apps (Messenger, WhatsApp...)	3.9 (1.1)	85.7	3
Interest-based forum (Discord, Reddit...)	3.1 (1.6)	57.1	4
Search engine (Google...)	3.3 (1.7)	42.9	5
AI (Chatgpt, Microsoft Copilot...)	4.0 (1.2)	28.6	6
Long-form video (YouTube...)	3.3 (1.5)	28.6	7
Creative gaming (Roblox, Minecraft...)	3.3 (1.5)	28.6	7
Gaming devices (Xbox, Switch...)	3.1 (1.2)	14.3	9
Music streaming (Spotify, Apple Music...)	3.0 (1.5)	14.3	10
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Likes, dislikes, emojis, react	4.3 (1.0)	100	1
Comments, respond	4.4 (0.8)	85.7	2
Connect with others	4.7 (0.8)	71.4	3
Instant messaging	4.3 (1.3)	57.1	4
Share	4.3 (0.8)	42.9	5
Repost	4.0 (1.2)	42.9	6
Tag	3.9 (0.7)	42.9	7
Create videos	4.3 (1.0)	14.3	8
Upload images	4.0 (1.2)	14.3	9
Ignore	3.1 (1.3)	14.3	10
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Communication, chatting	4.6 (0.8)	71.4	1
News	4.4 (1.1)	71.4	2
Entertainment, fun	4.7 (0.5)	42.9	3
Connection, socialising	4.6 (0.8)	42.9	4
Cooling off, switching off, relief, relaxing	4.6 (0.5)	42.9	4
Platform for advocacy	4.4 (0.5)	42.9	6
Anonymity	4.3 (1.3)	42.9	7
Being known, voice your opinions	4.4 (0.8)	28.6	8
Hearing others input	4.1 (1.1)	28.6	9
Learning, access to different ideas	4.0 (1.2)	28.6	10
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Bullying, black mailing, hate/harmful comments	3.7 (1.9)	71.4	1
Cancel culture	3.7 (1.9)	71.4	2
Insecurities	3.3 (1.9)	57.1	3

Extreme views	4.0 (1.2)	42.9	4
Over consumerism	3.7 (1.7)	42.9	5
Promotion of negativity	3.4 (1.8)	42.9	6
Misogyny, racism	3.0 (1.7)	42.9	7
Risk-taking	3.9 (1.5)	28.6	8
Exclusion, alienation	3.7 (1.7)	28.6	9
Addiction	3.7 (1.3)	28.6	10

Appendix E: Top 10 Priority Rankings for Neurodivergent Adolescents Aged 13-17 years

Digital Technologies	Mean (SD)	Vote %	Priority Ranking
Image/video-based social media (Instagram, TikTok, Snapchat...)	4.6 (0.9)	80	1
Hand-held devices (phones, iPad...)	4.6 (0.9)	60	2
Discord	4.0 (1.2)	60	3
Audio devices (earphones, speakers...)	3.2 (1.8)	60	4
Desktop devices (laptops, computers...)	4.2 (1.1)	40	5
Long-form video (YouTube...)	4.2 (0.4)	40	5
Messenger apps (WhatsApp...)	3.8 (1.3)	40	7
Creative gaming (Roblox...)	3.6 (0.9)	40	8
Search engines (Google...)	3.4 (1.5)	40	9
Games (Fortnite...)	4.0 (1.2)	20	10
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Chat/messaging	4.8 (0.4)	100	1
Video/image sharing, reposts, GIFs	4.2 (0.8)	80	2
Comments	4.0 (1.0)	80	3
Do not disturb	3.4 (1.7)	60	4
Videos, short-form videos	4.2 (1.1)	40	5
Reactions	3.8 (0.8)	40	6
Status	3.6 (1.3)	40	7
Accessibility (voice-to-text, subtitles, brightness)	3.4 (1.8)	40	8
Stories	2.8 (1.3)	20	9
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Socialising, talking to friends	4.6 (0.9)	100	1
Research, education, learning	4.0 (0.7)	100	2
Interesting content	3.6 (0.9)	80	3
Finding niche things	4.4 (0.5)	60	4
Less eye contact, time to think about responses, don't have to worry about body language	3.8 (1.3)	60	5
Convenience	3.8 (0.8)	60	5
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Poor oversight/moderation (reporting typically sucks)	4.2 (1.3)	80	1
Invasive - hard to turn off, addiction	4.2 (0.8)	80	1
Hatefulness, criticism	3.8 (1.3)	80	3
Bullying, cyberbullying, harassment	3.6 (1.7)	80	4
Isolation	3.4 (1.5)	80	5
Scammers	3.4 (1.3)	40	6

Appendix F: Top 10 Priority Rankings for LGBTQA+ Adolescents Aged 13-17 years*

Digital Technologies	**Mean (SD)**	**Vote %**	**Priority Ranking**
TikTok	5.0 (0.0)	100	1
Discord	4.0 (1.4)	100	2
YouTube	3.5 (0.7)	100	3
Instagram	4.0 (0.0)	0	4
Phones	3.5 (0.7)	0	5
Audio devices (earphones, earbuds...)	2.0 (1.4)	0	6
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Chat	4.5 (0.7)	100	1
Entertainment	3.0 (0.0)	100	2
News	2.0 (1.4)	100	3
Doom scrolling	5.0 (0.0)	50	4
Posting	4.0 (0.0)	50	5
Finding new information	3.5 (2.1)	50	6
Calling	3.0 (1.4)	50	7
Sharing Opinions	4.0 (0.0)	0	8
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Escaping, including escaping from reality	5.0 (0.0)	100	1
Playing with friends	4.5 (0.7)	100	2
Finding new friends	4.5 (0.7)	50	3
Talking to friends	4.0 (0.0)	50	4
Learning	3.0 (0.0)	0	5
Entertainment	2.5 (0.7)	0	6
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Misinformation	4.5 (0.7)	100	1
Addiction	4.0 (1.4)	100	2
Doom scrolling	3.5 (2.1)	50	3
Being too anonymous	3.0 (2.8)	50	4
Uncomfortable topics	3.5 (2.1)	0	5

Note. There were only n = 2 participants in the LGBTQA+ adolescents group. Due to the low number of ideas generated, participants only voted on their top 3 options, rather than their top 5.

Appendix G: Top 10 Priority Rankings for Young Adults Aged 18-25 years

Digital Technologies	Mean (SD)	Vote %	Priority Ranking
Image/video-based social media (Instagram, TikTok, Snapchat, Pinterest...)[a]	4.8 (0.4)	100	1
Artificial intelligence (ChatGPT...)[c]	4.6 (0.6)	80	2
Hand-held devices (phones, tablets...) [a]	4.2 (1.1)	63.6	3
Gaming platforms (Steam, Twitch, Discord...)[c]	4.4 (0.6)	60	4
Productivity-based apps (Outlook, gmail)[b]	4.0 (1.3)	50	5
Text-based apps (Twitter, LinkedIn) [a]	3.9 (0.9)	45.5	6
Messenger apps (Messenger, WhatsApp...) [a]	3.6 (1.0)	45.5	7
Pinterest, Tumblr[c]	3.0 (1.6)	40	8
Smart watch[b]	3.2 (1.3)	33.3	9
Long-form video (YouTube...)[a]	3.8 (0.9)	27.3	10
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Endless scrolling/automatic scrolling [a]	4.6 (0.5)	100	1
Algorithm recommendations[c]	3.8 (1.3)	80	2
Communication (Chat, group chats, direct message) [a]	4.2 (1.0)	72.7	3
Artificial intelligence, ChatGPT[b]	4.8 (0.4)	66.7	4
Posting, taking photos[b]	4.2 (1.0)	66.7	5
Sharing/reposts [a]	4.0 (1.0)	54.5	6
Reactions (e.g., like) and comments [a]	4.0 (0.8)	54.5	6
Educational/productivity[b]	4.2 (0.8)	50	8
Notifications[c]	4.0 (0.7)	40	9
Follow, subscribe[c]	3.6 (0.6)	40	10
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Social connection [a]	4.5 (0.8)	100	1
Self-expression, creativity	4.2 (0.8)	60	2
Relaxation, distraction [a]	4.6 (0.7)	54.5	3
Updated with the news[b]	3.8 (1.2)	50	4
Education, learning [a]	4.4 (0.8)	45.5	5
Sharing (ideas, memories) [a]	3.7 (1.1)	45.5	6
Being anonymous, privacy[c]	4.6 (0.6)	40	7
Sense of security[c]	4.0 (1.0)	40	8
Entertainment, humour [a]	3.8 (1.1)	36.4	9
Finding good deal, community support[b]	3.7 (1.8)	33.3	10
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Comparison[b]	4.8 (0.4)	100	1
Loss of time, addiction, distraction [a]	4.5 (0.7)	81.8	2
Catfishing, trauma dumping strangers[c]	4.0 (1.2)	80	3
Body image concerns [a]	4.5 (0.7)	54.5	4
Fear of missing out (anxiety) [a]	4.5 (0.8)	45.5	5
Misinformation [a]	3.9 (1.4)	45.5	6
Bullying, hate, negative comments [a]	4.3 (0.8)	36.4	7

Excess information/overwhelmed [a]	4.0 (0.8)	36.4	8
Materialism [a]	3.8 (1.1)	27.3	9
Echo chambers[c]	4.0 (1.2)	20	10

Note. [a]Responses from the two sessions with 18-25-year-olds combined. [b]responses from Group 1; [c]responses from group 2

Appendix H: Top 10 Priority Rankings for Neurodivergent Young Adults Aged 18-25 years

Digital Technologies	Mean (SD)	Vote %	Priority Ranking
Image/video-based social media (Instagram, TikTok, Snapchat...)	4.5 (0.8)	66.7	1
Hand-held devices (phones, tablets...)	4.3 (0.5)	66.7	2
Reddit	4.3 (1.0)	66.7	2
YouTube short-form	4.0 (0.6)	50	4
Messenger apps (Messenger, WhatsApp...)	4.2 (0.4)	33.3	5
Audio devices (earphones, headphone...)	4.0 (1.5)	33.3	6
Productivity and organisational apps (calendar, task managers)	3.8 (1.0)	33.3	7
Online shopping (e.g., Facebook marketplace)	3.5 (0.8)	33.3	8
Gaming	3.8 (1.2)	16.7	9
Long-form video (YouTube...)	3.8 (1.0)	16.7	9
Discord	3.8 (1.2)	16.7	9
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Share	4.3 (0.8)	83.3	1
Communication (chat, group chats, direct message)	4.7 (0.5)	66.7	2
Endless scrolling/automatic scrolling	4.3 (1.2)	50	3
algorithm	4.2 (1.3)	50	4
Favourite/save	4.0 (1.3)	50	5
Like	4.2 (1.0)	33.3	6
Reels and stories	4.0 (1.5)	33.3	7
Delete	3.7 (1.2)	33.3	8
Reactions	3.5 (1.2)	33.3	9
Sort by engagement	3.5 (1.2)	33.3	9
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Social connection (e.g., meeting, connecting and reconnecting with friends, friendships)	4.7 (0.5)	100	1
New hobbies and interests	4.7 (0.8)	50	2
Assisting with daily life (including daily support)	4.8 (0.4)	33.3	3
Community	4.7 (0.5)	33.3	4
Entertainment and fun	4.5 (0.8)	33.3	5
Convenience	4.2 (0.8)	33.3	6
Learning new things	4.0 (1.1)	33.3	7
Self-expression	4.0 (1.3)	33.3	7
Efficiency	3.5 (1.0)	33.3	9
Support	3.5 (1.5)	33.3	9
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Time blindness	4.6 (0.5)	66.7	1
Addiction (addictive)	4.4 (0.5)	50	2
Materialism	4.2 (0.8)	50	3

Burnt out	4.3 (0.8)	33.3	4
Intrusive to daily life	4.2 (0.8)	33.3	5
Gender based violence	4.2 (0.8)	33.3	5
Fear of missing out (FOMO)	4.0 (0.7)	33.3	7
Racism and discrimination	4.0 (1.2)	33.3	7
Bullying	3.8 (0.8)	33.3	9
Overstimulation	3.8 (1.1)	33.3	9

Appendix I: Top 10 Priority Rankings for LGBTQA+ Young Adults Aged 18-25 years

Digital Technologies	**Mean (SD)**	**Vote %**	**Priority Ranking**
Hand-held devices (phones, tablets...)	5.0 (0.0)	100	1
Artificial intelligence	4.4 (1.1)	85.7	2
Instagram	5.0 (0.0)	71.4	3
TikTok	4.4 (0.5)	71.4	4
Discord	4.6 (0.5)	28.6	5
Reddit	4.3 (1.0)	28.6	6
Online dating	3.9 (0.7)	28.6	7
Long-form video (YouTube...)	3.7 (1.0)	28.6	8
Tumblr	3.4 (1.1)	28.6	9
Twitter	4.0 (0.6)	14.3	10
Features (of Digital Technologies)	**Mean (SD)**	**Vote %**	**Priority Ranking**
Comments	4.9 (0.4)	71.4	1
Algorithm	4.7 (0.5)	71.4	2
Reactions	4.6 (0.8)	71.4	3
Group chat	4.7 (0.5)	42.9	4
Block reports	4.3 (1.0)	42.9	5
Endless scroll	4.3 (1.5)	42.9	5
Short form contents	4.3 (0.8)	28.6	7
Easy content creation	4.0 (1.0)	28.6	8
Photos	4.0 (1.0)	28.6	8
Video calls	3.7 (1.0)	28.6	10
Positive Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Community	4.9 (0.4)	100	1
Activism	4.4 (0.8)	57.1	2
Accessible information (including free info, online resources)	4.4 (0.5)	57.1	2
Representation	4.3 (1.0)	57.1	4
Discovering new interests	4.0 (0.8)	57.1	5
Connection	4.9 (0.4)	42.9	6
Learning (including education)	4.4 (0.5)	42.9	7
Information sharing	4.3 (0.8)	42.9	8
Awareness	4.0 (0.8)	28.6	9
Solidarity	4.4 (0.8)	14.3	10
Negative Mental Health Experiences	**Mean (SD)**	**Vote %**	**Priority Ranking**
Misinformation	4.9 (0.4)	71.4	1
Poor concentration	4.7 (0.5)	57.1	2
Negativity overload	4.6 (1.1)	57.1	3
Echo chamber	4.4 (0.8)	42.9	4
Constant connection	4.3 (1.1)	42.9	5
Predators and scammers	4.3 (1.0)	28.6	6
Isolation	4.7 (0.8)	14.3	7

24h news cycle	4.6 (0.8)	14.3	8
Over-usage	4.6 (0.5)	14.3	8
Addictions	4.3 (0.8)	14.3	9
Harassment	4.3 (1.0)	14.3	9
Lack of nuance	4.3 (1.1)	14.3	9

Chapter 2.

Empirical Literature Review

Chapter 2. Empirical Literature Review

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2.1 Background

Digital technologies are now near-universal in the lives of children and young people in high-income countries. Australian survey data indicate that more than 90% of 14–17-year-olds own a smartphone, more than 80% use at least one social media platform daily, and the average age of first social media account creation has fallen to around 12 (eSafety Commissioner, 2024). Comparable patterns are documented across the OECD (OECD, 2024). Importantly, digital technology is not a single thing: young people's engagement spans devices (smartphones, tablets, gaming consoles, smart televisions), platforms (image-based, video-based, messaging, multiplayer gaming), modalities (active posting, passive scrolling, synchronous communication, algorithmic content consumption), and increasingly AI-driven systems including recommender algorithms and generative chatbots. This heterogeneity requires careful consideration in understanding mental health implications of digital technology use.

Public concern about the mental health of young people has grown alongside their digital engagement. Population surveys document increases in adolescent depression, anxiety, and self-harm in many high-income countries since the early 2010s, including Australia (Australian Bureau of Statistics, 2020-2022) and digital technology use has been raised as a potential contributor to these increases. Empirical syntheses, however, urge greater caution: meta-analyses report effect sizes that are typically small, inconsistent in direction across studies, and complicated by bidirectional relationships in which poorer mental health appears to predict subsequent technology use as much as the reverse (Odgers & Jensen, 2020; Orben, 2020; Vahedi & Zanella, 2021). The disconnect between strong public narratives and modest empirical effects has produced sustained methodological debate about how the field should measure exposure, model temporal sequence, and account for individual differences.

A growing body of review literature has attempted to summarise this evidence. Sala et al. (2024) synthesised 23 meta-analyses on social media and adolescent wellbeing in an umbrella review; Girela-Serrano et al. (2024) reviewed mobile-phone use and mental health in children and adolescents; and several meta-analyses have addressed specific exposure–outcome pairings (e.g., Ivie et al., 2020; Liu et al., 2022). These syntheses share notable limitations. First, most focus on a single technology category — social media or smartphones — rather than mapping the full digital ecosystem young people now navigate. Second, and of high significance, most have drawn on cross-sectional evidence, which cannot disentangle the temporal direction of association.

This scoping review addresses these gaps by mapping the longitudinal, evidence on digital technology use and mental health in children and young people aged 5–25. The review attends to bidirectional pathways throughout, recognising that selection effects — young people with poorer mental health gravitating toward particular platforms or content — are a substantive part of the evidence rather than a confound to be controlled away.

Specifically, this review addresses six research questions:

1. How is the longitudinal evidence base distributed across digital technology categories (social media, gaming, messaging/chat), mental health variables, and developmental age groups (5–12, 13–17, 18–25)?

2. Within each digital technology category, what proportion of longitudinal effect estimates indicate that higher technology use predicts subsequent change in mental health (Tech → MH), and in what direction — harmful, beneficial, or null?
3. Within each digital technology category, what proportion of longitudinal effect estimates indicate that mental health predicts subsequent change in technology use (MH → Tech), and in what direction — poor mental health predicting more or less use, good mental health predicting more or less use, or null?
4. How do the direction-of-effect proportions in RQ2 and RQ3 vary by developmental age group (5–12, 13–17, 18–25)?
5. How do the direction-of-effect proportions in RQ2 and RQ3 differ across the three digital technology categories when compared side by side?
6. Where are the most consequential gaps in the longitudinal evidence base — by technology, mental health variable, age group, and direction — and what do these gaps imply for future research priorities?

Where more than 10 primary studies are available separately for examination of the relationship between digital technology use and a specific mental health indicator (for a specific digital technology type), namely depression, anxiety, and wellbeing/life satisfaction, we will additionally address the research questions:

7. Within each digital technology category and for the identified mental health outcome(s), what proportion of longitudinal effect estimates indicate that higher technology use predicts subsequent change in mental health, and in what direction — harmful, beneficial, or null?
8. Within each digital technology category and for the identified mental health outcome(s), what proportion of longitudinal effect estimates indicate that poor/good mental health predicts subsequent change in digital technology use, and in what direction — harmful, beneficial, or null?

2.2. Methods

2.2.1 Protocol and registration

This scoping review was conducted in accordance with the methodological guidance of the JBI Manual for Evidence Synthesis (*JBI manual for evidence synthesis*, 2024) and reported in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018). The protocol was prospectively registered on the Open Science Framework on 21 August 2025 (Khalil, McLean, Jarman, & Fuller-Tyszkiewicz, 2025; https://osf.io/jtsz7).

2.2.2 Eligibility criteria

Eligibility criteria were specified using the Population, Concept, and Context (PCC) framework recommended by JBI for scoping reviews.

2.2.2.1 Population

Studies were eligible if they reported on children and young people aged 5 to 25 years. Studies including participants outside this age range were eligible if at least 70% of the sample fell within the 5–25 range, or if data for the eligible age group could be extracted separately.

2.2.2.2 Concept

The concept of interest comprised three linked elements: (i) the use of digital technologies, including but not limited to smartphones, tablets, social media platforms, messaging applications, internet-enabled devices, smart televisions, online gaming platforms, streaming devices, virtual reality (VR) tools, learning platforms, email, and video calling; (ii) features and affordances of these technologies, including but not limited to "likes" and other social-feedback mechanisms, notifications, recommender systems, opportunities for social comparison, and identity exploration; and (iii) mental health and wellbeing indicators, including but not limited to depressed mood, anxiety, body image, life satisfaction, self-esteem, loneliness, self-harm, suicidal ideation, sleep, and general psychological distress.

To ensure consistent classification across the review, technologies were charted using a hierarchical taxonomy distinguishing (i) device type, (ii) platform or application, (iii) activity or modality, and (iv) features and affordances. The taxonomy was piloted on 20 included studies and refined before full extraction.

2.2.2.3 Context

Studies conducted in any setting (home, school, community, healthcare, workplace) and any geographic or cultural context were eligible.

2.2.2.4 Types of evidence sources

The review included primary research studies and evidence syntheses. Eligible primary study designs were experimental and longitudinal or repeated-assessment designs, including ecological momentary assessment (EMA) and network analysis methodologies, with a minimum of two assessment points to permit inference about within-person change. Eligible evidence syntheses comprised systematic reviews, scoping reviews, and umbrella reviews of studies meeting these design criteria. While these studies were included as eligible for the wider literature review, only longitudinal papers were assessed in the current review. Cross-sectional studies and qualitative studies were excluded, as the review aimed to map evidence supporting inferences about temporal sequence between digital technology use and mental health. This exclusion is acknowledged as a scope decision: the cross-sectional and qualitative literatures, while informative for hypothesis generation, do not address the temporal questions at the centre of this review.

Studies focused on therapeutic technologies whose primary purpose is mental health intervention or behaviour change (e.g., dedicated mental health apps such as Headspace, Woebot, MoodGym; AI-enhanced therapy chatbots) were excluded. General-purpose technologies used for self-soothing, escapism, or social connection remained eligible regardless of any incidental therapeutic effect.

Studies that did not allow differentiation between distinct types of digital technology (e.g., aggregate "screen time" measures combining gaming, social media, and television viewing without sub-categorisation) were excluded from this review, because such aggregation does not support inference about specific technology-mental health pathways.

2.2.2.5 Outcomes

Mental health outcomes of interest comprised internalising symptoms (depression, anxiety, social anxiety, eating-disorder symptoms), and wellbeing indicators (self-esteem, wellbeing/life satisfaction, positive affect, loneliness, social connectedness, body appreciation). Studies examining outcomes outside this set (e.g., academic achievement as a sole outcome, treatment adherence) were excluded unless mental health was also reported. Externalising symptoms (anger or aggression as relevant to children, conduct problems) were retained as eligible outcomes when reported alongside internalising or wellbeing outcomes; in the final longitudinal dataset no studies reported externalising outcomes in isolation and data on estimates of the associations between externalising symptoms in isolation and mental health were not extracted. In addition, anger or aggression was retained as a mental health variable of particular interest for the cohort of 5-12-year-old children.

2.2.2.6 Publication criteria

Eligible publications were those reporting empirical research, published in English, between January 2010 and the date of the final search in August 2025. The 2010 cut-off was selected to align with the launch of the major image-based social media platforms (Instagram launched October 2010, Snapchat September 2011), which mark a substantive shift in the digital media landscape relevant to this review. The English-only restriction reflects translation resource constraints and is acknowledged as a limitation in Section 2.4.1.

2.2.3 Information sources

Four bibliographic databases were searched: MEDLINE (Ovid), PsycINFO (EBSCO), Sociological Abstracts (ProQuest), and Scopus. Database selection was guided by the cross-disciplinary nature of the topic, spanning psychology (PsycINFO), biomedicine (MEDLINE), sociology and social science (Sociological Abstracts), and broad multidisciplinary coverage including computer science and human-computer interaction (Scopus).

2.2.4 Search strategy

The search strategy was developed in consultation with an information specialist and informed by the approach reported by Sala et al. (2024). It was piloted iteratively against a set of known relevant articles to ensure adequate sensitivity and coverage. Searches combined three core concept blocks using the Boolean operator AND and OR.

The first concept captured the population, using a combination of Medical Subject Headings (MeSH) and free-text terms relating to children, adolescents and young people, including Child, Adolescent, and Young Adult, as well as text words such as "adolescen*", "child*", "youth", "teen*", "young adult*", "young people*", "kids", "girls", and "boys".

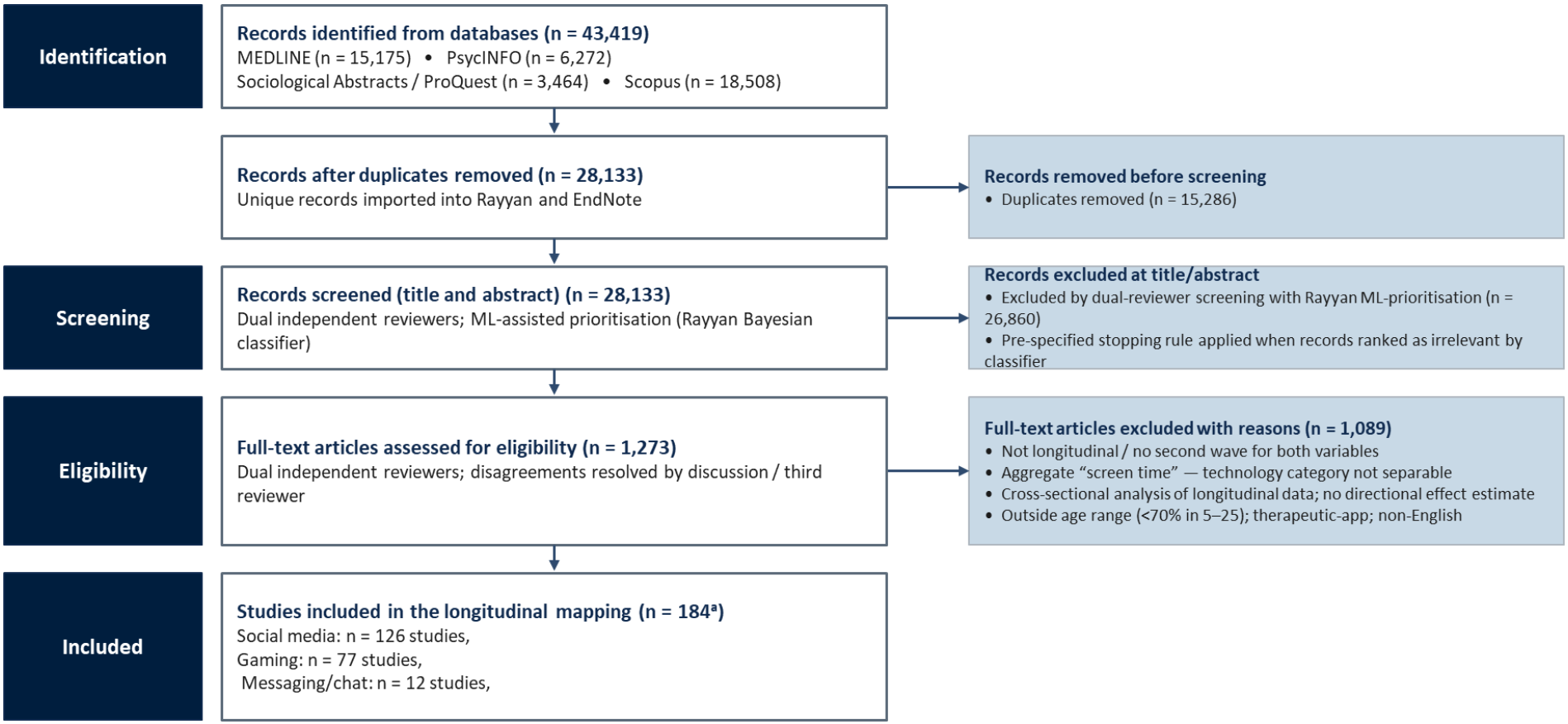
The second concept focused on digital and online technologies, particularly social media and related platforms. MeSH terms included Social Media, Social Networking, Online Social Networking, and Smartphone. These were supplemented with free-text terms capturing broad technologies and specific applications, including "social media", "social network*", "digital technology", "online platform*", "gaming", "recommender system*", and "messaging app*", as well as named platforms and devices such as Facebook, Instagram, TikTok, YouTube, Snapchat, WhatsApp, WeChat, smartphones, and iPhones.

The third concept addressed mental health, wellbeing, and related psychosocial outcomes, using MeSH terms such as Mental Health, Depression, Anxiety, Anxiety Disorders, Quality of Life, Loneliness, Psychological Stress, Self-Injurious Behaviour, Suicide, Body Image, Self-Concept, Social Comparison, Sleep, Learning, Knowledge, and Social Skills. Free-text terms were used to capture additional outcomes and constructs, including "mental health", "wellbeing"/"well being", "illbeing"/"ill being", "depression", "anxiety", "quality of life", "life satisfaction", "positive affect", "self-esteem", "body image", "psychological distress", "loneliness", "envy", "self-harm", "self-injur*", "suicidal", "sleep*", "attention", "concentration", "learning", and "skills".

Together, these three concept blocks ensured comprehensive retrieval of studies examining the relationships between digital technologies and mental health, wellbeing, and related cognitive, emotional, and behavioural outcomes among children, adolescents, and young adults. Subject headings were used in addition to keyword searches in databases supporting controlled vocabularies (MEDLINE/MeSH, PsycINFO/Thesaurus). The full search strategy for each database, including subject headings, free-text terms, field codes, and platform-specific syntax adjustments, is provided in Appendix A-D. The MEDLINE strategy returned 13,146 records on 15 August 2025 in piloting; final search counts are reported in the PRISMA flow diagram (Figure 2.1).

Search terms for features and affordances and for mediating mechanisms were not included in the search strategy. Data on these concepts were extracted from eligible papers identified through the population × concept × outcome combination, on the rationale that such terms are inconsistently indexed across the literature and would have substantially reduced search sensitivity if included.

Figure 2.1. *PRISMA-ScR flow diagram: Identification, screening, eligibility, and inclusion of records for the longitudinal mapping*



Note. [a]*There were 184 unique papers; 31 papers were included in more than one technology category. The mapping draws on three technology categories analysable as separate constructs: social media, gaming, and messaging/chat. Reported in accordance with PRISMA-ScR (Tricco et al., 2018).*

2.2.5 Selection of sources of evidence

The database searches yielded a total of 43,419 records. After removing 15,286 duplicate records, 28,133 unique records were screened at the title and abstract level using Rayyan's AI-assisted automation tools, with iterative classifier updating as decisions were recorded. All identified records were imported into Rayyan and deduplicated. Title and abstract screening, and subsequent full-text screening, were conducted by AI and one human reviewer. Multiple human reviewers were involved, working independently. Discrepancies at either stage were resolved through discussion between reviewers.

To support efficient screening of the high-volume collation of papers, machine-learning prioritisation was used: records were ranked in descending order of predicted relevance using Rayyan's built-in Bayesian classifier, with the classifier updated iteratively as decisions were recorded. A pre-specified stopping rule was applied: screening continued until records were ranked as irrelevant by Rayyan. To verify that stopping had not missed eligible records, a random sample of 100 records from those predicted least likely to be relevant was reviewed by reviewers; This approach is consistent with recommendations for machine learning (ML)-assisted screening (Callaghan & Müller-Hansen, 2020; Howard et al., 2016). Reasons for exclusion at full-text stage are reported in the PRISMA-ScR flow diagram (Figure 2.1).

For the purpose of presenting the results, we focussed on longitudinal studies that reported additional criteria sufficient to support inferences about temporal sequence between digital technology use and mental health. Specifically, included studies were required to:

- Use a longitudinal design with at least two assessment waves of both the digital technology variable and the mental health variable, allowing one variable to be modelled as a predictor of change in the other. Eligible designs included prospective cohort studies and panel surveys with a minimum of two post-intervention assessments.
- Report a temporally directional analysis — that is, an effect estimate (regression coefficient, structural-equation path coefficient, latent growth model parameter, cross-lagged effect, network-analysis edge, or equivalent) in which one construct measured at an earlier time point predicted the other at a later time point, with appropriate adjustment for the autoregressive effect of the outcome wherever possible.
- Examine participants in the eligible age range of 5–25 years, with mixed-age samples included if at least 70% of participants fell within this range or if effects could be extracted separately for the eligible age group.
- Examine specific technology categories that could be analysed as separate constructs. On this basis, three digital technology categories were retained for the mapping: social media, gaming, and messaging/chat. Studies that aggregated multiple technologies into a composite "screen time" measure without permitting decomposition by technology category were excluded from this component, because such aggregation does not support inference about technology-specific pathways.

Cross-sectional and qualitative studies were excluded from the review. This is a deliberate scope decision: the analytic objective of the longitudinal mapping is to characterise temporal evidence

specifically, and cross-sectional and qualitative literatures, while informative for hypothesis generation, do not contribute to questions about temporal direction.

2.2.6 Data charting

A data charting form was developed by the review team based on the JBI Data Extraction template, refined through pilot extraction on a sample of 10 included studies, and revised before formal extraction commenced. Data were extracted by both Elicit and Claude and a human reviewer verified all extracted data and discrepancies were resolved. During this process of careful full-text checking, the greater scrutiny led to further exclusions of studies which did not meet the specific criteria for this component of analysis (primarily based on ability to separate by technology type, and the presence of true longitudinal analysis); these exclusions are included in the full-text exclusion count provided in Figure 2.1.

2.2.6.1 Data items

Extracted data items comprised:

- Bibliographic details (authors, year, country, funding source, declared conflicts of interest);
- Study design (e.g., longitudinal cohort, EMA, experimental, RCT, systematic review), with information on number of measurement waves, follow-up duration, and timing of measurements;
- Sample characteristics (sample size, age range, mean age, sex/gender composition, country, recruitment setting, attrition);
- Type and frequency of digital technology use, classified using the four-level taxonomy (device, platform, modality, features and affordances);
- Affordances, motives, and purposes of digital technology use as reported by participants or operationalised by the study;
- Mental health outcomes assessed (construct, measurement instrument, time of assessment);
- Mediating variables and mechanisms assessed;
- Theoretical foundation or framing identified in the introduction;
- Confounders and moderators considered in the analysis;
- Key findings relevant to each research question, with effect estimates extracted where reported;
- Limitations and future-research directions identified by the study authors.

2.2.7 Data charting process

Mental health constructs reported in the included studies were mapped to a controlled vocabulary of twelve categories derived from the data-extraction codebook, comprising five internalising symptom categories (depressed mood; anxiety or social anxiety; loneliness or isolation; self-harm or suicidal ideation; eating disorder symptoms; body dissatisfaction), four wellbeing and positive constructs (self-esteem; wellbeing or life satisfaction; positive mood or

emotions; body appreciation), and three residual categories ("other general distress" for composites such as the SDQ Total Difficulties score; "other externalising" for conduct or aggression reported alongside mental health outcomes; and "other" for constructs such as bipolar features or identity-related variables that did not fit elsewhere). Where a single effect estimate captured a composite outcome spanning two categories (for example, an "internalising difficulties" scale combining depression and anxiety items), the row contributed to both relevant cells. Construct mapping followed a standardised procedure documented in the analysis script, with ambiguous cases manually reviewed. Body-image constructs were further differentiated based on the assessment instrument and conceptual framing used in each study: studies measuring body dissatisfaction, body surveillance, thin-ideal internalisation, or related deficit-focused constructs were mapped to the internalising body-image category, whereas studies measuring body appreciation, body satisfaction (positively framed), or related affirmative constructs were mapped to the positive-construct category. Where a single instrument captured both poles (e.g., a bipolar body-image scale), the study was assigned to the category corresponding to the predominant directional framing in the analysis.

Effect estimates were also assigned to one or more of three developmental age groups including; 5–12 years (childhood), 13–17 years (adolescence), and 18–25 years (emerging adulthood) using pre-existing per-row flags where available, otherwise derived from each study's age cohort field. Effects from samples falling within a single age group contributed to that group only; effects from samples spanning multiple age groups contributed to each spanned group, treating broad-age studies as informative for each developmental period they cover rather than discarding them. Studies whose samples fell entirely outside the 5–25 range were excluded. Counts and proportions are therefore reported at the effect-estimate level for the direction-of-effect analyses and at the unique-study level for the evidence gap maps, with multi-age studies counted in each group they span.

2.2.8 Critical appraisal of included studies

Risk of bias for the longitudinal primary studies contributing to this mapping was assessed using the ROBINS-I tool (Sterne et al., 2016). Although developed for non-randomised intervention studies, its seven-domain structure — covering confounding, participant selection, exposure classification, deviations from intended exposures, missing data, outcome measurement, and selection of the reported result — maps directly onto the methodological challenges that most affect causal inference in observational longitudinal research on digital technology and mental health, including confounding by prior mental health and family context, heterogeneity of exposure measurement, and selective reporting of significant cross-lagged effects from larger model spaces. Initial appraisals were conducted by Claude AI using the ROBINS-I signalling questions, with each domain judged on the standard scale (low, moderate, serious, critical, no information) and a corresponding overall judgement assigned. A random 10% sample of the appraisals was independently checked by a human reviewer; agreement between AI and human ratings was assessed at the domain level and resolved by discussion where it diverged, with the reviewer's judgement recorded as final in the cases of disagreement. Adjustment for the autoregressive effect of the outcome was not captured by the ROBINS-I signalling questions and was instead recorded manually during data extraction; this information was used to

contextualise the "confounding" domain rating rather than altering the standard ROBINS-I judgement.

2.2.9 Classification of findings

Findings were classified into eight categories at the level of individual effect estimates. Three categories cover the technology to mental health direction (harmful, beneficial, null), and five cover the mental health to technology direction (poor mental health increasing use, good mental health increasing use, poor mental health decreasing use, good mental health decreasing use, null). The asymmetric structure exists because mental health outcomes predicted from digital technology use are valenced constructs (e.g., "more technology use leads to more depression" and "more technology use leads to lower self-esteem" make the same substantive claim about valence of outcome), whereas digital technology use outcomes predicted from mental health are a behaviour and need to account for the valence of the predictor variable. Thus, the four directional patterns reflect distinct interpretive scenarios that should not be collapsed. These interpretations are shown in Table 2.1 for each of the eight categories of outcomes.

Table 2.1. *Operational categories defining direction of relationships between digital technology and mental health.*

Category	Direction	Meaning
1	Tech → MH; harmful	Higher digital technology use predicts worse mental health later (more depression, anxiety, loneliness, or lower wellbeing/self-esteem, etc).
2	Tech → MH; beneficial	Higher digital technology use predicts better mental health later (higher wellbeing/self-esteem, or less depression/anxiety, etc).
3	MH → Tech; poor/increasing	Poor mental health predicts more digital technology use later.
4	MH → Tech; good/increasing	Good mental health predicts more digital technology use later.
5	MH → Tech; poor/decreasing	Poor mental health predicts less digital technology use later.
6	MH → Tech; good/decreasing	Good mental health predicts less digital technology use later.
7	Tech → MH; null	Digital technology use does not predict change in mental health (null).
8	MH → Tech; null	Mental health does not predict change in digital technology use (null).

Note. In the figure shading, Categories 1, 3, and 4 are coloured orange for outcomes categorised as harmful or increasing technology use; Categories 2, 5, and 6 are coloured blue for outcomes categorised as beneficial or decreasing technology use); Categories 7 and 8 are null (grey). The harmful/increasing and beneficial/decreasing labelling is applied to enable interpretation of patterns of findings across the two temporal direction. This labelling for MH → Tech reflects a value judgement about whether technology use is a desirable behaviour, rather than a direct measurement of harm; alternative interpretive frames are defensible

2.3. Results

2.3.1 Critical appraisal of included studies

Critical appraisal of the 12 included messaging/chat studies was conducted using the ROBINS-I tool, with "intervention" interpreted as exposure to messaging/chat use. Overall risk of bias was rated Low for two studies (17%), Moderate for seven (58%), and Serious for three (25%), with no study rated Critical. The principal sources of bias were confounding (D1), rated Moderate or Serious in 75% of studies, and missing data (D5), rated Moderate or Serious in 42%. By contrast, classification of exposures (D3) and deviations from intended exposures (D4) were rated Low in all 12 studies (100%), while measurement of outcomes (D6) and selective reporting (D7) were rated Low in 75% and 67% respectively.

Critical appraisal of the 77 included gaming studies was conducted using the ROBINS-I tool, with "intervention" interpreted as exposure to videogame or gaming use. Overall risk of bias was rated Moderate for 59 studies (77%) and Serious for 18 (23%), with no study rated Low or Critical. Confounding (D1) was the principal source of bias, rated Moderate or Serious in 91% of studies, followed by missing data (D5), rated Moderate or Serious in 55% (Serious in 14%). Selective reporting (D7) was also frequently rated Moderate (88%), reflecting the near-universal absence of pre-registered protocols or statistical analysis plans across this observational literature. By contrast, deviations from intended exposures (D4) were rated Low in all 77 studies (100%), while selection of participants (D2), classification of exposures (D3), and measurement of outcomes (D6) were rated Low in 77%, 65%, and 60% of studies respectively.

Critical appraisal of the 126 included social media studies was conducted using the ROBINS-I tool, with "intervention" interpreted as exposure to social media, digital technology, or related online experiences. Overall risk of bias was rated Moderate for 99 studies (79%) and Serious for 26 (21%), with a single study (1%) rated Low and none rated Critical. Confounding (D1) was the principal source of bias, rated Moderate or Serious in 91% of studies (Serious in 12%), followed by measurement of outcomes (D6), rated Moderate or Serious in 83%, and classification of exposures (D3), rated Moderate or Serious in 78%. Selective reporting (D7) was also frequently rated Moderate (84%), again reflecting the near-universal absence of pre-registered protocols or statistical analysis plans, while missing data (D5) was rated Moderate or Serious in 62% (Serious in 12%). By contrast, deviations from intended exposures (D4) were rated Low in all 126 studies (100%), and selection of participants (D2) was rated Low in 36% (Serious in only 2%).

2.3.2 Study Characteristics

For the purposes of this chapter, we report synthesis of findings from data extracted from studies with longitudinal designs that examine the digital technologies of social media, gaming, and messaging/chat use. Although other study designs and technologies are pertinent to the question of the digital technology-mental health pathway, restricting our focus to these studies provided stronger alignment with other empirical data reported in the larger project.

Findings are organised by the six research questions of the longitudinal mapping. Each section opens with the research question, presents the supporting figures and tables, and closes with a brief synthesis of what the evidence answers.

This chapter reports the longitudinal mapping for the three digital technology categories that could be analysed as separate constructs in the included studies: social media (n = 126 verified studies, k = 725 effect estimates), gaming (n = 77 studies, k = 460 estimates), and messaging/chat (n = 12 studies, k = 53 estimates). In total, the mapping draws on 184 unique studies and 1,238 effect estimates. Numbers are reported as k (effect estimates) and n (unique studies) throughout.

2.3.3 Distribution of the evidence base

The first research question examining the distribution of the evidence is addressed by collating the number of longitudinal studies that have examined the temporal relationship between digital technology use and mental health across digital technology categories, mental health variables, and age groups.

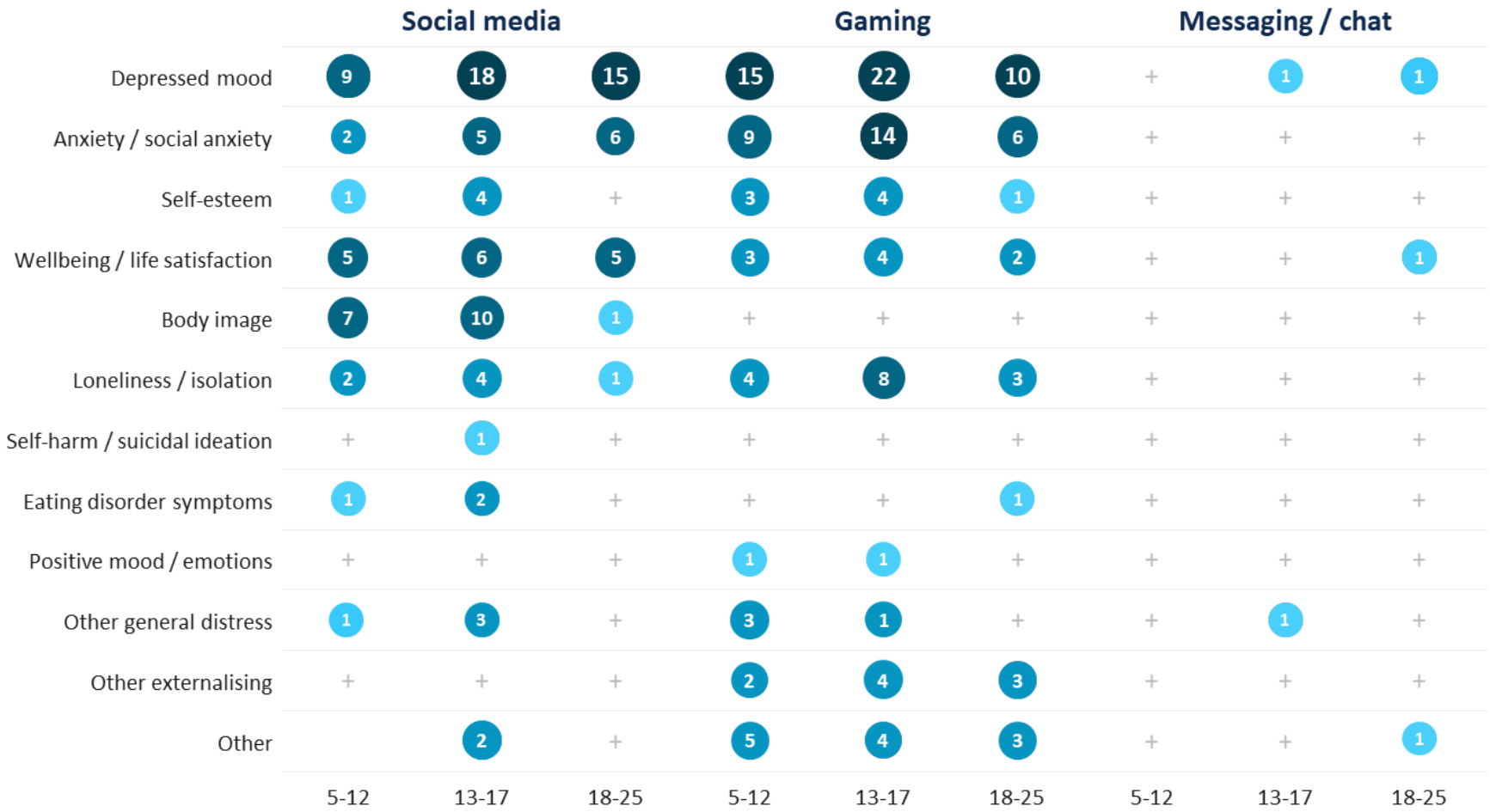
Findings are presented in two evidence maps showing studies examining the two directions of temporal associations between digital technology and mental health (Figures 2.2 and 2.3). Each evidence map presents the number of unique studies for all three technology categories (social media, gaming, messaging/chat) side by side against mental health variables within the three separate age groups (5–12, 13–17, 18–25 years). Unique study counts are represented by 'bubbles' with size scaled to reflect the number of unique studies contributing to each cell and, the exact study count shown inside each bubble. Cells with no contributing studies are marked with a small plus sign so that gaps are visible rather than hidden.

Four patterns of distribution are evident. First, the longitudinal evidence base is heavily concentrated in social media, with 126 studies, compared with 77 for gaming, and 12 for messaging/chat. Second, within each technology, studies are concentrated within the 13–17 age group. Across all three technologies, this is the densest column of the maps, with the 5–12 and 18–25 groups systematically under-represented. Third, the evidence is concentrated in internalising outcomes, particularly depressed mood (the densest cell across all three technologies and both directions) then to a lesser extent anxiety, along with wellbeing, and self-esteem; less common outcomes such as eating disorder symptoms, body image, loneliness/isolation and self-harm or suicidal ideation outcomes have markedly thinner evidence bases. Fourth, across all technologies, studies examining the effect of digital technology use on later mental health dominate, with double the number of studies examining this direction than the reverse. Specifically, for social media, the mental health to technology direction is examined in 52 studies (compared with 123 for technology to mental health); for gaming, 42 studies (versus 63); for messaging/chat, only 5 studies (versus 10). This asymmetry reflects that fewer studies analyse mental health as a predictor of subsequent technology use, even when the underlying longitudinal data would support such analyses.

Figure 2.2. *Evidence map of the number of studies examining the temporal association from digital technology use to mental health for social media, gaming, and messaging/chat across mental health outcome and age group.*

Note. The three panels (one per digital technology) show unique-study counts (bubble size and number) for each combination of mental health variable and age group. Empty cells are marked with a small plus sign. Darker bubbles indicate a higher number of unique studies.

Figure 2.3. *Evidence map of the number of studies examining the temporal association from mental health to digital technology use for social media, gaming, and messaging/chat across mental health outcome and age group.*



Note. The three panels (one per digital technology) show unique-study counts (bubble size and number) for each combination of mental health variable and age group. Empty cells are marked with a small plus sign. Darker bubbles indicate a higher number of unique studies.

2.3.4 Digital Technology to Mental Health: Direction of effect proportions

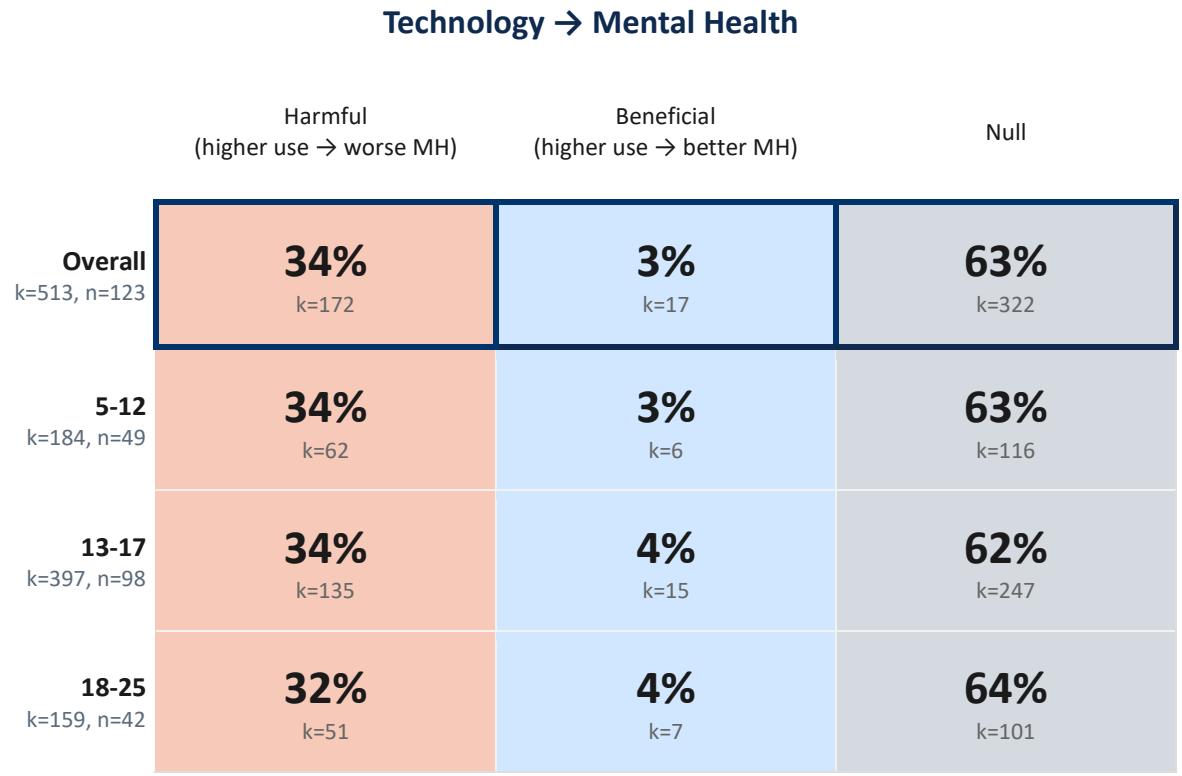
Within each of social media, gaming, and messaging/chat digital technology types, we sought to examine the proportion of longitudinal effects that indicate prediction of change in mental health from technology use. The direction-of-effect matrices are represented separately for each technology type in Figure 2.4 (social media), Figure 2.5 (gaming), and Figure 2.6 (messaging/chat), showing the proportions of evidence for each of the three effect types for digital technology's impact on mental health (harmful, beneficial or null effect). See section 2.2.9 for detail on how the effects were categorised.

2.3.4.1 Social media

Across the 513 social media technology to mental health effect estimates from 123 studies, null effects are the most frequently observed (modal) outcome (see Figure 2.4). That is, 63% of all estimates observed non-significant associations between earlier digital technology use and later mental health outcomes, 34% of estimates indicated harmful effects, (i.e., that greater use of technology predicted poorer subsequent mental health), and 3% of estimates indicated beneficial effects, (i.e., that greater use of technology predicted better subsequent mental health). Distribution of null, harmful, and beneficial effects is similar across age groups, described in further detail in section 2.3.6.

The substantively important finding is that null effects predominate over harmful effects in studies examining digital technology use as a predictor of later mental health. Across the social media evidence base, the majority of effect estimates failed to detect a directional effect of social media use on subsequent mental health. Where significant effects over time are observed, however, these are predominantly in the direction of social media use predicting poor mental health rather than good mental health over time.

Figure 2.4. *Direction-of-effect proportions for social media, looking at Tech → MH overall and by age group.*



Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate harmful (orange), beneficial (blue) and null (grey). Overall row outlined in navy.

2.3.4.1.1 Per-indicator analyses: Social media prediction of specific mental health indicators

Four mental health indicators meet the n > 10 studies threshold for separate analysis of the social media technology to mental health pathway: depressed mood (k = 195 estimates from n = 74 studies), anxiety/social anxiety (k = 96, n = 36), wellbeing/life satisfaction (k = 95, n = 25), and body image/disordered eating-related constructs[1] (k = 72, n = 16). Across all four indicators the pattern observed in the aggregate technology to mental health analysis is preserved: null effects are the modal outcome and beneficial effects are uniformly rare (3–6%). The harmful proportion is highest for depressed mood (34.9.0%, k = 68) and body image/disordered eating (30.6%, k = 22), followed by wellbeing/life satisfaction (29.5%, k = 28), with anxiety/social anxiety lowest at 29.2%, k = 22). Null effects are correspondingly highest for anxiety (67.7%%, k = 65) and wellbeing/life satisfaction (67.4%. k =64) and lowest for depressed mood (61.5%, k = 120). The substantive interpretation is that the modest directional effect observed across the social media technology to mental health evidence base is broadly consistent across these specific indicators (restricted to those with adequate study coverage), with depressed mood and body image/disordered eating

[1] Note that body image variables were coded with reference to valence, i.e., coding accounted for different valence of body appreciation-type variables versus body dissatisfaction-type variables

constructs showing somewhat stronger harmful proportions than anxiety or wellbeing/life satisfaction.

2.3.4.2 Gaming

The proportion of estimates from studies examining the effects of gaming technology on mental health show a broadly similar pattern to social media (see Figure 2.5). Across the 266 effect estimates from 63 studies examining associations between digital technology use and later mental health, null effects are the modal outcome at 59%, exceeding harmful effects at 35% and beneficial effects at 5%. Among adolescents, a slightly higher proportion of harmful effects and a slightly lower proportion of null effects were observed, relative to proportions of effects for both children and young adults. Further detail is provided in section 2.3.6.

Figure 2.5. *Direction-of-effect proportions for gaming, looking at Tech → MH overall and by age group.*

Technology → Mental Health

	Harmful (higher use → worse MH)	Beneficial (higher use → better MH)	Null
Overall k=266, n=63	**35%** k=94	**5%** k=14	**59%** k=158
5-12 k=102, n=34	**36%** k=37	**4%** k=4	**60%** k=61
13-17 k=194, n=43	**40%** k=77	**5%** k=9	**56%** k=108
18-25 k=81, n=17	**36%** k=29	**1%** k=1	**63%** k=51

Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate harmful (orange), beneficial (blue) and null (grey). Overall row is outlined in navy.

2.3.4.2.1 Per-indicator analyses: Gaming prediction of specific mental health indicators

Two mental health indicators meet the n > 10 studies threshold for separate analysis of the gaming technology to mental health pathway: depressed mood (k = 92, n = 38) and anxiety/social anxiety (k = 47, n = 21). Wellbeing/life satisfaction falls just below the threshold (k = 28, n = 10) and is therefore not analysed separately. For depressed mood, the gaming pattern closely mirrors the aggregate technology to mental health finding: null effects predominate at 57.6% (k = 53), harmful effects account for 35.9% (k = 33), and beneficial effects for 6.5% (k = 6) of estimates. For

anxiety/social anxiety, however, the pattern departs from the aggregate: null effects remain the modal outcome at 48.9% (k = 23), but are similar to the proportion for harmful effects at 46.8% (k = 22), with beneficial effects at 4.3% (k = 2). This outcome-specific pattern is noteworthy: gaming is the only technology × direction × indicator cell across the mapping where the harmful proportion is so closely similar to the null proportion. The suggests that the gaming technology to mental health effect is stronger for anxiety outcomes compared to depression, with the caveat that the underlying evidence base for gaming and anxiety (k = 47, n = 21) is substantially smaller than for gaming and depressed mood (k = 92, n = 38).

2.3.4.3 Messaging/chat

The messaging/chat evidence base is small (n = 11 studies for technology to mental health) and the patterns differ qualitatively from both social media and gaming. Across the 33 technology to mental health estimates, null effects are dominant with 61% of effects reflecting this result, with harmful effects at 27%, beneficial effects at 12%. Beneficial effects were most highly concentrated for studies with adolescent participants (17%), whereas the proportion of beneficial effects for studies with young adult participants were similar to those observed for social media and gaming studies. Effects specifically from studies among children are not separately interpreted as only two gaming studies with children were included in analyses. Age group patterns are described in further detail in section 2.3.6.

Figure 2.6. *Direction-of-effect proportions for messaging/chat, looking at Tech → MH overall and by age group.*

Technology → Mental Health

	Harmful (higher use → worse MH)	Beneficial (higher use → better MH)	Null
Overall k=33, n=11	**27%** k=9	**12%** k=4	**61%** k=19
5-12 k=2, n=2	**50%** k=1	**0%** k=0	**50%** k=1
13-17 k=22, n=7	**32%** k=7	**9%** k=2	**59%** k=12
18-25 k=20, n=4	**30%** k=6	**5%** k=1	**65%** k=13

Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate harmful (orange), beneficial (blue) and null (grey). Overall row is outlined in navy.

2.3.4.3.1 Per-indicator analyses: Messaging/chat predicting mental health indicators

No mental health indicator in the messaging/chat technology to mental health evidence base meets the n > 10 studies threshold for separate analysis. The most-studied indicators are depressed mood (n = 6 studies, k = 9 estimates) and wellbeing/life satisfaction (n = 2 studies, k = 7 estimates), both of which fall below the threshold. Per-indicator analyses for the messaging/chat technology to mental health pathway are therefore not reported.

2.3.4.4. Summary of direction-of-effect proportions

In summary, across social media and gaming studies, similar proportions of harmful (34% vs 35%) and null (63% vs 59%) technology to mental health effects were observed. A difference was observed for proportions of effects in the messaging/chat technology to mental health effect than for social media and gaming. In particular, the proportion of beneficial effects for messaging/chat (12%) is higher than those observed for either social media (3%) or gaming (5%), albeit on a much smaller sample of studies. However, the directional effect on all technologies is dominated by null findings, with harmful effects forming a substantial but minority share of estimates.

2.3.5 Mental health to Digital Technology Use: Direction of effect proportions

Within each of social media, gaming, and messaging/chat digital technology types, we sought to examine the proportion of longitudinal effects that indicate prediction of change in use of these technologies from mental health. The direction-of-effect matrices are represented separately for each technology type in Figure 2.7 (social media), Figure 2.8 (gaming), and Figure 2.9 (messaging/chat), showing the proportions of evidence for each of the three effect types for mental health's impact on digital technology use. The directions of effects from mental health to digital technology use preserves five operational categories for the types of effect, reflecting that earlier mental health can be categorised as poor or good, and each of these may predict increases or decreases in technology use or no change. See section 2.2.9 for a complete overview of the categorisation.

2.3.5.1 Social media

Across the 212 mental health to digital technology estimates from 52 studies on social media, null effects predominate at 75%, with the modal directional category being that poor mental health predicts increased digital technology use at 17%. As shown in Figure 2.7, the other three directional categories (poor mental health predicts decreased technology use, good mental health predicts increased technology use, and good mental health predicts decreased technology use) are each rare, occupying less than 4% of effect estimates. The pattern of effects across age groups is relatively similar, with further discussion in section 2.3.6.

Figure 2.7. *Direction-of-effect proportions for social media, looking at MH → Tech overall and by age group.*

Mental Health → Technology

	Poor MH → ↑ use	Good MH → ↑ use	Poor MH → ↓ use	Good MH → ↓ use	Null
Overall k=212, n=52	**17%** k=35	**4%** k=8	**0%** k=1	**3%** k=7	**75%** k=158
5-12 k=93, n=22	**14%** k=13	**1%** k=1	**0%** k=0	**1%** k=1	**84%** k=78
13-17 k=167, n=40	**19%** k=31	**3%** k=5	**1%** k=1	**4%** k=7	**73%** k=122
18-25 k=57, n=20	**16%** k=9	**5%** k=3	**0%** k=0	**2%** k=1	**74%** k=42

Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate increases in tech use (orange), decreases in tech use (blue) and null (grey). Overall row is outlined in navy.

2.3.5.1.1 Per-indicator analyses: Specific mental health indicators predicting social media use

Three mental health indicators meet the n > 10 studies threshold for separate analysis of the mental health to social media technology use pathway: depressed mood (k = 76, n = 28), anxiety/social anxiety (k = 46, n = 12), and body image/disordered eating (k = 47, n = 10). Wellbeing/life satisfaction falls below the threshold (k = 31, n = 9). Across all three qualifying indicators, null effects remain the modal outcome (75.0% for depressed mood, 84.8% for anxiety/social anxiety, 78.7% for body image/disordered eating), and for the significant directional effects, poor mental health predicting increased use was the most common for each mental health indicator (21.1%, 13%, and 14.9% respectively). The significant effect is therefore strongest for depressed mood (poor mental health to increased use at 21.6%, k = 16) and weakest for anxiety/social anxiety (poor mental health to increased use at 13%, k = 6). Estimates reflecting that good mental health increase social media use is essentially absent for depressed mood and anxiety (0% in both) and is also absent for body image/disordered eating (0%), in line with the aggregate finding that the dominant non-null pattern is poor mental health predicting subsequent increased use of social media rather than good mental health doing so. The interpretation most consistent with the per-indicator findings is that depression-related distress drives the selection pathway into social media use more strongly than anxiety-related distress does, and that body-image concerns sit between the two.

2.3.5.2 Gaming

The proportion of estimates from studies examining the effects of mental health on gaming technology use were examined. Gaming shows the strongest non-null mental health to digital technology effect of the three technologies. As show in Figure 2.8, across the 187 estimates from 42 studies, the category whereby poor mental health predicts increased gaming use accounts for 29% of effect estimates, while null effects remain the modal category (65%). The category by which good mental health predicts increased use is entirely absent (0% across all age groups), in contrast to social media where this category is present, albeit at a low proportion (4%). Slight differences across age groups were observed, with incrementally higher proportion of null effects with increased age (lowest proportion of null effects in children; highest proportion of null effects in young adults). These are discussed further in section 2.3.6.

Table 2.8. *Direction-of-effect proportions for gaming, looking at MH → Tech overall and by age group.*

Mental Health → Technology

	Poor MH → ↑ use	Good MH → ↑ use	Poor MH → ↓ use	Good MH → ↓ use	Null
Overall k=187, n=42	**29%** k=54	**0%** k=0	**3%** k=6	**3%** k=5	**65%** k=121
5-12 k=92, n=26	**37%** k=34	**0%** k=0	**4%** k=4	**2%** k=2	**57%** k=52
13-17 k=152, n=33	**28%** k=43	**0%** k=0	**4%** k=6	**2%** k=3	**65%** k=99
18-25 k=83, n=14	**19%** k=16	**0%** k=0	**7%** k=6	**2%** k=2	**71%** k=59

Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate increases in tech use (orange), decreases in tech use (blue) and null (grey). Overall row is outlined in navy.

2.3.5.2.1 Per-indicator analyses: Specific mental health indicators predicting gaming use

Two mental health indicators meet the n > 10 studies threshold for separate analysis of the mental health to gaming technology use pathway: depressed mood (k = 67, n = 26) and anxiety/social anxiety (k = 39, n = 16). Wellbeing/life satisfaction falls below the threshold (k = 12, n = 6). For both qualifying indicators, the proportion of estimates indicating that poor mental health predicts increased gaming use) is substantially larger than in the corresponding proportion observed for social media, i.e., 31.3% (k = 21) for depressed mood and 35.9% (k = 14) for anxiety/social anxiety in

gaming studies, compared with 21.1% and 13% respectively for social media. Null effects account for the remainder in each case (63.6% and 64.1%) The indicator-specific findings strengthen the aggregate-level interpretation that gaming selection is dominated by poor mental health predicting increased use, and indicate that this pathway is at least as strong for anxiety as for depressed mood — possibly somewhat stronger, although the modest size of the gaming-anxiety evidence base (n = 16 studies) limits confidence in the magnitude of this contrast.

2.3.5.3 Messaging/chat

The evidence base for effects examining the effect of mental health on subsequent use of messaging/chat is small. As shown in Figure 2.9., the 20 mental health to digital technology use estimates from 5 studies on messaging/chat are dominated almost entirely by null findings (95%); only one estimate falls into a directional category, whereby poor mental health predicts increased use of messaging/chat. The limited number of available studies prevents any conclusive inferences. The contrast with social media (17%) and gaming (29%) for this category of outcome is nevertheless notable.

Figure 2.9. *Direction-of-effect proportions for messaging/chat, looking at MH → Tech overall and by age group.*

Mental Health → Technology

	Poor MH → ↑ use	Good MH → ↑ use	Poor MH → ↓ use	Good MH → ↓ use	Null
Overall k=20, n=5	**10%** k=2	**0%** k=0	**0%** k=0	**0%** k=0	**90%** k=18
5-12 k=0, n=0	**0%** k=0	**0%** k=0	**0%** k=0	**0%** k=0	**0%** k=0
13-17 k=8, n=3	**25%** k=1	**0%** k=0	**0%** k=0	**0%** k=0	**75%** k=6
18-25 k=18, n=3	**6%** k=1	**0%** k=0	**0%** k=0	**0%** k=0	**94%** k=17

Note. k = number of effect estimate, n = number of studies. 5-12, 13-17 and 18-25 presented in the first column indicate the three groupings of age ranges the direction of effects relate to; the first row represents the percentage of direction-of-effects for all age groups together. Cell shadings indicate increases in tech use (orange), decreases in tech use (blue) and null (grey). Overall row is outlined in navy.

2.3.5.3.1 Per-indicator analyses: Specific mental health indicators predicting gaming use

No mental health indicator in the mental health to messaging/chat use evidence base meets the n > 10 studies threshold for separate analysis. The most-studied indicators are wellbeing/life satisfaction (n = 1 study, k = 6 estimates) and depressed mood (n = 2 studies, k = 3 estimates), both substantially below the threshold. Per-indicator analyses for the mental health to messaging/chat pathway are therefore not reported, and inference about indicator-specific selection effects awaits future studies.

2.3.6 Variation in effect proportions by age group

After analysing the direction-of-effect proportions by technology type, we sought to investigate any variations in these proportions based on the three age groups (5-12, 13-17 and 18-25 years of age). The per-age-group rows of Figures 2.4 to 2.9 present the proportions of effects for outcome categories across each age group. Three patterns of age-group variation emerge.

2.3.6.1 Social media

In the technology to mental health direction, variation in the harmful proportion is essentially flat across age groups, at 34% in 5–12, 34% in 13–17, and 32% in 18–25. Null effects similarly show little variation across age (63%, 62%, and 64% respectively), and beneficial effects are uniformly rare across all age groups (3–4%). The technology to mental health social media pattern is therefore developmentally consistent, with no evidence of stronger harmful effects in any particular age group. In the mental health to technology use direction, the effect whereby poor mental health predicts increased social media use is somewhat higher in 13–17 (19%) than in 5–12 (14%) and 18–25 (16%), although the differences are modest.

2.3.6.2 Gaming

In the technology to mental health direction for gaming, the harmful proportion is relatively stable across age groups at 36% in 5–12, 40% in 13–17, and 36% in 18–25, with null effects also broadly stable (60%, 56%, 63% respectively). In the mental health to technology direction, the effect whereby poor mental health increases gaming use is most pronounced in the 5–12 group (37%), declining to 28% in 13–17 and 19% in 18–25; the absence of good mental health increasing gaming use is consistent across all three age groups.

2.3.6.3 Messaging/chat

Age group variation in the messaging/chat evidence base is difficult to interpret given the small underlying number of studies. For technology to mental health directions, the 5–12 age group has only 2 estimates (split between harmful and null effects). The 13–17 (k = 22) and 18–25 (k = 20) age groups have slightly more studies but still a low number. For the mental health to technology use direction, the 5–12 age group had no relevant effects and the 13-17 and 18-25 age group only had proportions above 0% for null effects (k = 6, k = 17 respectively) and a very minimal number (k = 1 for both) for the effect whereby poor mental health increases messaging/chat use.

2.3.7 Cross-technology comparison of temporal associations between digital technology use and mental health

Drawing on the results from sections 2.3.4 and 2.3.5, we sought to take the separate analyses of the three digital technology categories (social media, gaming and messaging/chat) and directly compare them. When analysed collectively, four substantive patterns emerge that are not visible from analysing any single technology in isolation.

Social media and gaming show similar harmful digital technology to mental health proportions

Social media and gaming show closely comparable proportions of harmful effects whereby use of social media and gaming predict subsequent poor mental health (34% and 35% respectively), with messaging/chat lower at 27%. However, some slight differences were observed in examination of individual mental health outcomes. Specifically, gaming was more likely to predict increases in anxiety (48.6%) than social media to predict subsequent anxiety (29.2%).

The mental health to technology effect is strongest for gaming

The largest mental health to digital technology use effect is observed for gaming: 29% of effect estimates show that poor mental health predicts increased gaming use, exceeding the 17% observed for social media. Effects whereby good mental health predicts increased digital technology use) is essentially absent from the evidence base for all technologies (4% social media, 0% gaming, and 0% messaging/chat), albeit on a much smaller evidence base.

Messaging/chat shows the most distinctive direction-of-effect profile

Outcomes for messaging/chat differ from both social media and gaming on three dimensions: somewhat lower harmful proportions in the digital technology use to mental health effects (27% versus 34–35%), markedly higher beneficial proportions in technology use to mental health effects (12% versus 3–5%), and a near-absence of mental health to technology use selection effects (i.e., 90% of effects were null for messaging/chat versus 65–75% null effects for the other technologies). Confidence in these messaging-specific patterns is limited by the small number of studies (12 studies total for messaging/chat).

Null effects are common across all three technologies and both directions

Across digital technology use to subsequent mental health, the most common outcomes are null effects. Null proportions range from 59% (gaming), to 61% (messaging/chat) and 63% (social media). Across mental health to subsequent use of digital technology, null proportions range from 65% (gaming) to 75% (social media) to 95% (messaging/chat). For all technologies and in both directions of analysis, null effects are the most frequent outcome, and in most sub-groupings of the evidence base they account for a clear majority of effect estimates.

2.3.8 Evidence gaps and research priorities

Given the current evidence base for longitudinal research, there is a need to identify what gaps remain to be addressed (including consideration of technology type, mental health outcomes and age groups), and how this should be used to develop directions for future research. When looking at the 184 studies included, the full mapping spans 216 cells of the evidence space (3 technologies × 2 directions × 12 mental health variables × 3 age groups). Of these, 81 cells (38%) contain no

studies at all, a further 63 cells (29%) contain only 1–2 studies, and 72 cells (33%) have 3 or more studies. The mapping therefore reveals as much by what is absent as by what is present. Three categories of gap in particular merit specific attention.

2.3.8.1 Cross-technology imbalance

Empty cell counts vary dramatically by technology: 16 of 72 (22%) cells are empty for social media, 16 of 72 (22%) for gaming, and 49 of 72 (68%) for messaging/chat. The messaging/chat evidence base is therefore not just smaller in aggregate but also patchier in its coverage — most cells of the evidence map contain no longitudinal evidence at all. This imbalance does not reflect the relative population reach of these technologies as messaging is among the most-used digital technologies for young people.

2.3.8.2 Construct-level gaps

Several conceptually important mental health variables are sparsely represented across all three technologies. Self-harm and suicidal ideation, a key concern for public-policy that has driven much of the policy debate around digital technology and youth mental health, is examined longitudinally in only 8 social media studies (k = 33 estimates), 6 gaming studies (k = 20), and 2 messaging/chat studies (k = 9). Eating disorder symptoms are similarly under-investigated, particularly in gaming and messaging/chat. Closing these gaps is a research priority that follows directly from the mapping.

2.3.8.3 Age-group gaps

Across all three technologies, the 13–17 age group is consistently the densest and the 5–12 and 18–25 groups are systematically under-represented. For social media, 99 of 126 studies (79%) include 13–17-year-olds in their analytical samples, compared with 50 (40%) including 5–12-year-olds and 44 (35%) including 18–25-year-olds. The 5–12 age group is particularly important to develop further because uptake of digital technology commonly begins in childhood and because longitudinal effects observed in adolescence may be partly driven by mental health vulnerabilities established earlier. The 18–25 age group, although less commonly framed as a target for digital-media research, is a critical period for emerging mental health conditions and deserves more attention than it has received.

2.3.8.4 Direction-of-analysis gaps

Across all three technologies, the mental health to digital technology use direction of effects is examined in considerably fewer studies than the digital technology use to mental health direction: 52 versus 123 studies for social media; 42 versus 63 for gaming; 5 versus 11 for messaging/chat. This asymmetry persists even though most longitudinal designs in the review could in principle support analyses in both directions. Bidirectional designs (which examine both directions in the same study) are increasingly common in the cross-lagged panel literature, but only 49 of 126 social media studies (39%) explicitly examined both directions; for gaming and messaging/chat the proportions are lower still. Increasing the proportion of studies that systematically examine the mental health to digital technology use direction — ideally as part of bidirectional designs — is a methodological priority.

2.4. Summary and Discussion

This review of longitudinal papers looking at the relationship between digital technology and mental health across time found some important considerations from the literature. Analysis revealed that across technology types and age groups, most effect estimates returned null results. Comparison across age groups also suggested a mostly consistent pattern. Of the significant directional effects, there was more evidence to support digital technology use leading to subsequent poor mental health, with significant beneficial effects consistently rare across the three technologies. A noteworthy harmful effect was that gaming use on later anxiety symptoms was the only specific mental health outcome amongst all technologies to be approximately equivalent in proportion to the null effects; suggesting that the relationship between gaming and anxiety may be worth exploring further.

A smaller number of studies investigated mental health to technology. Effects in this direction were also mostly null, but of the directional effects, the pattern trended towards poor mental health increasing technology use (as opposed to good mental health increasing use, or either decreasing use). This was consistent across both social media and gaming technology types. This suggests that when looking at how mental health might predict subsequent technology use, social media and gaming serve primarily as a coping strategy, with young people turning to these technologies to escape, distract or relax from poor mental health or distress. Comparatively, messaging/chat had a lower proportion of directional effects that indicated poor mental health increased messaging, which could suggest that this technology type is less driven by mental health states than social media and gaming. However, the minimal evidence base available for messaging/chat means any inference needs to be addressed with caution, but particularly for mental health's impact on technology (where only n = 5 studies were included). The lack of research is itself an important finding, showing that despite the high prevalence of use, messaging/chat has received less attention in the literature.

The gaps present in the current evidence base and the proportion of null versus significant effects means all interpretation of findings must be carefully considered and any conclusions made tentatively. Null findings were the most common finding for all technologies and directions, and were more or equally common across most cells of the evidence base. This is particularly relevant in the context of existing public discourse, which has tended to assume digital technologies (and social media in particular) worsens mental health outcomes. Longitudinal findings suggest this link is not as strong as previously thought, but more work is needed to make any conclusive statements about the relationship between technology and mental health over time.

2.4.1. Strengths and Limitations

2.4.1.1. Strengths

This review has several methodological strengths. First, the search strategy was developed in consultation with an information specialist and executed across four cross-disciplinary databases (MEDLINE, PsycINFO, Sociological Abstracts, Scopus), capturing literature from psychology, biomedicine, sociology, and computer science. Second, the longitudinal mapping uses a transparent direction-of-effect classification (Table 2.1) that preserves the asymmetry between technology use to mental health and mental health to technology use pathways, allowing

selection and harm pathways to be examined separately rather than collapsed. Third, results are reported simultaneously at the effect-estimate level (k) and the unique-study level (n), making the distinction between estimate-rich and study-poor cells visible to readers. Finally, age-group coverage is examined at three developmental periods (5–12, 13–17, 18–25), with multi-group samples contributing to each age bracket rather than discarded, which preserves descriptive information about which periods the evidence does and does not address.

2.4.1.2. Limitations of the evidence base

Several limitations relate to the underlying primary studies rather than to the review process itself. Exposure measurement is highly heterogeneous: self-reported time-use estimates remain the dominant metric despite well-documented inaccuracy relative to device-logged measures, and operationalisations of constructs such as "problematic" or "addictive" use vary substantially across scales. This heterogeneity limits the comparability of effect estimates and is one reason the present review reports direction-of-effect categories rather than pooled effect sizes. Mental health measurement is similarly variable, with depression, anxiety, and wellbeing assessed using a wide range of instruments differing in screening versus diagnostic intent, time frame, and cultural validation.

Confounding by prior mental health, family context, and socioeconomic position is incompletely addressed in much of the included literature. While cross-lagged panel models and related designs adjust for the autoregressive effect of the outcome, time-varying confounders are rarely modelled, and few studies use within-person specifications that separate between-person from within-person variation.

The evidence base is geographically and developmentally uneven. Studies are concentrated in high-income countries and in the 13–17 age group, with the 5–12 and 18–25 groups systematically under-represented across all three technology categories. Studies of messaging/chat are particularly sparse (n = 12), and several conceptually important outcomes — self-harm and suicidal ideation, eating disorder symptoms, externalising outcomes — have thin longitudinal evidence bases across all three technologies. These gaps are themselves substantive findings but they limit the strength of inference that can be drawn for the under-represented cells of the evidence map.

2.4.1.3. Limitations of the review process

Several scope decisions shape what this review can and cannot say. The 2010 publication cut-off for the included studies aligns with the launch of major image-based platforms but excludes earlier longitudinal cohorts that examined first-generation internet and online communication technologies; some of those studies remain relevant to current questions about messaging and chat. The English-language restriction reflects translation resource constraints and means that potentially relevant longitudinal evidence published in other languages — particularly from East Asian and European research groups active in this field — is not represented. The exclusion of cross-sectional and qualitative studies, which is a deliberate scope decision rather than a quality judgement, narrows the inclusions to studies that can support inferences about temporal sequence and necessarily omits hypothesis-generating evidence on mechanisms, lived experience, and contextual moderators.

The review excluded studies that aggregated multiple technologies into a single composite "screen time" measure without permitting decomposition. This is methodologically appropriate for technology-specific inference but does mean that a substantial portion of the longitudinal screen-time literature does not contribute to the present mapping. It also means the review cannot speak to the cumulative effects of multi-technology use patterns, which may differ from the sum of single-technology effects.

The longitudinal mapping is restricted to three technology categories — social media, gaming, and messaging/chat — that could be analysed as separable constructs in the included studies. Other digital exposures (e.g., video streaming, content creation on user-generated platforms, generative AI tools, learning platforms, virtual reality) are absent from the longitudinal evidence base in numbers sufficient for separate analysis. The conceptual taxonomy of features and affordances developed for the broader review is therefore only partially populated by longitudinal data, and the present chapter does not attempt feature-level synthesis.

The direction-of-effect mapping does not weight estimates by precision or sample size, and individual studies vary substantially in both. A study contributing a single, highly powered cross-lagged effect estimate contributes one row to the corresponding cell, as does a study contributing one of many estimates from a sub-group analysis in a smaller sample. The headline proportions in this chapter should be read as descriptive summaries of the longitudinal evidence base rather than as effect-size estimates. Where a single effect estimate spans two construct categories (for example, a composite internalising scale), the row was mapped to both relevant cells; this preserves substantive content at the cost of mild inflation of k relative to the count of distinct estimates.

Title-and-abstract screening was supported by Rayyan's machine-learning prioritisation with a pre-specified stopping rule, which is consistent with current recommendations for high-volume systematic search workflows but carries some residual risk of missing eligible records ranked low by the classifier. A random sample of low-ranked records was reviewed to verify that stopping had not omitted eligible studies, and the verification procedure is documented in Section 2.2.5; the procedure cannot, however, guarantee a complete accumulation.

2.4.2. Implications for future research

The mapping identifies three concrete priorities for future longitudinal research on digital technology and youth mental health:

- **Expand the messaging/chat evidence base,** particularly for the mental health to digital technology use direction, the 5–12 age group, and outcomes beyond depressed mood and anxiety. The current evidence base of 12 studies is too thin to support confident inference and is inconsistent with the population reach of messaging technologies.
- **Develop the evidence base on consequential, lower-frequency outcomes,** particularly self-harm and suicidal ideation and eating disorder symptoms across all three technologies. These outcomes drive much of the public-policy debate but are sparsely represented in the longitudinal evidence.

- **Extend coverage at both ends of the developmental age range.** The 5–12 age group is particularly important because digital technology uptake commonly begins in childhood and the patterns established in this period may shape the trajectories observed in adolescence. The 18–25 age group warrants more attention than it has received given its overlap with peak emergence of several mental health conditions.
- **Adopt bidirectional designs as the default for new studies,** particularly cross-lagged panel models that allow digital technology use to mental health and mental health to digital technology use pathways to be examined in parallel within the same sample. This would address the persistent asymmetry between the two directions of analysis and would substantially improve the inferential basis for claims about whether digital technology drives mental health change, mental health drives technology use change, or both.

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Appendices

Appendix A. Search Strategy Medline

#	Query	Results from 19 Aug 2025
1	adolescent/ or young adult/ or child/	3,859,233
2	(adolescen* or teen* or youth or "young adult*" or "young person*" or "young people*" or child* or kid or kids or girls or boys).ti,ab.	2,217,539
3	1 or 2	4,677,446
4	Social Media/	20,275
5	social networking/ or online social networking/	6,429
6	("social media" or "social network*").ti,ab.	65,274
7	(facebook or instagram or tiktok or youtube or snapchat or whatsapp or wechat).ti,ab.	17,901
8	(smartphone* or "smart phone*").ti,ab.	32,238
9	("i phone*" or iphone).ti,ab.	1,386
10	Smartphone/	11,944
11	"digital technology".ti,ab.	3,984
12	gaming.ti,ab.	6,689
13	"online platform*".ti,ab.	4,306
14	"recommender system*".ti,ab.	694
15	("messaging app*" or "facebook messenger").ti,ab.	560
16	or/4-15	126,382
17	Mental Health/	74,139
18	Depression/	172,381
19	Anxiety/	123,121
20	anxiety disorders/ or generalized anxiety disorder/	45,093
21	exp "Quality of Life"/	309,815

22	self concept/ or exp body image/ or self-assessment/ or self-compassion/ or social comparison/	92,729
23	Loneliness/	8,361
24	Stress, Psychological/	143,915
25	Knowledge/	15,610
26	social skills/	3,115
27	Learning/	89,652
28	self-injurious behavior/ or self mutilation/ or suicide/ or suicidal ideation/ or suicide prevention/ or suicide, attempted/ or suicide, completed/	84,681
29	"mental health".ti,ab.	265,297
30	(wellbeing or "well being").ti,ab.	183,469
31	(illbeing or "ill being").ti,ab.	446
32	(depression or depressed).ti,ab.	539,011
33	anxiety.ti,ab.	310,384
34	"quality of life".ti,ab.	453,297
35	"life satisfaction".ti,ab.	13,316
36	"positive affect".ti,ab.	8,900
37	"self esteem".ti,ab.	28,429
38	loneliness.ti,ab.	16,227
39	"psychological* distress*".ti,ab.	33,800
40	suicidal.ti,ab.	44,265
41	envy.ti,ab.	826
42	("self harm*" or "self injur*" or "self mutilat*").ti,ab.	18,324
43	sleep*.ti,ab.	269,815
44	learning.ti,ab.	606,177
45	attention.ti,ab.	655,287

46	Knowledge.ti,ab.	1,059,530
47	skills.ti,ab.	229,872
48	concentration.ti,ab.	1,492,915
49	or/17-48	5,448,771
50	3 and 16 and 49	16,022
51	limit 50 to (english language and yr="2010 -Current")	15,175

Appendix B. Search Strategy PsychINFO

#	Query	Results from 19 Aug 2025
1	(adolescen* or teen* or youth or "young adult*" or "young person*" or "young people*" or child* or kid or kids or girls or boys).ti,ab.	1,138,395
2	social media/ or online social networks/	29,861
3	("social media" or "social network*").ti,ab.	58,536
4	(facebook or instagram or tiktok or youtube or snapchat or whatsapp or wechat).ti,ab.	12,774
5	(smartphone* or "smart phone*").ti,ab.	9,867
6	("i phone*" or iphone*).ti,ab.	460
7	smartphones/ or "smartphone use"/	5,248
8	"digital technology".ti,ab.	2,250
9	gaming.ti,ab.	7,726
10	"online platform*".ti,ab.	2,020
11	"recommender system*".ti,ab.	786
12	("messaging app*" or "facebook messenger").ti,ab.	263
13	or/2-12	89,429
14	mental health/ or emotional health/ or youth mental health/	110,905
15	"Depression (Emotion)"/ or Major Depression/	198,462
16	anxiety/ or anxiety disorders/ or generalized anxiety disorder/	111,930
17	"quality of life"/	53,248
18	self-concept/ or self-esteem/ or self-worth/	75,771
19	exp Body Image/	17,277
20	self-evaluation/	11,541
21	social comparison/	4,957

22	loneliness/	9,061
23	psychological stress/	10,244
24	social skills/	16,878
25	learning/	82,462
26	nonsuicidal self-injury/ or self-inflicted wounds/	8,613
27	Youth Suicide/ or Attempted Suicide/ or Suicide Prevention/ or Suicide/ or Suicide Risk Assessment/	45,966
28	"mental health".ti,ab.	264,595
29	(wellbeing or "well being").ti,ab.	149,351
30	(illbeing or "ill being").ti,ab.	559
31	(depression or depressed).ti,ab.	330,358
32	anxiety.ti,ab.	256,344
33	"quality of life".ti,ab.	95,852
34	"life satisfaction".ti,ab.	18,997
35	"positive affect".ti,ab.	13,988
36	"self esteem".ti,ab.	51,434
37	loneliness.ti,ab.	16,596
38	"psychological* distress*".ti,ab.	27,600
39	suicidal.ti,ab.	40,945
40	envy.ti,ab.	2,914
41	("self harm*" or "self injur*" or "self mutilat*").ti,ab.	17,331
42	sleep*.ti,ab.	97,237
43	learning.ti,ab.	466,869
44	attention.ti,ab.	324,756
45	Knowledge.ti,ab.	389,298

46	skills.ti,ab.	236,726
47	concentration.ti,ab.	42,941
48	or/14-47	2,177,730
49	1 and 13 and 48	9,847
50	Limit 49 to (peer reviewed journal and english language and yr="2010 -Current")	6272

Appendix C. Search Strategy Social Science Database (ProQuest)

Set#	Searched for	Results
S1	MAINSUBJECT.EXACT("Children & youth")	72228
S2	noft(adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)	369894
S3	[S1] OR [S2]	369894
S4	MAINSUBJECT.EXACT(Social networks)	39683
S5	noft("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")	65655
S6	[S4] OR [S5]	65655
S7	MAINSUBJECT.EXACT("Mental health") OR MAINSUBJECT.EXACT("Mental depression") OR MAINSUBJECT.EXACT("Anxiety") OR MAINSUBJECT.EXACT("Generalized anxiety disorder") OR MAINSUBJECT.EXACT("Anxiety disorders")	92429
S8	MAINSUBJECT.EXACT("Quality of life") OR MAINSUBJECT.EXACT("Self esteem") OR MAINSUBJECT.EXACT("Body image") OR MAINSUBJECT.EXACT("Self evaluation") OR MAINSUBJECT.EXACT("Self image")	39583
S9	MAINSUBJECT.EXACT("Loneliness") OR MAINSUBJECT.EXACT("Knowledge") OR MAINSUBJECT.EXACT("Social skills") OR MAINSUBJECT.EXACT("Learning")	48047
S10	noft("mental health" OR wellbeing OR "well being" OR illbeing OR "ill being" OR depression OR depressed OR anxiety OR "quality of life" OR "life satisfaction" OR "positive affect" OR "self esteem" OR loneliness OR "psychological* distress*" OR suicidal OR envy OR "self harm*" OR "self injur*" OR "self mutilat*" OR sleep* OR learning OR attention OR knowledge OR skills OR concentration)	528679
S11	MAINSUBJECT.EXACT("Suicides & suicide attempts")	13193

S12	[S7] OR [S8] OR [S9] OR [S10] OR [S11]	537534
S13	[S3] AND [S6] AND [S12]	4382
S14	([S3] AND [S6] AND [S12]) AND stype.exact("Scholarly Journals" OR "Dissertations & Theses" OR "Conference Papers & Proceedings")	4035
S15	([S3] AND [S6] AND [S12]) AND (stype.exact("Scholarly Journals" OR "Dissertations & Theses" OR "Conference Papers & Proceedings") AND yr(2010-2029))	3609
S16	([S3] AND [S6] AND [S12]) AND (stype.exact("Scholarly Journals" OR "Dissertations & Theses" OR "Conference Papers & Proceedings") AND la.exact("ENG") AND yr(2010-2029))	3464

Appendix D. Search Strategy Scopus

#	Query	Results
1	TITLE-ABS (adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)	3558213
2	TITLE-ABS ("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone* OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")	640987
3	TITLE-ABS ("mental health" OR depression OR depressed OR anxiety OR "quality of life" OR "self concept" OR "body image" OR "self assessment" OR "self compassion" OR "social comparison" OR loneliness OR "psychological* distress*" OR knowledge OR "social skills" OR learning OR "self harm" OR "self injur*" OR "self mutilat*" OR suicidal OR suicide OR wellbeing OR "well being" OR illbeing OR "ill being" OR "life satisfaction" OR "positive affect" OR "self esteem" OR envy OR sleep* OR attention OR skills OR concentration)	15076905
4	(TITLE-ABS (adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)) AND (TITLE-ABS ("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone* OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")) AND (TITLE-ABS ("mental health" OR depression OR depressed OR anxiety OR "quality of life" OR "self concept" OR "body image" OR "self assessment" OR "self compassion" OR "social comparison" OR loneliness OR "psychological* distress*" OR knowledge OR "social skills" OR learning OR "self harm" OR "self injur*" OR "self mutilat*" OR suicidal OR suicide OR wellbeing OR "well being" OR illbeing OR "ill being" OR "life satisfaction" OR "positive affect" OR "self esteem" OR envy OR sleep* OR attention OR skills OR concentration))	24518
5	(TITLE-ABS (adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)) AND (TITLE-ABS ("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone* OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")) AND (TITLE-ABS ("mental health" OR depression OR depressed OR anxiety OR "quality of life" OR "self concept" OR "body image" OR "self assessment" OR "self compassion" OR "social comparison" OR loneliness OR "psychological* distress*" OR knowledge OR "social skills" OR learning OR "self harm" OR "self injur*" OR "self mutilat*" OR suicidal OR suicide OR wellbeing OR "well being" OR illbeing OR "ill being" OR "life satisfaction" OR "positive affect" OR "self	20438

	esteem" OR envy OR sleep* OR attention OR skills OR concentration)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp"))	
6	(TITLE-ABS (adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)) AND (TITLE-ABS ("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone* OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")) AND (TITLE-ABS ("mental health" OR depression OR depressed OR anxiety OR "quality of life" OR "self concept" OR "body image" OR "self assessment" OR "self compassion" OR "social comparison" OR loneliness OR "psychological* distress*" OR knowledge OR "social skills" OR learning OR "self harm" OR "self injur*" OR "self mutilat*" OR suicidal OR suicide OR wellbeing OR "well being" OR illbeing OR "ill being" OR "life satisfaction" OR "positive affect" OR "self esteem" OR envy OR sleep* OR attention OR skills OR concentration)) AND PUBYEAR > 2009 AND PUBYEAR < 2027 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp"))	19607
7	(TITLE-ABS (adolescen* OR teen* OR youth OR "young adult*" OR "young person*" OR "young people*" OR child* OR kid OR kids OR girls OR boys)) AND (TITLE-ABS ("social media" OR "social network*" OR facebook OR instagram OR tiktok OR youtube OR snapchat OR whatsapp OR wechat OR smartphone* OR "smart phone*" OR iphone* OR "i phone*" OR "digital technology" OR gaming OR "online platform*" OR "recommender system*" OR "messaging app*" OR "facebook messenger")) AND (TITLE-ABS ("mental health" OR depression OR depressed OR anxiety OR "quality of life" OR "self concept" OR "body image" OR "self assessment" OR "self compassion" OR "social comparison" OR loneliness OR "psychological* distress*" OR knowledge OR "social skills" OR learning OR "self harm" OR "self injur*" OR "self mutilat*" OR suicidal OR suicide OR wellbeing OR "well being" OR illbeing OR "ill being" OR "life satisfaction" OR "positive affect" OR "self esteem" OR envy OR sleep* OR attention OR skills OR concentration)) AND PUBYEAR > 2009 AND PUBYEAR < 2027 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp")) AND (LIMIT-TO (LANGUAGE , "English"))	18508

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Chapter 3

Analysis of Existing Longitudinal Datasets

Chapter 3. Analysis of Existing Longitudinal Datasets

Overview

This technical chapter provides analysis of three pre-existing longitudinal databases of Australian children and young people. These are the Children to Adult Transition Study (CATS), the Risk to Adolescent Wellbeing (RAW) project, and the Longitudinal Study of Australian Children (LSAC).

For each of these databases, the same cohort of participants provided annual or biannual data across several waves of data collection. Of interest for the present project are data that provide insights into digital technology use, the relationship between technology use and mental health over time, and factors associated with the type of digital technology and characteristics of the child or young person that affect the technology-mental health relationship.

For the purposes of this Final Report submission, four separate sections are submitted. These contain analyses of:

1. The CATS dataset: analyses explore the relationships from social media use to mental health outcomes over time in sub-groups of youth exposed to social disadvantage.
2. The CATS dataset: analyses explore the relationships from to mental health to social media use over time.
3. The RAW dataset.
4. The LSAC dataset.

Chapter 3.A. CATS Dataset – Subgroup Analyses

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3.1 Background

Social media is a ubiquitous part of adolescence, with young people using digital platforms for social connection, self-expression, and identity exploration. In Australia, more than 90% of adolescents report daily social media use, often for several hours per day (Office of the eSafety Commissioner, 2022). This unprecedented shift in the social landscape has sparked widespread concern about potential mental health consequences, particularly given the concurrent rise in adolescent depression, anxiety, and self-harm over the past decade. While there is growing empirical evidence linking social media use to poorer mental health, findings remain inconsistent and effect sizes are typically small and highly variable across individuals (Ivie et al., 2020; Odgers & Jensen, 2020; Valkenburg et al., 2022). This may reflect differential effects across individual and contextual factors, such as gender and sexual identity, and prior exposure to stressors or adversity. Identifying the conditions under which social media use confers risk or resilience for mental health is therefore an urgent public health priority.

Social media use likely plays a complex role in gender and sexual minority youth. Digital platforms can provide environments for self-expression, identity exploration and social connection for LGBTQIA+ adolescents, potentially buffering against minority stress experienced offline (Cormier et al., 2026). Conversely, these same digital spaces may increase exposure to stigma, harassment, and exclusion, which could amplify risk for mental health problems (Bitran et al., 2026). Systematic reviews have concluded that social media may benefit the mental health and wellbeing of LGBTQIA+ adolescents, but have also highlighted the need for further longitudinal studies to corroborate findings (Berger et al., 2022). Similarly, adolescents who have experienced discrimination or peer victimisation offline may use social media to seek social support, but also encounter repeated exposure to hostile or invalidating content that reinforces their offline stressors (Kreski et al., 2022). Understanding the effects of social media use on mental health and wellbeing in these subgroups is critical for identifying potential widening or narrowing of mental health disparities among youth facing social disadvantage. It can also inform targeted prevention and digital literacy interventions, including the potential effects of social media regulations for these subgroups.

Accordingly, the present study uses a causal modelling framework (target trial emulation) to examine the social media impacts on mental health outcomes in youth exposed to social disadvantage, specifically focusing on youth who are gender or sexually diverse, on those who have experienced discrimination or on those who have experienced peer bullying. We sought to address these issues in a longitudinal population-based cohort of Australians followed from childhood into early adulthood. We used data from nine annual waves of the Child to Adult Transition Study (CATS) to examine the relationship between social media use at any given wave and depressive symptoms, anxiety symptoms, poor wellbeing, or self-harm one year later. We considered effects across adolescence (14 to 18 years), as well as by sex at birth and age periods (early, middle and late adolescence).

3.2 Methods

3.2.1 Study Sample

Participants were drawn from the CATS. In 2012, 1,239 Grade 3 students from a possible 2,289 were recruited into the study and followed up annually after parental consent was provided. Students were from schools in Melbourne, Australia (n=43) that were selected using stratified random sampling (Mundy et al., 2013).

Data collected between waves 6 and 10 were used in this analysis. Participants were aged 13-18 years over these waves. The final analytic sample consisted of 1,079 participants, with 160 (13%) being excluded due to having no data available in the relevant waves. Table 3.1 presents demographic comparisons between the analytic sample and full cohort, and Appendix A presents the distribution of missing data among all analysis variables in the analytic sample.

Table 3.1. *Comparison of wave 1 demographic characteristics of all participants in the CATS cohort (n = 1,239) to participants in the analytic sample (n = 1,079).*

Measure	Analytic sample	Full cohort
	N (%) / Mean [SD]	N (%) / Mean [SD]
Participant characteristics		
Male	500 (46.3)	572 (46.2)
Age (years)	9 [0.4]	9 [0.4]
Aboriginal and Torres Strait Islander people*	54 (5.2)	58 (4.8)
Born in Australia**	921 (87.8)	1055 (87.8)
Socioeconomic status (SEIFA)		
1st quintile (most disadvantaged)	141 (13.1)	167 (13.5)
2nd quintile	85 (7.9)	109 (8.8)
3rd quintile	168 (15.6)	194 (15.7)
4th quintile	302 (28.0)	346 (27.9)
5th quintile (most advantaged)	383 (35.5)	423 (34.1)

3.3 Measures

Social media use

At each wave from 7 to 9, participants self-reported their duration of social media use for a normal school day using a 6-point scale from 'none' to '4 or more hours'. Responses were grouped into three categories (<1 hour, 1-2 hours, >2 hours) to remain consistent with prior investigations.

Mental health problems

From waves 8-10, self-reported depressive symptoms, anxiety symptoms, and wellbeing data were collected. These were measured using the 13-item Short Mood and Feelings Questionnaire (Thabrew et al., 2018), a shortened 8-item Spence Children's Anxiety Scale (Reardon et al., 2018;

Spence et al., 2003), and six items from the Paediatric Quality of Life General Wellbeing Scale (Varni et al., 2001), respectively. Scale scores from all measures were dichotomised to define high and low levels of depressive and anxiety symptoms, and poor and high wellbeing. Self-harming behaviours were also self-reported between waves 8-10, with two independent mental health experts grading the behaviours as self-harming or not. Detail on the reporting, thresholds used, and grading process are shown in Appendix A.

3.4 Effect modifiers

Gender/sexual diversity

In waves 7 to 9, participants were asked questions pertaining to their gender identity and to whom they are attracted. These, and participants' listed sex at birth, were used to generate a binary variable denoting whether the participant reported gender or sexual diversity. Hereafter, participants whose sex at birth was consistent with their gender identity are referred to as male and as female.

Discrimination

In wave 9, participants were asked questions about their experiences being discriminated because of their language/accent, skin colour, and/or ethnicity/culture. These were used to generate a dichotomous variable indicating whether the participant had or had not experienced any discrimination.

Frequently bullied

In waves 7 to 9, participants were asked questions about their experiences being bullied (being teased, being physically hurt, being purposely left out, being talked about behind their back). These were used to generate a binary variable indicating whether the participant had or had not experienced any frequent bullying.

3.5 Confounders

A causal diagram was developed *a priori* to guide the selection of confounders (See Figure 1 in Appendix B). Confounders included demographic, individual, and family factors (also listed in Statistical Analysis section below).

Refer to Appendix A for further detail on all measures used in the analyses.

3.6 Statistical Analysis

All analyses were performed using R 4.4.2 (R Core Team, 2024).

The primary estimand of interest was the average effect of social media use at any given wave on mental health problems at the subsequent wave, reflecting the association over time between these variables. The average effect was expressed on the risk difference (RD) scale (per 100). Specifically, RD estimates allow us to infer the number of adolescents who might experience changes in mental health outcomes if exposed to different levels of social media use resulting from policy interventions. Risk ratios (RR) were examined in supplemental models.

Regression standardisation (g-computation) was used to adjust for confounding, using a logistic regression model for the outcome on the exposure and confounders. As each participant could contribute more than one exposure-outcome measurement, generalised estimating equations (Højsgaard et al., 2006) with an exchangeable correlation matrix and robust standard errors were used, allowing for the marginal average treatment effect to be estimated while also accounting for the correlated data structure.

Separate analysis models were created for each outcome (high depressive symptoms, high anxiety symptoms, poor wellbeing, self-harm) and marginalised group (gender/sexual diversity, discrimination, frequently bullied) pairing, and included an interaction term between the relevant effect modifier and social media use. These models were used to obtain predicted probabilities of the outcome under each level of social media use (<1 hour, 1-2 hours, >2 hours). These were averaged across individuals for each exposure level and contrasted to estimate the absolute (RD) and relative (RR) differences in outcomes between social media levels within different marginalised group strata. Contrasts were made between >2 hours and <1 hour social media use, as well as between 1-2 hours vs <1 hour social media use. The delta method was used to estimate the standard errors of these estimates and obtain 95% confidence intervals (CIs).

Results were interpreted by considering the strength of point estimates and range of effect sizes with which our data were compatible under modelling assumptions (i.e., values within the 95% CI), consistent with best practice discouraging the dichotomisation of evidence (Greenland et al., 2019).

3.6.1 Confounding adjustment

Models were adjusted for demographic factors from wave 1 (baseline) including sex at birth (female, male), country of birth (other, Australia), and socioeconomic status (disadvantaged, advantaged), as well as individual and family factors at the wave prior to exposure (prior depressive symptoms, anxiety symptoms, poor wellbeing, peer victimisation, parental support, sleep duration, physical activity, and social media use). Prior self-harming behaviours was only adjusted for in models analysing the effect on subsequent self-harm. Models also adjusted for participant age at the wave of exposure, as well as the age period (middle adolescence: wave 7-8, late adolescence: wave 9). See Appendix B for Figure 1 for visual representation and further details about this causal model.

In addition to the effect modifier, interaction terms between social media use and sex at birth, and social media use and age period were included to relax the assumption of a constant confounding effect across these measures. An additional interaction term between sex and age period was also included to increase the flexibility of their adjustment. These inclusions were decided *a priori*.

Sensitivity analyses included adjustment for concurrent mental health problems at the wave of social media use as an additional confounder. This measure indicated the presence of at least one of the following: high depressive symptoms, high anxiety symptoms or poor wellbeing (or self-harm for analyses with self-harm as the outcome.

3.6.2 Missing data

Across the entire analytic sample, 61.1% of participants had missing data for at least one variable. Multiple imputation via fully conditional specification (FCS) was implemented to handle the missing data using the *mice* (Buuren & Groothuis-Oudshoorn, 2011) package in R. Imputation was performed separately for each outcome and effect modifier combination, stratified by sex. All analysis variables for each outcome model were included in the imputation models, with the number of datasets imputed to reflect the percentage of observations with missing data for at least one variable (see Appendix A Table 3.7). Each imputed dataset was analysed individually, then pooled using Rubin's rules (Rubin, 2004) to obtain the final estimates. Appendix A Tables 3.8 to 3.9 for provide further breakdown of social media use and mental health variables over time.

3.7 Results

3.7.1 Estimated effects of social media use across adolescents

Estimated RDs (per 100) for the effects of social media use (SMU) on mental health problems one year later across groups are presented in Table 3.2.

Table 3.2. *Estimated risk ratios (RR 95% CI) and risk differences (RD, 95%CI) of social media use of future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) during adolescence, by marginalised group.*

			RD *100 (95%CI)		RR (95%CI)	
			1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
Depressive symptoms						
	Gender/sexual diversity					
		No	-1.2 (-5.9, 3.4)	3.8 (-1.4, 9.0)	0.95 (0.80, 1.14)	1.15 (0.95, 1.38)
		Yes	11.0 (-2.4, 24.4)	8.8 (-3.3, 20.9)	1.28 (0.94, 1.74)	1.23 (0.92, 1.64)
	Discrimination					
		No	0.2 (-9.2, 9.5)	5.5 (-3.9, 15.0)	1.01 (0.75, 1.36)	1.18 (0.88, 1.57)
		Yes	1.0 (-19.2, 21.2)	10.7 (-8.7, 30.1)	1.03 (0.59, 1.80)	1.30 (0.79, 2.15)
	Frequent Bullied					
		No	-0.8 (-5.4, 3.8)	4.2 (-1.0, 9.4)	0.97 (0.80, 1.17)	1.17 (0.96, 1.43)
		Yes	4.0 (-6.1, 14.1)	5.3 (-4.9, 15.6)	1.10 (0.87, 1.39)	1.13 (0.89, 1.43)
Anxiety symptoms						
	Gender/sexual diversity					
		No	-2.4 (-6.7, 2.0)	0.3 (-4.4, 5.0)	0.90 (0.74, 1.10)	1.01 (0.83, 1.24)
		Yes	1.0 (-12.7, 14.6)	1.5 (-11.1, 14.2)	1.03 (0.70, 1.52)	1.05 (0.73, 1.50)
	Discrimination					

		No	-1.6 (-9.7, 6.5)	2.0 (-6.8, 10.9)		0.94 (0.69, 1.28)	1.08 (0.78, 1.48)
		Yes	-2.3 (-19.0, 14.4)	-5.9 (-23.5, 11.6)		0.94 (0.58, 1.52)	0.83 (0.49, 1.42)
	Frequent Bullied						
		No	-2.0 (-6.6, 2.5)	1.0 (-3.7, 5.7)		0.91 (0.73, 1.13)	1.05 (0.85, 1.29)
		Yes	-3.8 (-13.2, 5.7)	-4.1 (-13.3, 5.0)		0.90 (0.69, 1.18)	0.89 (0.69, 1.15)
Poor wellbeing							
	Gender/sexual diversity						
		No	1.3 (-3.1, 5.7)	2.3 (-2.7, 7.4)		1.04 (0.91, 1.18)	1.07 (0.92, 1.24)
		Yes	2.3 (-11.1, 15.7)	0.1 (-12.6, 12.8)		1.04 (0.82, 1.33)	1.00 (0.79, 1.27)
	Discrimination						
		No	3.7 (-6.0, 13.3)	0.3 (-10.1, 10.6)		1.09 (0.87, 1.36)	1.01 (0.79, 1.29)
		Yes	7.3 (-11.2, 25.8)	6.1 (-14.6, 26.8)		1.17 (0.78, 1.76)	1.14 (0.72, 1.80)
	Frequent Bullied						
		No	1.9 (-3.2, 7.0)	2.6 (-2.9, 8.0)		1.06 (0.91, 1.23)	1.08 (0.92, 1.27)
		Yes	-2.9 (-13.3, 7.6)	-4.3 (-13.9, 5.3)		0.95 (0.77, 1.16)	0.92 (0.76, 1.11)
Self-harm							
	Gender/sexual diversity						
		No	-1.4 (-4.8, 2.1)	0.2 (-3.7, 4.2)		0.86 (0.58, 1.27)	1.02 (0.68, 1.54)
		Yes	12.1 (-1.6, 25.8)	4.2 (-7.2, 15.5)		1.74 (0.89, 3.39)	1.26 (0.66, 2.40)
	Discrimination						
		No	0.7 (-5.6, 7.0)	2.0 (-4.8, 8.8)		1.07 (0.58, 1.98)	1.21 (0.65, 2.26)
		Yes	4.9 (-9.1, 18.9)	8.1 (-5.3, 21.4)		1.92 (0.27, 13.40)	2.46 (0.39, 15.62)
	Frequent Bullied						
		No	1.2 (-2.2, 4.7)	1.4 (-2.4, 5.2)		1.16 (0.77, 1.75)	1.18 (0.75, 1.85)
		Yes	-5.8 (-16.4, 4.8)	-4.9 (-15.0, 5.2)		0.75 (0.45, 1.25)	0.79 (0.50, 1.26)

Among gender/sexually diverse adolescents, the RD for 1-2 hours vs <1 hour of SMU was 11.0 (95% CI: -2.4, 24.4) for high depressive symptoms and 12.1 (95% CI: -1.6, 25.8) for self-harm. Although CIs were wide and indicate substantial uncertainty, findings were most compatible with an increased risk associated with a greater duration of social media use. Estimates for >2 hours vs <1 hour of SMU were similar for high depressive symptoms (RD: 8.8 [-3.3, 20.9]) but more modest for self-harm (RD: 4.2 [-7.2, 15.5]). In contrast, RDs for non-gender/sexually diverse adolescents were smaller with narrower CIs when comparing 1-2 hours vs <1 hour of SMU (high

depressive symptoms: RD = -1.2 [-5.9, 3.4]; self-harm: RD = -1.4 [-4.8, 2.1]) and >2 hours vs <1 hour of SMU (high depressive symptoms: RD = 3.8 [-1.4, 9.0]; self-harm: RD = 0.2 [−3.7, 4.2]). For high anxiety symptoms and poor wellbeing, RDs were close to zero in both gender/sexually diverse adolescents and their non-diverse counterparts, with little evidence of differential risk according to duration of social media use.

For those exposed to discrimination, the RD for >2 hours vs <1 hour of SMU was 10.7 for high depressive symptoms (95% CI: -8.7, 30.1) and 8.1 for self-harm (95% CI: -5.3, 21.4). Wide CIs again indicate considerably uncertainty. When comparing 1-2 vs <1 hour of SMU in those exposed to discrimination, RD estimates for high depressive symptoms and self-harm were generally less pronounced. In the non-discriminated group, estimates for >2 hours vs <1 hour of SMU for these outcomes were more modest (high depressive symptoms: RD= 5.5 [-3.9, 15.0]; self-harm: RD=2.0 [-4.8, 8.8]), while patterns for 1-2 vs <1 hour of SMU were similar to those in the discriminated group. For high anxiety symptoms and wellbeing, in general, RDs were close to zero in both discriminated and non-discriminated adolescent groups, with little evidence of differential risk according to duration of social media use.

Among frequently bullied adolescents, all CIs were wide and inconclusive. The point estimates suggested increased risk for high depressive symptoms when comparing >2 hours vs <1 hour of SMU (RD = 5.3 [-4.9, 15.6]). For high anxiety symptoms, poor wellbeing and self-harm, point estimates suggested lower risk with >2 hours vs <1 hour of SMU (RD=-4.1 [-13.3, 5.0], RD=-4.3 [-13.9, 5.3] and RD=-4.9 [-15.0, 5.2], respectively). However, all CIs were inconclusive and spanned the null. Similar, but slightly smaller estimates were identified for all outcomes when comparing 1-2 hours vs <1 hour of SMU in frequently bullied adolescents. Among non-bullied adolescents, estimates were close to zero and all CIs were inconclusive.

3.7.2 Estimated effects of social media use by sex

Estimated RDs (per 100) for the effects of SMU on mental health problems one year later, across groups stratified by sex assigned at birth are presented in Table 3.3.

For high depressive symptoms and poor wellbeing, RD patterns (including point estimates and CIs) were similar for males and females across both social disadvantage (i.e., gender/sexually diverse, discriminated or bullied) and non-disadvantaged groups. For high anxiety symptoms, estimated RDs were generally closer to zero in males compared to females in both socially disadvantaged and non-disadvantaged groups. These findings suggest little evidence that the risk for poor outcomes in socially disadvantaged groups differs by sex.

Table 3.3. *Estimated risk ratios (RR, 95%CI) and risk differences (RD, 95%CI) of social media use on future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm during adolescence, by marginalised group and sex.*

			RD *100 (95%CI)					RR (95%CI)			
			Females		Males			Females		Males	
			1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
Depressive symptoms											
	Gender/sexual diversity										
		No	-1.5 (-8.6, 5.6)	4.3 (-3.2, 11.7)	-1.0 (-6.2, 4.2)	3.4 (-2.8, 9.5)		0.96 (0.80, 1.16)	1.11 (0.92, 1.34)	0.93 (0.61, 1.40)	1.26 (0.82, 1.92)
		Yes	12.1 (-2.5, 26.8)	9.3 (-4.2, 22.8)	8.8 (-4.9, 22.5)	7.9 (-4.6, 20.3)		1.25 (0.95, 1.66)	1.19 (0.92, 1.56)	1.42 (0.82, 2.45)	1.38 (0.82, 2.33)
	Discrimination										
		No	-0.5 (-14.1, 13.1)	5.1 (-7.9, 18.1)	1.0 (-9.2, 11.1)	6.1 (-4.5, 16.7)		0.99 (0.72, 1.35)	1.12 (0.84, 1.49)	1.05 (0.59, 1.88)	1.35 (0.78, 2.34)
		Yes	0.6 (-25.1, 26.3)	10.5 (-13.4, 34.4)	1.5 (-15.4, 18.5)	10.8 (-6.5, 28.2)		1.01 (0.63, 1.64)	1.20 (0.78, 1.84)	1.10 (0.41, 2.92)	1.66 (0.70, 3.93)
	Frequent Bullied										
		No	-0.6 (-7.4, 6.2)	4.5 (-3.2, 12.3)	-0.9 (-5.8, 3.9)	3.8 (-1.6, 9.3)		0.98 (0.81, 1.19)	1.13 (0.92, 1.38)	0.92 (0.59, 1.42)	1.33 (0.89, 1.97)
		Yes	5.2 (-7.2, 17.5)	5.0 (-7.2, 17.2)	2.5 (-7.6, 12.7)	5.7 (-4.9, 16.3)		1.09 (0.88, 1.35)	1.09 (0.88, 1.35)	1.11 (0.72, 1.71)	1.25 (0.82, 1.91)
Anxiety symptoms			**Females**		**Males**			**Females**		**Males**	
	Gender/sexual diversity		**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**		**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**
		No	-4.2 (-11.0, 2.6)	-2.5 (-9.5, 4.6)	-0.4 (-5.3, 4.5)	3.2 (-2.6, 9.0)		0.88 (0.71, 1.08)	0.93 (0.75, 1.15)	0.97 (0.61, 1.53)	1.30 (0.81, 2.06)
		Yes	0.3 (-15.2, 15.7)	-0.5 (-14.6, 13.5)	2.5 (-9.9, 14.9)	5.8 (-6.8, 18.3)		1.00 (0.70, 1.44)	0.99 (0.71, 1.37)	1.14 (0.59, 2.23)	1.34 (0.70, 2.55)

	Discrimination									
		No	-3.6 (-16.0, 8.9)	-3.1 (-15.8, 9.6)	0.8 (-7.1, 8.7)	8.1 (-1.4, 17.6)	0.91 (0.66, 1.26)	0.92 (0.66, 1.29)	1.07 (0.57, 2.00)	1.66 (0.89, 3.11)
		Yes	-4.7 (-26.6, 17.2)	-13.3 (-35.9, 9.3)	0.2 (-14.2, 14.6)	1.6 (-13.6, 16.9)	0.92 (0.60, 1.39)	0.76 (0.47, 1.21)	1.02 (0.40, 2.57)	1.11 (0.43, 2.86)
	Frequent Bullied									
		No	-3.7 (-10.6, 3.3)	-1.5 (-8.4, 5.5)	-0.2 (-4.8, 4.5)	3.7 (-1.4, 8.9)	0.89 (0.70, 1.11)	0.96 (0.77, 1.19)	0.98 (0.62, 1.56)	1.37 (0.88, 2.13)
		Yes	-5.6 (-17.6, 6.4)	-8.0 (-19.3, 3.3)	-1.3 (-10.4, 7.8)	0.9 (-8.4, 10.2)	0.89 (0.70, 1.14)	0.84 (0.67, 1.07)	0.93 (0.57, 1.53)	1.05 (0.65, 1.69)
Poor wellbeing			**Females**		**Males**		**Females**		**Males**	
	Gender/sexual diversity		**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**
		No	1.6 (-4.8, 8.1)	1.8 (-5.2, 8.8)	0.9 (-5.0, 6.9)	2.9 (-3.8, 9.6)	1.04 (0.89, 1.21)	1.04 (0.88, 1.23)	1.04 (0.82, 1.31)	1.12 (0.86, 1.44)
		Yes	2.6 (-10.8, 15.9)	-0.5 (-13.7, 12.6)	1.7 (-13.8, 17.3)	1.4 (-13.0, 15.8)	1.04 (0.83, 1.30)	0.99 (0.79, 1.24)	1.04 (0.73, 1.48)	1.03 (0.74, 1.43)
	Discrimination									
		No	3.5 (-9.4, 16.3)	-1.4 (-14.7, 11.8)	3.9 (-8.4, 16.1)	2.3 (-10.7, 15.3)	1.07 (0.84, 1.36)	0.97 (0.75, 1.26)	1.14 (0.76, 1.69)	1.08 (0.70, 1.65)
		Yes	7.1 (-14.0, 28.3)	4.6 (-18.7, 27.8)	7.5 (-11.1, 26.1)	7.7 (-13.0, 28.5)	1.12 (0.80, 1.57)	1.08 (0.74, 1.57)	1.30 (0.67, 2.54)	1.30 (0.63, 2.71)
	Frequent Bullied									
		No	1.9 (-4.9, 8.7)	1.4 (-5.7, 8.5)	1.9 (-4.6, 8.5)	3.9 (-3.1, 10.8)	1.05 (0.89, 1.23)	1.03 (0.87, 1.23)	1.08 (0.82, 1.42)	1.17 (0.89, 1.54)
		Yes	-2.9 (-13.8, 8.0)	-5.7 (-16.2, 4.7)	-2.8 (-15.0, 9.4)	-2.4 (-13.5, 8.8)	0.95 (0.80, 1.14)	0.91 (0.76, 1.08)	0.93 (0.68, 1.28)	0.94 (0.71, 1.25)
Self-harm			**Females**		**Males**		**Females**		**Males**	
	Gender/sexual diversity		**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**
		No	0.8 (-4.5, 6.0)	0.9 (-4.7, 6.5)	-3.6 (-7.3, 0.1)	-0.5 (-4.8, 3.8)	1.07 (0.70, 1.63)	1.08 (0.68, 1.69)	0.47 (0.20, 1.10)	0.93 (0.48, 1.78)

		Yes	17.3 (1.8, 32.8)	5.2 (-7.2, 17.6)	1.6 (-12.0, 15.2)	2.1 (-9.8, 13.9)		1.93 (1.02, 3.64)	1.28 (0.69, 2.38)	1.12 (0.38, 3.26)	1.18 (0.47, 2.96)
	Discrimination										
		No	6.6 (-3.2, 16.4)	5.3 (-4.8, 15.5)	-6.4 (-13.4, 0.7)	-1.9 (-9.7, 5.9)		1.62 (0.75, 3.52)	1.50 (0.66, 3.41)	0.28 (0.06, 1.26)	0.79 (0.30, 2.08)
		Yes	12.3 (-6.4, 31.1)	13.0 (-3.1, 29.1)	-2.9 (-14.7, 8.9)	3.0 (-9.8, 15.7)		2.87 (0.43, 18.98)	2.99 (0.49, 18.15)	0.54 (0.04, 6.91)	1.73 (0.19, 15.53)
	Frequent Bullied										
		No	4.0 (-1.4, 9.3)	1.9 (-3.6, 7.3)	-1.9 (-5.2, 1.4)	0.9 (-3.1, 4.8)		1.40 (0.89, 2.20)	1.18 (0.72, 1.94)	0.64 (0.29, 1.42)	1.16 (0.59, 2.32)
		Yes	-2.9 (-16.8, 11.0)	-5.7 (-18.9, 7.5)	-9.5 (-18.6, -0.3)	-3.9 (-13.5, 5.6)		0.90 (0.54, 1.49)	0.81 (0.50, 1.31)	0.42 (0.17, 1.03)	0.76 (0.39, 1.48)

For self-harm, some differences in risk across socially disadvantaged vs non-disadvantaged groups were evident. For gender/sexually diverse and discriminated groups, RDs for self-harm were generally larger for females than males at higher levels of SMU. The pattern was less evident in non-socially disadvantaged groups. For example, when comparing 1-2 hours vs <1 hour of SMU among gender/sexually diverse participants, female adolescents showed larger RDs for self-harm (RD = 17.3 [1.8, 32.8]) than male adolescents (RD = 1.6 [-12.0, 15.2]). In contrast, among non-gender/sexually diverse adolescents, females had an RD of 0.8 (-4.5, 6.0), while males had an RD of -3.6 (-7.3, 0.1). The frequently bullied group, RD estimates suggested a potentially reduced risk for self-harm associated with 1-2 hours vs <1 hour of SMU, which was stronger and more precise among male adolescents (RD = -9.5 [-18.6, -0.3]) than female adolescents (RD = -2.9 [-16.8, 11.0]). Among non-bullied adolescents, the patterns of difference by sex were smaller and less conclusive for 1-2 hours vs < 1 hour of SMU (female: RD = 4.0 [-1.4, 9.3]; male: RD = -1.9 [-5.2, 1.4]).

3.7.3 Estimated effects of social media use by age group

Estimated RDs (per 100) for the effects of differing levels of social media use (SMU) on mental health problems one year later, across subgroups stratified by age group are detailed in Table 3.4. Overall, estimates in late adolescence were less precise than those in mid adolescence, as reflected by wider CIs.

For high anxiety symptoms, poor wellbeing and self-harm, RD estimates were broadly similar in mid and late adolescence within both gender- and sexually-diverse and bullied groups, with comparable patterns observed in respective comparison groups.

Among adolescents exposed to social disadvantage (gender/sexual diversity, frequent bullying), estimated RDs for high depressive symptoms tended to be larger in late adolescence compared with mid adolescence, and a similar pattern was also observed in corresponding comparison groups. For example, when comparing >2 hours vs <1 hour of SMU, the RD was 12.3 (95% CI: −1.6-26.2) in late adolescence and 6.5 (95% CI: −5.9-18.9) in mid adolescence for the gender/sexual diversity group, while the RD was 7.4 (95% CI: −1.3, 16.1) in late adolescence and 2.1 (95% CI: −3.1, 7.3) in mid adolescence for the corresponding non-diverse group. A similar pattern was observed for frequent bullying, with a RD of 9.5 (−95% CI: 3.5, 22.5) in late adolescence and 3.4 (95% CI: −7.0, 13.8) in mid adolescence, compared to 8.4 (95% CI: 0.0-16.8) in late adolescence and 2.1 (95% CI: −3.7, 7.8) in mid adolescence in the non-bullied group. However, confidence intervals were wide and generally included the null, limiting interpretability.

Results for all sensitivity analyses (which showed similar findings) are presented in Appendix A Tables 3.10 to 3.12.

Table 3.4. *Estimated risk ratios (RR, 95% CI) and risk differences (RD, 95% CI) of social media use on future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) during adolescence, by marginalised group and adolescent age group.*

			RD *100 (95%CI)				RR (95%CI)			
			Mid adolescence		Late adolescence		Mid adolescence		Late adolescence	
			1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
Depressive symptoms										
	Gender/sexual diversity									
		No	-1.8 (-6.4, 2.8)	2.1 (-3.1, 7.3)	-0.2 (-9.0, 8.6)	7.4 (-1.3, 16.1)	0.93 (0.77, 1.13)	1.08 (0.89, 1.32)	1.00 (0.73, 1.35)	1.26 (0.95, 1.67)
		Yes	10.0 (-4.0, 24.0)	6.5 (-5.9, 18.9)	12.6 (-2.5, 27.7)	12.3 (-1.6, 26.2)	1.28 (0.90, 1.81)	1.18 (0.85, 1.64)	1.28 (0.94, 1.75)	1.28 (0.95, 1.72)
	Frequent Bullied									
		No	-1.7 (-6.6, 3.2)	2.1 (-3.7, 7.8)	1.0 (-6.9, 8.8)	8.4 (0.0, 16.8)	0.93 (0.74, 1.16)	1.09 (0.86, 1.38)	1.04 (0.78, 1.37)	1.30 (0.99, 1.72)
		Yes	2.9 (-7.2, 13.0)	3.4 (-7.0, 13.8)	6.4 (-6.5, 19.4)	9.5 (-3.5, 22.5)	1.07 (0.84, 1.37)	1.09 (0.84, 1.40)	1.15 (0.87, 1.52)	1.21 (0.92, 1.60)
Anxiety symptoms			Mid adolescence		Late adolescence		Mid adolescence		Late adolescence	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-2.5 (-7.1, 2.0)	0.1 (-5.0, 5.2)	-2.0 (-10.1, 6.1)	0.8 (-7.1, 8.7)	0.89 (0.71, 1.10)	1.00 (0.80, 1.26)	0.92 (0.66, 1.29)	1.03 (0.75, 1.41)
		Yes	0.7 (-13.1, 14.5)	1.4 (-11.1, 14.0)	1.4 (-14.4, 17.2)	1.7 (-13.3, 16.7)	1.02 (0.65, 1.59)	1.05 (0.70, 1.56)	1.04 (0.70, 1.53)	1.04 (0.72, 1.51)
	Frequent Bullied									
		No	-2.2 (-7.2, 2.8)	0.5 (-4.8, 5.8)	-1.7 (-9.4, 6.0)	2.0 (-5.9, 9.9)	0.89 (0.68, 1.16)	1.02 (0.79, 1.32)	0.93 (0.68, 1.28)	1.08 (0.79, 1.47)
		Yes	-3.9 (-13.7, 5.8)	-4.4 (-14.1, 5.3)	-3.3 (-15.7, 9.0)	-3.6 (-15.2, 8.0)	0.89 (0.67, 1.19)	0.88 (0.66, 1.17)	0.92 (0.67, 1.26)	0.91 (0.68, 1.23)
Poor wellbeing			Mid adolescence		Late adolescence		Mid adolescence		Late adolescence	

Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
	No	-0.1 (-5.1, 4.9)	3.1 (-2.6, 8.9)	4.2 (-4.1, 12.6)	0.6 (-8.0, 9.3)		1.00 (0.85, 1.17)	1.10 (0.92, 1.32)	1.11 (0.90, 1.36)	1.02 (0.82, 1.27)
	Yes	0.6 (-13.6, 14.8)	1.2 (-12.0, 14.5)	4.7 (-9.4, 18.9)	-1.6 (-15.7, 12.5)		1.01 (0.76, 1.35)	1.03 (0.79, 1.34)	1.08 (0.86, 1.35)	0.97 (0.77, 1.23)
Frequent Bullied										
	No	0.6 (-4.8, 6.1)	3.5 (-2.5, 9.5)	4.4 (-4.6, 13.4)	0.7 (-7.9, 9.4)		1.02 (0.85, 1.23)	1.12 (0.92, 1.36)	1.11 (0.90, 1.38)	1.02 (0.82, 1.26)
	Yes	-4.0 (-15.0, 6.9)	-3.4 (-13.6, 6.9)	-0.3 (-12.5, 11.9)	-6.3 (-17.5, 4.8)		0.92 (0.73, 1.16)	0.93 (0.75, 1.15)	0.99 (0.81, 1.23)	0.89 (0.73, 1.09)
Self-harm		Mid adolescence		Late adolescence			Mid adolescence		Late adolescence	
Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
	No	-0.4 (-4.1, 3.3)	0.9 (-3.3, 5.1)	-3.3 (-9.2, 2.6)	-1.1 (-7.4, 5.1)		0.95 (0.63, 1.44)	1.09 (0.71, 1.69)	0.68 (0.35, 1.32)	0.89 (0.47, 1.69)
	Yes	13.7 (-0.2, 27.6)	5.2 (-6.1, 16.6)	9.7 (-6.9, 26.3)	2.5 (-11.7, 16.7)		1.94 (0.95, 3.94)	1.36 (0.68, 2.73)	1.52 (0.72, 3.21)	1.15 (0.56, 2.34)
Frequent Bullied										
	No	1.6 (-2.4, 5.6)	1.8 (-2.4, 6.1)	0.5 (-5.0, 6.0)	0.6 (-5.1, 6.2)		1.22 (0.75, 1.99)	1.25 (0.74, 2.10)	1.06 (0.58, 1.96)	1.07 (0.57, 2.00)
	Yes	-5.5 (-16.2, 5.3)	-4.2 (-14.5, 6.1)	-6.5 (-21.1, 8.1)	-6.7 (-20.8, 7.5)		0.76 (0.44, 1.30)	0.82 (0.50, 1.34)	0.74 (0.39, 1.42)	0.74 (0.41, 1.36)

3.8 Discussion and Conclusion

This study examined whether SMU differentially affects mental health among adolescents who face social disadvantages, using data from a longitudinal, population-based cohort of Australian youth. Overall, findings suggest potential heterogeneity in effect of SMU and mental health in socially disadvantaged groups. Point estimates for adolescents who identified as gender- or sexually diverse and those who reported experiencing discrimination were suggestive of greater risk for high depressive symptoms and self-harm from higher relative to lower levels of SMU, although wide CIs indicate considerable uncertainty (i.e., the range of estimates are compatible with indicating both a small decrease and moderate increase in risk, and thus interpretation should be cautious). Patterns among frequently bullied adolescents were suggestive of a potential reduced risk for high anxiety symptoms, poor wellbeing, and self-harm at higher levels of SMU relative to lower levels of SMU, although findings were again inconclusive. Findings were broadly similar across adolescents assigned female and male at birth, aside from some sex-specific patterns for self-harm, and findings did not differ markedly between mid and late adolescence.

Higher levels of SMU were potentially associated with larger estimated increases in risk for depressive symptoms and self-harm among gender- or sexually-diverse adolescents relative to non-diverse adolescents. Point estimates for these mental health problems were approximately two to three times larger among gender/sexually-diverse adolescents, but CIs were wide. A similar pattern was also observed among adolescents who reported experiences of discrimination relative to those who did not report discrimination. Both these groups can be conceptualised as marginalised, reflecting structural or experience-based social disadvantage and exposure to unfair treatment. While estimates were imprecise, the consistency of larger point estimates across these socially marginalised groups suggests that SMU may contribute to the amplification of existing mental health disparities. This pattern is broadly consistent with minority stress frameworks which propose that chronic exposure to stigma, discrimination and identity-related stress may heighten susceptibility to stress-amplifying online experiences such as social comparison or exposure to harassment (Luo et al., 2025). In addition, gender-/sexually-diverse adolescents report higher exposure to cyberbullying and online harassment than their heterosexual peers (Abreu & Kenny, 2017), suggesting that marginalised youth may encounter a greater frequency or intensity of negative experiences within online environments. However, the imprecision of our estimates indicates that findings should be interpreted cautiously, warranting future replication. Importantly, SMU among marginalised adolescents can also serve protective functions, including facilitating social connection, identity affirmation, and access to peer support (Ceglarek & Ward, 2016), which are known protective factors for mental health. Thus, it is also important that future research considers the nature and context of online experiences when evaluating potential mental health risks among marginalised youth.

In contrast to marginalised youth, associations between SMU and mental health outcomes among frequently bullied adolescents were less consistent. While there was some indication of increased risk for depressive symptoms, but lower risk for anxiety, poor wellbeing, and self-harm; although confidence intervals were wide and compatible with no effect for all outcomes. One possible interpretation is that, for adolescents experiencing peer bullying, social media may

serve both risk-enhancing and protective functions. Online spaces may provide opportunities for social connection, identity affirmation, or escape from offline victimisation, potentially offsetting some adverse effects (Cole et al., 2017). One-third of adolescents exposed to traditional bullying have been found to also experience cyberbullying, again reflecting considerable variability in online experiences (Li et al., 2022). These mixed patterns again underscore the importance of moving toward a more nuanced understanding of how and why adolescents engage with social media.

Sex-stratified analyses provided limited evidence that associations between SMU and subsequent mental health outcomes differed substantially by sex assigned at birth. For high depressive symptoms and poor wellbeing, estimated risk differences were similar for female (assigned at birth) and male (assigned at birth) adolescents who were and were not exposed to social disadvantage. For high anxiety symptoms, point estimates were often closer to zero among male adolescents, but this pattern was not specific to social marginalisation or exclusion. More pronounced sex differences were evident for self-harm, where higher levels of SMU were associated with a larger estimated risk among female than male adolescents who were gender/sexually-diverse. There was also suggestion of lower estimated risk among male than female adolescents who were frequently bullied. However, similar – albeit weaker – patterns were also observed among non-bullied adolescents, and estimates were frequently imprecise. Taken together, these findings suggest that sex assigned at birth does not appear to strongly modify the *overall pattern* of associations between SMU and mental health across socially marginalised or excluded adolescents.

Similarly, age-stratified analyses provided little evidence that the associations between SMU and subsequent anxiety symptoms, poor wellbeing, or self-harm differed meaningfully between mid and late adolescence. Although risk for high depressive symptoms, indicated by point estimates, were generally larger in late adolescence, this pattern was observed across all adolescents, and age-related differences were similar in magnitude across subgroups. Rather than indicating a specific period of heightened susceptibility among marginalised or excluded adolescents, age-related differences may reflect general developmental processes (e.g., increasing intensity or salience of online interactions) that are present across social contexts.

3.9 Strength and limitations

Key strengths of this study include its longitudinal design with repeated annual assessments and population-based sampling. However, several limitations should be noted. Some subgroup estimates were imprecise due to limited power, underscoring the need for replication in larger samples. Adolescents tend to under-report their social media use (Alexander et al., 2024), reflecting the need for more objective assessments in future. Moreover, the focus on duration rather than specific patterns of SMU may mask important heterogeneity in adolescents' online experiences and how these relate to mental health. Finally, we examined adolescents from 2017 onwards, yet social media platforms, and the frequency of use, have changed considerably since then and effects on mental health may also have changed.

3.10 Conclusion

In summary, higher levels of social media use were potentially associated with small increases in depressive symptoms and self-harm among marginalised adolescents, specifically gender/sexually diverse and discriminated adolescents but findings were inconclusive and should be replicated in larger studies. These findings suggest that social media may contribute to widening mental health disparities for some youth, while having more complex or neutral effects for others. These results argue against one-size-fits-all approaches to public health policies on adolescent social media use. Policies and interventions may need to be tailored to specific vulnerable groups, with particular attention to online safety, exposure to harmful content, and access to affirming digital spaces.

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Appendices

Appendix A: Tables

Table 3.5 *Frequency and percent of missing data in analytic sample for all variables used in the analysis (overall, and by sex).*

Variable	n (%)		
	Overall	Females	Males
Wave 6 depressive symptoms	103 (9.5%)	63 (10.9%)	40 (8%)
Wave 7 depressive symptoms	203 (18.8%)	110 (19%)	93 (18.6%)
Wave 8 depressive symptoms	246 (22.8%)	123 (21.2%)	123 (24.6%)
Wave 9 depressive symptoms	249 (23.1%)	113 (19.5%)	136 (27.2%)
Wave 10 depressive symptoms	266 (24.7%)	121 (20.9%)	145 (29%)
Wave 6 anxiety symptoms	91 (8.4%)	57 (9.8%)	34 (6.8%)
Wave 7 anxiety symptoms	196 (18.2%)	107 (18.5%)	89 (17.8%)
Wave 8 anxiety symptoms	235 (21.8%)	120 (20.7%)	115 (23%)
Wave 9 anxiety symptoms	245 (22.7%)	112 (19.3%)	133 (26.6%)
Wave 10 anxiety symptoms	265 (24.6%)	119 (20.6%)	146 (29.2%)
Wave 6 poor wellbeing	84 (7.8%)	54 (9.3%)	30 (6%)
Wave 7 poor wellbeing	192 (17.8%)	104 (18%)	88 (17.6%)
Wave 8 poor wellbeing	231 (21.4%)	115 (19.9%)	116 (23.2%)
Wave 9 poor wellbeing	242 (22.4%)	109 (18.8%)	133 (26.6%)
Wave 10 poor wellbeing	259 (24%)	117 (20.2%)	142 (28.4%)
Wave 6 self-harm	115 (10.7%)	73 (12.6%)	42 (8.4%)
Wave 7 self-harm	204 (18.9%)	114 (19.7%)	90 (18%)
Wave 8 self-harm	251 (23.3%)	129 (22.3%)	122 (24.4%)
Wave 9 self-harm	261 (24.2%)	119 (20.6%)	142 (28.4%)
Wave 10 self-harm	278 (25.8%)	130 (22.5%)	148 (29.6%)
Wave 6 social media use	88 (8.2%)	58 (10%)	30 (6%)
Wave 7 social media use	199 (18.4%)	107 (18.5%)	92 (18.4%)

Wave 8 social media use	237 (22%)	118 (20.4%)	119 (23.8%)
Wave 9 social media use	244 (22.6%)	110 (19%)	134 (26.8%)
Wave 7 gender/sexual diversity	240 (22.2%)	129 (22.3%)	111 (22.2%)
Wave 8 gender/sexual diversity	298 (27.6%)	149 (25.7%)	149 (29.8%)
Wave 9 gender/sexual diversity	291 (27%)	140 (24.2%)	151 (30.2%)
Wave 9 discrimination	240 (22.2%)	107 (18.5%)	133 (26.6%)
Wave 6 frequently bullied	90 (8.3%)	58 (10%)	32 (6.4%)
Wave 7 frequently bullied	200 (18.5%)	107 (18.5%)	93 (18.6%)
Wave 8 frequently bullied	238 (22.1%)	117 (20.2%)	121 (24.2%)
Wave 9 frequently bullied	247 (22.9%)	112 (19.3%)	135 (27%)
Wave 6 parental support	102 (9.5%)	66 (11.4%)	36 (7.2%)
Wave 7 parental support	210 (19.5%)	119 (20.6%)	91 (18.2%)
Wave 8 parental support	250 (23.2%)	123 (21.2%)	127 (25.4%)
Wave 6 sleep duration	100 (9.3%)	59 (10.2%)	41 (8.2%)
Wave 7 sleep duration	194 (18%)	107 (18.5%)	87 (17.4%)
Wave 8 sleep duration	246 (22.8%)	119 (20.6%)	127 (25.4%)
Wave 6 physical activity	99 (9.2%)	59 (10.2%)	40 (8%)
Wave 7 physical activity	197 (18.3%)	109 (18.8%)	88 (17.6%)
Wave 8 physical activity	240 (22.2%)	120 (20.7%)	120 (24%)
Wave 7 age at survey completion	181 (16.8%)	102 (17.6%)	79 (15.8%)
Wave 8 age at survey completion	223 (20.7%)	111 (19.2%)	112 (22.4%)
Wave 9 age at survey completion	232 (21.5%)	103 (17.8%)	129 (25.8%)
Wave 7 any concurrent mental health problems (w/o self-harm)	204 (18.9%)	110 (19%)	94 (18.8%)
Wave 8 any concurrent mental health problems (w/o self-harm)	246 (22.8%)	124 (21.4%)	122 (24.4%)
Wave 9 any concurrent mental health problems (w/o self-harm)	247 (22.9%)	111 (19.2%)	136 (27.2%)
Wave 7 any concurrent mental health problems (w/ self-harm)	210 (19.5%)	114 (19.7%)	96 (19.2%)
Wave 8 any concurrent mental health problems (w/ self-harm)	254 (23.5%)	128 (22.1%)	126 (25.2%)
Wave 9 any concurrent mental health problems (w/ self-harm)	253 (23.4%)	114 (19.7%)	139 (27.8%)
Country of birth	30 (2.8%)	14 (2.4%)	16 (3.2%)
Sex assigned at birth	0 (0%)	0 (0%)	0 (0%)

SEIFA IRSAD	0 (0%)	0 (0%)	0 (0%)
Missing data in at least one variable	659 (61.1%)	343 (59.2%)	316 (63.2%)

Notes. SEIFA IRSAD – Socio-Economic Index for Areas - Index of Relative Socio-Economic Advantage and Disadvantage.

Table 3.6 *Information on how the different mental health outcomes (depressive symptoms, anxiety symptoms, poor wellbeing and self-harm), effect modifiers (gender/sexual diversity, discrimination, and frequently bullied) and confounders were included in the analytic models.*

Construct	Measure	Waves included in	Additional information
Depressive symptoms	Short Mood and Feelings Questionnaire (SMFQ)	8-10 (outcome) 6-8 (confounder)	All 13 items of the SMFQ were included in the survey. Items were scored on a 5-point Likert scale (0 (never) to 4 (almost always)) and responses were then recoded to a 3-point scale (0 (not true), 1 (sometimes), and 2 (true)) to match the original SMFQ scoring. The total score (ranging from 0-26) was dichotomised at a threshold of ≥12 to define the presence of high levels of depressive symptoms (Thabrew et al. 2018).
Anxiety symptoms	Spence Children's Anxiety Scale (SCAS)	8-10 (outcome) 6-8 (confounder)	All 8 items of the SCAS were included in the survey. Items were scored on a 5-point Likert scale, ranging from 0 (never) to 4 (almost always). They were recoded to a 4-point scale (0 (never) to 3 (always)) to match the original SCAS scoring. The total score (ranging from 0-21) was dichotomised at a threshold of ≥10 to define the presence of high levels of anxiety symptoms (Kroenke et al. 2007).
Poor wellbeing	Paediatric Quality of Life General Wellbeing Scale	8-10 (outcome) 6-8 (confounder)	All 6 items of the Paediatric Quality of Life General Wellbeing Scale were included in the survey. Items were scored on a 5-point scale (ranging from 0-4),and then were linearly transformed to range between 0-100. Finally, values on this expanded scale were dichotomised at <60 to define poor wellbeing.

Self-harm	Study specific	8-10 (outcome) 6-8 (confounder)	Participants were asked: "In the past 12 months have you ever hurt yourself on purpose or done anything that might have harmed you or even killed you?" If endorsed, participants were asked to describe what they did. Two mental health clinician investigators independently rated the free-text descriptions using a classification system adapted from a previous large-scale epidemiological study of adolescent self-harm (Moran et al., 2012) to distinguish self-harm from behaviours that did not meet criteria.
Gender/sexual diversity	Study specific	7-9 (effect modifier)	Participants were asked questions pertaining to which gender they identified as (female, male, other). Their responses were compared to data on their sex at birth, and any differences resulted in classing the participant as gender diverse or not. Participants were also asked questions regarding sexual attraction (neither boys/girls, both boys/girls, boys, girls, don't know, prefer not to answer). These responses were compared alongside their gender diverse classification to classify a participant as sexually diverse if their gender identity and sexual attraction pairing did not indicate heterosexuality. Finally, the measures for gender diversity and sexual diversity were combined into a single binary "gender/sexual diversity" variable, indicating whether the participant is either gender diverse and/or sexually diverse.
Discrimination	Adapted from LSAC with expert knowledge	9 (effect modifier)	Participants were asked the following questions relating to being treated unfairly or badly in the past 6 months due to:

			- Language or accent - Skin colour - Ethnic or cultural background All items were scored on a 5-point scale: 0 (never), 1 (several times a week), 2 (once a month), 3 (every few weeks) and 4 (once or twice). Each was converted to a binary value, indicating the presence (1) or absence (0) of ever experiencing each particular type of discrimination. Finally, responses of the three measures were combined into a single binary discrimination variable, indicating whether the participant has ever experienced at least one of three types of discrimination or not.
Frequently bullied (peer victimisation)	Selected items from the Gatehouse Bullying Scale (Bond, Wolfe, Tollit, Butler, & Patton, 2007)	7-9 (effect modifier) 6-8 (confounder)	Participants were asked if they experienced each of the following types of bullying in the past 4 months: - Being teased or called names - Being talked about behind their back - Being purposely left out - Being physically hurt. If yes, participants were also asked to endorse the frequency of the related bullying (less than once a week, about once a week, most days). This was used to generate a binary variable indicating the presence of experiencing any frequent bullying (once a week or more).
Parent support	Study specific	6-8 (confounder)	Participants were asked questions regarding whether they talk about their feelings with their mum and whether they talk about their feelings with their dad. Participants were regarded as having parental support if they

			responded “yes” to either question.
Sleep duration		6-8 (confounder)	Participants were asked about their usual time they went to sleep and usual time they woke up on school days during the past 4 weeks. Sleep duration was calculated as the difference between these two times.
Physical activity		6-8 (confounder)	Participants were asked about the number of days they were physically active for at least 60 minutes over the past week.
Age		7-9 (confounder)	A continuous measure of age based on the participants date of birth and the date in which they completed the survey
Birthplace		1 (baseline)	Participants place of birth was obtained at the start of the study, with possible values 0 (other) and 1 (Australia). Was considered a baseline variable.
Socioeconomic status	Australian Bureau of Statistics Socio-Economic Index for Areas (SEIFA) 2011: Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) (based on home postcode) (population mean = 1000, SD = 100) (Australian Bureau of Statistics)	1 (baseline)	Participant SES was based on home postcode, with higher values indicating greater SES. Scores were collapsed into a binary measure indicating more disadvantaged or more advantaged.
Sex at birth		1 (baseline)	Participants’ sext at birth was obtained at the start of the study, with possible values 0 (female) and 1 (male). Was considered a baseline variable.
Age group		Static	A binary measure indicating whether the data was obtained in

			mid adolescence (waves 7, 8) or late adolescence (wave 9).
Any concurrent mental health problems (depression, anxiety, poor wellbeing)		7-9 (confounder)	A measure combining the results from the binary depressive symptoms, anxiety symptoms and poor wellbeing measures. Participants were classed as experiencing any concurrent mental health problems if they experienced at least any one of the three poor mental health outcomes.
Any concurrent mental health problems (also including self-harm)		7-9 (confounder)	A measure combining the results from the binary depressive symptoms, anxiety symptoms, poor wellbeing and self-harm measures. Participants were classed as experiencing any concurrent mental health problems if they experienced at least any one of the four poor mental health outcomes. Only used in models for self-harm.

Table 3.7 *Missing data percentage, and the resulting number of datasets imputed, calculated during each mental health outcome-marginalised group effect modifier imputation procedure.*

	Mental health outcome			
Effect modifier	**Missing data % (No. imputed datasets)**			
	Depression	**Anxiety**	**Poor wellbeing**	**Self-harm**
Gender/sexual diversity	57.7% (60)	57.6% (60)	57.1% (60)	60.1% (65)
Discrimination	41.3% (45)	41.3% (45)	40.8% (45)	43.1% (45)
Frequently bullied	51.2% (55)	51.2% (55)	50.6% (55)	54.5% (60)

Table 3.8 *Frequency and percent of study participants in each category of social media use at each wave, by sex (n = 1,079).*

	wave 6		wave 7		wave 8		wave 9	
Social media use	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
<1 hr	256 (49.1%)	290 (61.7%)	208 (44.1%)	229 (56.1%)	144 (31.2%)	165 (43.3%)	97 (20.7%)	109 (29.8%)
1-2 hrs	142 (27.3%)	107 (22.8%)	159 (33.7%)	98 (24.0%)	143 (31.0%)	114 (29.9%)	146 (31.1%)	123 (33.6%)
>2 hrs	123 (23.6%)	73 (15.5%)	105 (22.2%)	81 (19.9%)	174 (37.7%)	102 (26.8%)	226 (48.2%)	134 (36.6%)
Missing	58 (10.0%)	30 (6.0%)	107 (18.5%)	92 (18.4%)	118 (20.4%)	119 (23.8%)	110 (19.0%)	134 (26.8%)

Notes. Missing percentage based on total sample
Response category percentage based on non-missing responses

Table 3.9 *Frequency and percent of study participants reporting a mental health outcome (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) at each wave, by sex (n = 1079).*

	wave 6		wave 7		wave 8		wave 9		wave 10	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
Depressive Symptoms										

No	419 (81.2%)	435 (94.6%)	370 (78.9%)	384 (94.3%)	312 (68.4%)	344 (91.2%)	251 (53.9%)	315 (86.5%)	238 (52.0%)	289 (81.4%)
Yes	97 (18.8%)	25 (5.4%)	99 (21.1%)	23 (5.7%)	144 (31.6%)	33 (8.8%)	215 (46.1%)	49 (13.5%)	220 (48.0%)	66 (18.6%)
Missing	63 (10.9%)	40 (8.0%)	110 (19.0%)	93 (18.6%)	123 (21.2%)	123 (24.6%)	113 (19.5%)	136 (27.2%)	121 (20.9%)	145 (29.0%)
Anxiety Symptoms										
No	440 (84.3%)	446 (95.7%)	377 (79.9%)	389 (94.6%)	329 (71.7%)	352 (91.4%)	305 (65.3%)	325 (88.6%)	284 (61.7%)	304 (85.9%)
Yes	82 (15.7%)	20 (4.3%)	95 (20.1%)	22 (5.4%)	130 (28.3%)	33 (8.6%)	162 (34.7%)	42 (11.4%)	176 (38.3%)	50 (14.1%)
Missing	57 (9.8%)	34 (6.8%)	107 (18.5%)	89 (17.8%)	120 (20.7%)	115 (23.0%)	112 (19.3%)	133 (26.6%)	119 (20.6%)	146 (29.2%)
Poor wellbeing										
No	368 (70.1%)	390 (83.0%)	351 (73.9%)	344 (83.5%)	318 (68.5%)	316 (82.3%)	243 (51.7%)	255 (69.5%)	209 (45.2%)	248 (69.3%)
Yes	157 (29.9%)	80 (17.0%)	124 (26.1%)	68 (16.5%)	146 (31.5%)	68 (17.7%)	227 (48.3%)	112 (30.5%)	253 (54.8%)	110 (30.7%)
Missing	54 (9.3%)	30 (6.0%)	104 (18.0%)	88 (17.6%)	115 (19.9%)	116 (23.2%)	109 (18.8%)	133 (26.6%)	117 (20.2%)	142 (28.4%)
Self-harm										
No	479 (94.7%)	448 (97.8%)	434 (93.3%)	399 (97.3%)	388 (86.2%)	367 (97.1%)	401 (87.2%)	341 (95.3%)	380 (84.6%)	337 (95.7%)
Yes	27 (5.3%)	10 (2.2%)	31 (6.7%)	11 (2.7%)	62 (13.8%)	11 (2.9%)	59 (12.8%)	17 (4.7%)	69 (15.4%)	15 (4.3%)
Missing	73 (12.6%)	42 (8.4%)	114 (19.7%)	90 (18.0%)	129 (22.3%)	122 (24.4%)	119 (20.6%)	142 (28.4%)	130 (22.5%)	148 (29.6%)

Notes. Missing percentage based on total sample

Response category percentage based on non-missing responses

Table 3.10 *Aim 1 (sensitivity) – Estimated risk ratios (RR, 95% CI) and risk differences (RD, 95% CI) of social media use on future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) during adolescence, by marginalised group.*

		RD *100 (95%CI)		RR (95%CI)	
		1-2 hrs vs <1 hr SMU	**>2 hrs vs <1 hr SMU**	**1-2 hrs vs <1 hr SMU**	**>2 hrs vs <1 hr SMU**
Depressive symptoms					
Gender/sexual diversity					
	No	-2.4 (-7.1, 2.2)	2.8 (-2.3, 7.9)	0.91 (0.76, 1.09)	1.10 (0.92, 1.32)
	Yes	10.6 (-2.3, 23.4)	8.0 (-3.7, 19.7)	1.26 (0.95, 1.68)	1.20 (0.91, 1.57)
Discrimination					
	No	-1.0 (-10.3, 8.2)	3.9 (-5.6, 13.5)	0.97 (0.73, 1.29)	1.12 (0.84, 1.49)
	Yes	2.2 (-18.0, 22.3)	10.7 (-8.4, 29.9)	1.07 (0.61, 1.86)	1.31 (0.79, 2.16)
Frequent Bullied					
	No	-1.7 (-6.3, 2.9)	3.5 (-1.6, 8.6)	0.93 (0.77, 1.13)	1.14 (0.94, 1.39)
	Yes	2.9 (-7.3, 13.0)	4.3 (-5.8, 14.4)	1.07 (0.85, 1.34)	1.10 (0.88, 1.38)
Anxiety symptoms		RD *100 (95%CI)		RR (95%CI)	
Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
	No	-3.7 (-7.9, 0.6)	-1.1 (-5.7, 3.4)	0.85 (0.70, 1.03)	0.95 (0.78, 1.16)
	Yes	1.1 (-11.8, 14.0)	1.8 (-10.5, 14.1)	1.03 (0.72, 1.47)	1.05 (0.75, 1.47)
Discrimination					
	No	-3.2 (-11.5, 5.1)	0.5 (-8.3, 9.3)	0.89 (0.65, 1.21)	1.02 (0.75, 1.39)
	Yes	0.1 (-16.6, 16.8)	-4.9 (-22.0, 12.2)	1.01 (0.62, 1.64)	0.86 (0.50, 1.46)
Frequent Bullied					
	No	-3.2 (-7.7, 1.3)	-0.3 (-4.9, 4.3)	0.86 (0.69, 1.07)	0.99 (0.80, 1.21)
	Yes	-4.5 (-13.9, 4.9)	-4.4 (-13.5, 4.7)	0.88 (0.68, 1.15)	0.89 (0.69, 1.14)
Poor wellbeing		RD *100 (95%CI)		RR (95%CI)	
Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
	No	-0.1 (-4.3, 4.1)	0.9 (-3.9, 5.6)	1.00 (0.88, 1.13)	1.03 (0.89, 1.18)
	Yes	1.9 (-10.7, 14.5)	0.3 (-11.4, 12.0)	1.03 (0.83, 1.30)	1.01 (0.81, 1.24)
Discrimination					
	No	1.2 (-7.6, 10.1)	-2.4 (-12.4, 7.5)	1.03 (0.84, 1.26)	0.95 (0.75, 1.19)
	Yes	10.5 (-6.7, 27.7)	6.6 (-13.0, 26.2)	1.25 (0.85, 1.84)	1.16 (0.74, 1.80)
Frequent Bullied					
	No	1.1 (-3.7, 5.8)	1.5 (-3.6, 6.6)	1.03 (0.90, 1.19)	1.05 (0.90, 1.22)
	Yes	-4.6 (-14.8, 5.7)	-4.9 (-14.4, 4.6)	0.92 (0.75, 1.12)	0.91 (0.76, 1.09)
Self-harm		RD *100 (95%CI)		RR (95%CI)	
Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
	No	-2.1 (-5.6, 1.3)	-0.5 (-4.3, 3.4)	0.79 (0.53, 1.16)	0.95 (0.64, 1.42)
	Yes	11.7 (-1.9, 25.4)	3.9 (-7.3, 15.2)	1.69 (0.88, 3.23)	1.24 (0.67, 2.30)

	Discrimination					
		No	-0.2 (-6.6, 6.2)	1.2 (-5.6, 8.0)	0.99 (0.54, 1.80)	1.12 (0.61, 2.06)
		Yes	5.6 (-8.4, 19.7)	8.2 (-4.9, 21.2)	2.10 (0.29, 15.29)	2.55 (0.39, 16.83)
	Frequent Bullied					
		No	0.6 (-2.8, 4.1)	0.8 (-2.9, 4.5)	1.08 (0.71, 1.63)	1.10 (0.71, 1.71)
		Yes	-6.3 (-16.8, 4.2)	-4.9 (-14.9, 5.2)	0.74 (0.44, 1.22)	0.80 (0.51, 1.26)

Table 3.11 *Aim 2 (sensitivity) – Estimated risk ratios (RR, 95%CI) and risk differences (RD, 95%CI) of social media use on future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) during adolescence, by marginalised group and sex.*

	RD *100 (95%CI)				RR (95%CI)			
	Females		Males		Females		Males	
	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
Depressive symptoms								
Gender/sexual diversity								
No	-3.6 (-10.7, 3.4)	2.6 (-4.7, 9.8)	-1.1 (-6.3, 4.0)	3.1 (-3.0, 9.1)	0.91 (0.75, 1.09)	1.07 (0.89, 1.27)	0.91 (0.60, 1.38)	1.23 (0.81, 1.88)
Yes	11.0 (-3.0, 25.0)	8.0 (-4.9, 20.9)	9.7 (-3.7, 23.2)	7.9 (-4.5, 20.3)	1.22 (0.94, 1.58)	1.16 (0.91, 1.49)	1.44 (0.86, 2.40)	1.36 (0.82, 2.25)
Discrimination								
No	-1.8 (-15.2, 11.6)	3.2 (-9.8, 16.2)	-0.1 (-10.4, 10.1)	4.8 (-6.0, 15.7)	0.96 (0.71, 1.30)	1.07 (0.81, 1.43)	0.99 (0.56, 1.75)	1.27 (0.73, 2.18)
Yes	2.1 (-24.0, 28.2)	10.9 (-13.2, 35.0)	2.3 (-14.2, 18.8)	10.6 (-6.0, 27.2)	1.04 (0.64, 1.69)	1.20 (0.78, 1.86)	1.15 (0.42, 3.12)	1.69 (0.71, 4.05)
Frequent Bullied								
No	-2.4 (-9.2, 4.5)	3.4 (-4.1, 10.9)	-1.0 (-5.8, 3.8)	3.6 (-1.8, 9.0)	0.94 (0.77, 1.14)	1.09 (0.90, 1.33)	0.91 (0.58, 1.42)	1.31 (0.88, 1.96)
Yes	3.3 (-9.0, 15.6)	3.6 (-8.3, 15.5)	2.3 (-8.1, 12.7)	5.3 (-5.4, 16.0)	1.06 (0.86, 1.30)	1.06 (0.87, 1.30)	1.10 (0.72, 1.67)	1.22 (0.81, 1.83)
Anxiety symptoms	Females		Males		Females		Males	
Gender/sexual diversity	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU

		No	-6.5 (-13.2, 0.1)	-4.7 (-11.5, 2.1)	-0.7 (-5.5, 4.2)	2.7 (-2.8, 8.1)	0.82 (0.67, 1.00)	0.87 (0.71, 1.06)	0.94 (0.60, 1.48)	1.24 (0.79, 1.93)
		Yes	-0.2 (-14.7, 14.4)	-0.7 (-14.2, 12.9)	3.7 (-8.6, 16.0)	6.9 (-5.6, 19.3)	1.00 (0.72, 1.38)	0.99 (0.73, 1.34)	1.21 (0.64, 2.26)	1.39 (0.75, 2.55)
	Discrimination									
		No	-5.5 (-18.2, 7.2)	-4.6 (-17.3, 8.1)	-0.4 (-8.6, 7.7)	6.6 (-2.9, 16.0)	0.87 (0.62, 1.20)	0.89 (0.64, 1.23)	0.97 (0.52, 1.80)	1.49 (0.81, 2.75)
		Yes	-1.6 (-24.0, 20.8)	-11.7 (-34.4, 10.9)	1.9 (-12.2, 15.9)	2.1 (-12.3, 16.5)	0.97 (0.64, 1.48)	0.78 (0.49, 1.25)	1.14 (0.44, 2.99)	1.16 (0.44, 3.07)
	Frequent Bullied									
		No	-5.7 (-12.5, 1.2)	-3.4 (-10.2, 3.4)	-0.4 (-5.0, 4.2)	3.1 (-1.9, 8.1)	0.83 (0.66, 1.04)	0.90 (0.73, 1.11)	0.96 (0.60, 1.53)	1.31 (0.85, 2.04)
		Yes	-7.0 (-18.9, 4.9)	-8.6 (-19.8, 2.6)	-1.2 (-10.4, 8.1)	1.1 (-8.4, 10.6)	0.87 (0.68, 1.10)	0.84 (0.66, 1.05)	0.94 (0.59, 1.51)	1.06 (0.67, 1.67)
Poor wellbeing			Females		Males		Females		Males	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-0.9 (-7.0, 5.2)	-0.1 (-6.8, 6.5)	0.7 (-5.1, 6.4)	2.0 (-4.2, 8.2)	0.98 (0.85, 1.13)	1.00 (0.85, 1.17)	1.03 (0.82, 1.29)	1.08 (0.85, 1.37)
		Yes	1.5 (-11.3, 14.4)	-0.5 (-12.7, 11.6)	2.7 (-11.5, 16.9)	2.0 (-11.0, 15.1)	1.03 (0.83, 1.27)	0.99 (0.81, 1.21)	1.06 (0.78, 1.45)	1.05 (0.78, 1.40)
	Discrimination									
		No	1.0 (-11.2, 13.2)	-4.2 (-17.2, 8.8)	1.5 (-9.6, 12.5)	-0.3 (-12.2, 11.5)	1.02 (0.81, 1.28)	0.92 (0.72, 1.18)	1.05 (0.74, 1.48)	0.99 (0.68, 1.44)
		Yes	11.0 (-9.5, 31.4)	5.6 (-17.6, 28.7)	10.1 (-6.7, 26.9)	7.7 (-10.9, 26.2)	1.18 (0.85, 1.64)	1.09 (0.75, 1.59)	1.44 (0.76, 2.75)	1.33 (0.65, 2.72)

	Frequent Bullied									
		No	0.1 (-6.2, 6.5)	0.1 (-6.6, 6.9)	2.1 (-4.2, 8.3)	3.1 (-3.3, 9.4)		1.00 (0.86, 1.17)	1.00 (0.85, 1.18)	1.09 (0.84, 1.42)	1.13 (0.88, 1.47)
		Yes	-5.4 (-16.2, 5.4)	-6.5 (-16.7, 3.7)	-3.4 (-15.3, 8.5)	-2.8 (-13.7, 8.1)		0.91 (0.77, 1.09)	0.90 (0.76, 1.06)	0.92 (0.69, 1.23)	0.93 (0.72, 1.22)
Self-harm			Females		Males			Females		Males	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-0.6 (-5.9, 4.6)	-0.2 (-5.7, 5.4)	-3.7 (-7.4, 0.0)	-0.8 (-4.9, 3.4)		0.95 (0.62, 1.45)	0.99 (0.64, 1.54)	0.46 (0.19, 1.08)	0.88 (0.46, 1.68)
		Yes	16.4 (1.1, 31.8)	4.8 (-7.5, 17.1)	2.2 (-11.7, 16.1)	2.2 (-9.6, 14.0)		1.85 (1.00, 3.44)	1.25 (0.69, 2.28)	1.16 (0.41, 3.29)	1.18 (0.49, 2.87)
	Discrimination										
		No	5.7 (-4.2, 15.5)	4.8 (-5.5, 15.1)	-7.1 (-14.5, 0.2)	-3.0 (-10.9, 4.9)		1.51 (0.70, 3.26)	1.44 (0.64, 3.23)	0.26 (0.06, 1.16)	0.70 (0.27, 1.79)
		Yes	13.5 (-5.6, 32.7)	13.7 (-2.4, 29.9)	-2.6 (-14.1, 8.9)	2.4 (-9.6, 14.4)		3.16 (0.45, 22.22)	3.22 (0.50, 20.76)	0.58 (0.04, 7.55)	1.64 (0.18, 14.87)
	Frequent Bullied										
		No	2.8 (-2.5, 8.2)	1.1 (-4.3, 6.4)	-1.9 (-5.2, 1.4)	0.5 (-3.2, 4.3)		1.27 (0.81, 1.98)	1.10 (0.68, 1.77)	0.63 (0.28, 1.43)	1.11 (0.55, 2.21)
		Yes	-3.9 (-17.7, 9.9)	-5.7 (-18.8, 7.4)	-9.4 (-18.8, -0.1)	-3.7 (-13.3, 5.8)		0.87 (0.52, 1.44)	0.81 (0.50, 1.31)	0.44 (0.18, 1.05)	0.78 (0.41, 1.47)

Table 3.12 *Aim 3 (sensitivity) - Estimated risk ratios (RR, 95% CI) and risk differences (RD, 95% CI) of social media use on future mental health (depressive symptoms, anxiety symptoms, poor wellbeing, and self-harm) during adolescence, by marginalised group and adolescent age group.*

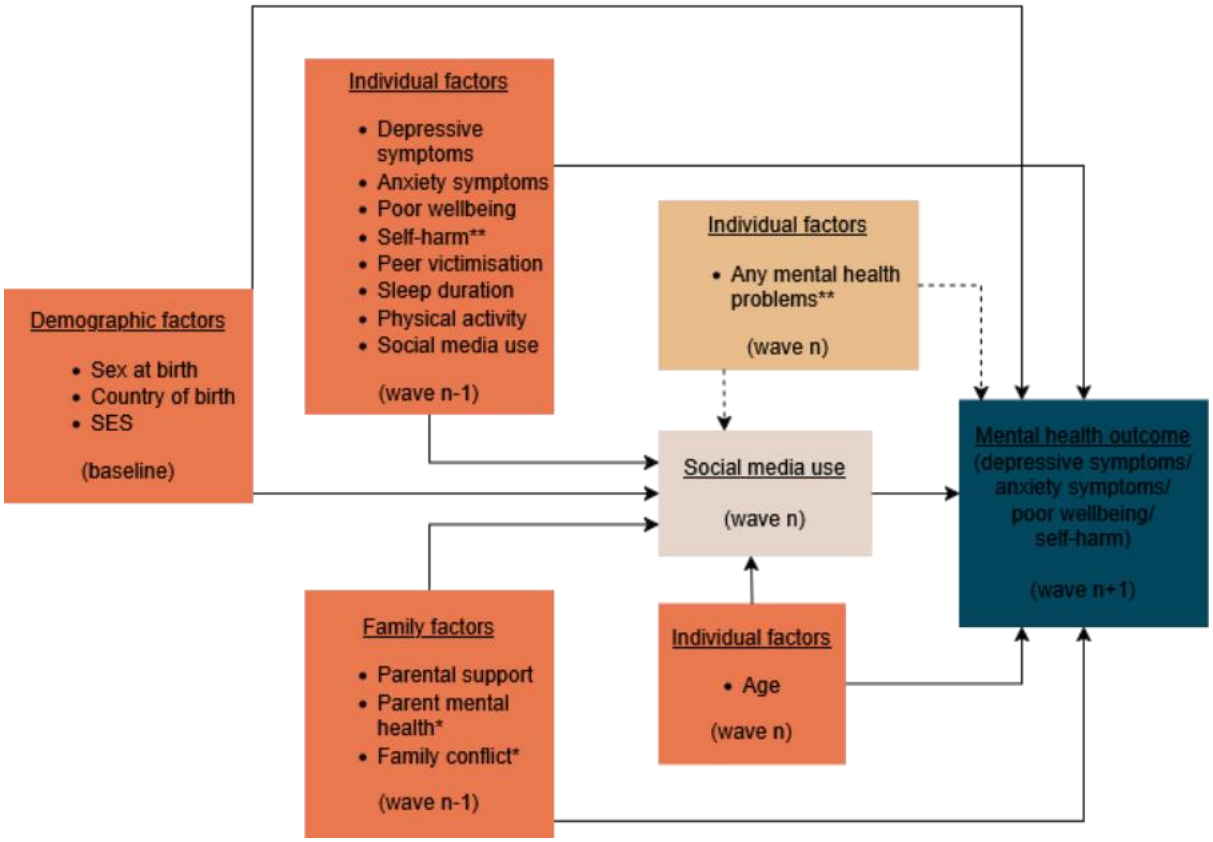
			RD *100 (95%CI)					RR (95%CI)			
			Mid adolescence		Late adolescence			Mid adolescence		Late adolescence	
			1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
Depressive symptoms											
	Gender/sexual diversity										
		No	-3.2 (-7.8, 1.4)	0.9 (-4.2, 5.9)	-0.8 (-9.5, 7.9)	6.9 (-1.7, 15.5)		0.88 (0.72, 1.06)	1.03 (0.85, 1.25)	0.97 (0.72, 1.32)	1.24 (0.94, 1.64)
		Yes	9.1 (-4.3, 22.5)	5.3 (-6.7, 17.3)	12.7 (-1.9, 27.4)	12.1 (-1.6, 25.7)		1.24 (0.90, 1.71)	1.14 (0.84, 1.54)	1.28 (0.95, 1.73)	1.27 (0.95, 1.69)
	Frequent Bullied										
		No	-2.8 (-7.6, 2.1)	1.2 (-4.3, 6.7)	0.3 (-7.5, 8.1)	7.9 (-0.4, 16.3)		0.88 (0.70, 1.10)	1.05 (0.84, 1.32)	1.01 (0.76, 1.34)	1.29 (0.98, 1.70)
		Yes	1.5 (-8.5, 11.6)	2.2 (-8.0, 12.4)	5.8 (-7.4, 19.0)	9.0 (-4.0, 22.0)		1.04 (0.82, 1.32)	1.05 (0.83, 1.34)	1.13 (0.85, 1.49)	1.20 (0.91, 1.57)
Anxiety symptoms			Mid adolescence		Late adolescence			Mid adolescence		Late adolescence	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-4.1 (-8.5, 0.4)	-1.6 (-6.5, 3.3)	-2.8 (-10.9, 5.3)	-0.1 (-7.9, 7.7)		0.82 (0.66, 1.02)	0.93 (0.74, 1.16)	0.89 (0.64, 1.24)	1.00 (0.73, 1.36)

		Yes	0.4 (-12.8, 13.7)	1.2 (-11.1, 13.6)	2.1 (-13.1, 17.3)	2.6 (-12.1, 17.4)	1.01 (0.67, 1.51)	1.04 (0.72, 1.51)	1.05 (0.73, 1.53)	1.07 (0.75, 1.53)
	Frequent Bullied									
		No	-3.5 (-8.4, 1.4)	-1.0 (-6.2, 4.1)	-2.5 (-10.2, 5.2)	1.1 (-6.8, 8.9)	0.83 (0.64, 1.08)	0.95 (0.74, 1.22)	0.90 (0.66, 1.24)	1.04 (0.77, 1.42)
		Yes	-4.9 (-14.5, 4.8)	-4.9 (-14.5, 4.8)	-3.7 (-16.4, 9.1)	-3.4 (-15.3, 8.6)	0.87 (0.66, 1.15)	0.87 (0.66, 1.15)	0.91 (0.67, 1.25)	0.92 (0.69, 1.23)
Poor wellbeing			Mid adolescence		Late adolescence		Mid adolescence		Late adolescence	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-1.8 (-6.6, 3.0)	1.3 (-4.2, 6.8)	3.5 (-4.4, 11.4)	0.0 (-8.1, 8.2)	0.94 (0.80, 1.10)	1.04 (0.88, 1.23)	1.09 (0.90, 1.32)	1.00 (0.82, 1.23)
		Yes	-0.2 (-13.6, 13.2)	0.9 (-11.3, 13.2)	5.0 (-8.5, 18.5)	-0.6 (-13.8, 12.5)	1.00 (0.77, 1.29)	1.02 (0.80, 1.29)	1.08 (0.87, 1.34)	0.99 (0.80, 1.23)
	Frequent Bullied									
		No	-0.6 (-5.9, 4.7)	2.1 (-3.7, 7.8)	4.2 (-4.1, 12.5)	0.5 (-7.7, 8.6)	0.98 (0.82, 1.18)	1.07 (0.89, 1.29)	1.11 (0.91, 1.35)	1.01 (0.82, 1.24)
		Yes	-6.1 (-16.8, 4.7)	-4.3 (-14.5, 5.9)	-1.2 (-13.3, 11.0)	-6.2 (-17.1, 4.7)	0.88 (0.71, 1.10)	0.92 (0.75, 1.13)	0.98 (0.80, 1.20)	0.90 (0.74, 1.08)
Self-harm			Mid adolescence		Late adolescence		Mid adolescence		Late adolescence	
	Gender/sexual diversity		1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU	1-2 hrs vs <1 hr SMU	>2 hrs vs <1 hr SMU
		No	-1.4 (-5.1, 2.3)	0.0 (-4.1, 4.1)	-3.6 (-9.6, 2.4)	-1.4 (-7.7, 4.9)	0.85 (0.56, 1.30)	1.00 (0.65, 1.53)	0.66 (0.34, 1.28)	0.88 (0.46, 1.65)
		Yes	12.9 (-1.1, 26.9)	4.6 (-6.7, 16.0)	10.0 (-6.4, 26.4)	2.9 (-11.2, 17.0)	1.81 (0.92, 3.59)	1.30 (0.67, 2.51)	1.54 (0.73, 3.23)	1.17 (0.57, 2.38)
	Frequent Bullied									

		No	0.8 (-3.2, 4.8)	1.1 (-3.1, 5.2)	0.3 (-5.3, 5.9)	0.4 (-5.3, 6.0)		1.10 (0.67, 1.81)	1.14 (0.68, 1.90)	1.04 (0.56, 1.92)	1.05 (0.56, 1.95)
		Yes	-6.4 (-17.1, 4.3)	-4.4 (-14.7, 5.8)	-6.2 (-20.9, 8.6)	-5.8 (-20.0, 8.4)		0.73 (0.42, 1.24)	0.81 (0.51, 1.31)	0.76 (0.39, 1.46)	0.77 (0.42, 1.42)

Appendix B: Causal Diagram

Figure 3.1. Causal diagram showing the proposed relationships between the exposure (tan), outcome (teal) and confounding (orange) variables. Any mental health problems at wave n was only included as a confounding variable in the sensitivity analysis.



Note.
* Parent mental health and family conflict were not measured across relevant waves and thus were not included as covariates in models.
** Self-harm was included as a confounder only when it was the outcome analysed.

Chapter 3.B. CATS dataset – Mental health predicting social media use over time

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3.1 Background

Over the past decade, social media has become a central aspect of adolescents' lives. This has prompted extensive empirical investigation into the associations between social media use and adolescent development, and in particular their mental health and wellbeing. However, findings are weak and heterogeneous. This uncertainty has contributed to ongoing debate regarding exactly how social media use and mental health are related during adolescence. Knowledge about pathways of effects is needed to both understand individual risk as well as inform public policy responses.

Several reviews have concluded that associations between adolescent social media use and mental health, particularly depressive symptoms and poor wellbeing, are present but weak. These reviews have noted considerable variation in findings by study design, measurement, and analytic approaches. However, this literature has largely treated social media use as the exposure of interest, with comparatively little attention to whether mental health problems shape subsequent patterns of social media use. Importantly, if mental health problems precede increases in social media use, then interventions that primarily reduce time spent online may be insufficient unless they also address distress-driven social media use, which could otherwise lead to substitution with other screen-based activities.

Research into the effects of mental health problems on social media use has most frequently been examined in longitudinal studies testing potential bidirectional associations. Some studies have reported effects of similar or greater magnitude for mental health problems predicting later social media use than for the reverse pathway. However, bidirectional models often constrain both pathways with the same functional form and time lag, which can lead to misleading inferences about the relative importance of pathways if one direction operates through different mechanisms (e.g., nonlinear effects or threshold-based risk) or over different timescales. They can also be limited in their ability to account for time-varying confounders that are themselves influenced by prior mental health and/or social media use.

A smaller number of studies have specifically examined the mental health-to-social media use pathway, reporting that depressive symptoms are associated with small subsequent increases in social media use, which is hypothesised to reflect distress-driven, compensatory, or reassurance-seeking engagement. Key gaps include whether these associations differ by sex or age, which are important given sex differences in both mental health problems and social media use during adolescence, as well as developmental changes to peer sensitivity and social contexts from early to late adolescence.

The current study examined whether adolescents with mental health problems, specifically high depressive symptoms, high anxiety symptoms, or poor wellbeing, were at increased risk of greater social media use in the following year, and whether these associations differed by sex and across age periods. We used annual data collected from early to late adolescence from the Child to Adult Transition Study (CATS), a population-based longitudinal cohort in Australia.

3.2 Methods

3.2.1 Study Sample

Data in the current study were obtained from CATS, a longitudinal cohort study based in Melbourne, Australia which invited all Year 3 students (N = 2,289; aged 8-9 years) from 43 schools that were selected via stratified (Government, Catholic, or Independent school) random sampling. Written parent consent was obtained from 1,239 (54%) participants who have been studied annually since 2012.

In the current study, data from Waves 6 (2017; age 13-14) to Wave 10 (2021; age 17-18) were used. Across these waves, 46 participants (4%) did not have any relevant data available to contribute to the analysis. These participants were excluded, resulting in the final analytic sample containing 1,193 participants. Table 3.1 presents demographic characteristics of the analytic sample, and Appendices Table 3.4 presents the distribution of missing data among all analysis variables in the analytic sample.

Table 3.1. *Comparison of wave 1 demographic characteristics of all participants in the CATS cohort (n = 1,239) to participants in the analytic sample (n = 1,193).*

Participant characteristics	N (%) / Mean (SD)
Male	552 (46.3)
Age (years)	9 [0.4]
ATSI status*	56 (4.8)
Born in Australia**	1019 (87.9)
Socioeconomic status (SEIFA)	
1st quintile (most disadvantaged)	158 (13.2)
2nd quintile	103 (8.6)
3rd quintile	188 (15.8)
4th quintile	335 (28.1)
5th quintile (most advantaged)	409 (34.3)

3.3 Measures

3.3.1 Depressive symptoms

Across Waves 4-9, the 13-item self-reported Short Mood and Feelings Questionnaire (SMFQ) was used to measure depressive symptoms over the prior two weeks. Scores were binarized to indicate the presence of high depressive symptoms. Mental health problems

Anxiety symptoms

Across Waves 4-9, the 8-item self-reported Spence Children's Anxiety Scale (SCAS) was used to measure anxiety symptoms over the past two weeks. Scores were binarized to indicate the presence of high anxiety symptoms.

Poor wellbeing

Data pertaining to the general wellbeing of participants were collected between Waves 4-9 using the Paediatric Quality of Life (PedsQL) General Wellbeing Scale. Six questions from this scale were used to create a dichotomous variable defining poor wellbeing.

Social media use

Across Waves 5-10, participants reported their typical social media use during normal school days using a 6-point scale. Responses were collapsed to produce a binary measure indicating ≥2 hours and <2 hours of daily social media usage.

Confounders

Potential confounders of the exposure(s) and outcome were identified using a directed acyclic graph (DAG) (Appendices Figure3.1). Further detail on the included confounders can be found in Appendices Table 3.5.

3.4 Statistical Analysis

3.4.1 Approach

All analyses were performed using R 4.4.2.

We sought to estimate the average effect of mental health difficulties (high depressive symptoms, high anxiety symptoms, poor wellbeing) at any given wave on social media usage in the following wave. Each mental health exposure had its own separate logistic regression outcome model, resulting in three separate models analysed. The g-computation procedure (regression standardisation) was applied using these models to obtain the average risk of higher social media use (≥2 hours) under each exposure level whilst also adjusting for confounding. Estimands of the average causal effect were obtained on the risk difference (RD) and risk ratio (RR) scales and were obtained by contrasting these estimates. Standard errors and 95% confidence intervals (95% CI) were used to quantify uncertainty about the point estimates, and were obtained via the delta method.

To accommodate the correlation present due to participants providing multiple data entries (each wave was a separate entry), generalised estimating equations were implemented using *geepack* with an exchangeable correlation matrix and robust standard errors.

3.4.2 Confounding

Confounding was considered to have occurred at three different points relative to the wave the exposure was measured.

In Wave 1, participant sex, country of birth and socioeconomic status (based on the Socio-Economic Indexes for Areas category Index of relative Socio-economic Advantage and Disadvantage (SEIFA IRSAD)) were collected and identified as confounders. As only data from Wave 1 were used for these variables, they remain consistent across models for each wave and hence were considered as baseline confounders.

Additionally, some confounders were considered to exist in the wave prior to, and in the same wave as the exposure. Depressive symptoms, anxiety symptoms, poor wellbeing, experiencing

frequent bullying, parental support, sleep duration, physical activity and social media use were all considered as confounders in the wave immediately prior to the exposure. Age, as well as the age-period (early, middle, late adolescence), at the same wave as the exposure were also considered as confounding factors.

Model-based decisions

Interactions between the mental health exposure and sex, and between the mental health exposure and age period were included in the outcome models to relax the assumption that the effects of the various mental health exposures were constant across their different levels. In addition, an interaction between sex and age period was also included to allow for increased flexibility in the confounding adjustment. These inclusions were determined *a priori*.

Missing data

Multiple imputation by fully conditional specification was used to handle missing data and was performed using the package *mice*. The procedure was performed separately for each mental health exposure, stratified by sex. The number of datasets imputed were based on the percentage of observations having missing data for at least one variable within the subset of analysis variables involved for each exposure model (Appendices Table 3.6). Results from the imputation were obtained using Rubin's rules.

Sensitivity Analyses

A sensitivity analysis was planned to investigate whether results changed based on whether the classification of high social media use differed from the classification used in the primary analyses. Specifically, sensitivity analysis used a binary social media use outcome indicating ≥1 hour and <1 hour of daily use.

Additional sensitivity analyses included an additional confounder used to indicate the presence of any mental health problem at the same wave as the exposure. The mental health measures used to create this indicator depended on the exposure of the model. This was performed for both the primary outcome (higher social media use ≥ ≥2 hours) and sensitivity outcome (higher social media use = ≥1 hour) analyses.

3.4.3 Confounding adjustment

Models were adjusted for demographic factors from wave 1 (baseline) including sex at birth (female, male), country of birth (other, Australia), and socioeconomic status (disadvantaged, advantaged), as well as individual and family factors at the wave prior to exposure (prior depressive symptoms, anxiety symptoms, poor wellbeing, peer victimisation, parental support, sleep duration, physical activity, and social media use). Prior self-harming behaviours was only adjusted for in models analysing the effect on subsequent self-harm. Models also adjusted for participant age at the wave of exposure, as well as the age period (middle adolescence: wave 7-8, late adolescence: wave 9). See Supplementary Figure 1 (to be provided) for visual representation and further details about this causal model.

In addition to the effect modifier, interaction terms between social media use and sex at birth, and social media use and age period were included to relax the assumption of a constant

confounding effect across these measures. An additional interaction term between sex and age period was also included to increase the flexibility of their adjustment. These inclusions were decided *a priori*.

Sensitivity analyses included adjustment for concurrent mental health problems at the wave of social media use as an additional confounder. This measure was comprised of depressive symptoms, anxiety symptoms and poor wellbeing, with self-harm included only for the analysis of self-harm.

3.4.4 Missing data

Across the entire analytic sample, 61.1% of participants had missing data for at least one variable. Multiple imputation via fully conditional specification (FCS) was implemented to handle the missing data using the *mice* (Buuren & Groothuis-Oudshoorn, 2011) package in R 4.4.2 (R core team, 2024). Imputation was performed separately for each outcome and effect modifier combination, stratified by sex. All analysis variables for each outcome model were included in the imputation models, with the number of datasets imputed to reflect the percentage of observations with missing data for at least one variable (see Appendices Table 3.6). Each imputed dataset was analysed individually, then pooled using Rubin's rules to obtain the final estimates. Appendices Tables 3.7-3.9 provide further breakdown of social media use and mental health variables over time.

3.5 Results

3.5.1 Estimated effects of mental health problems

Estimated RRs and RDs (per 100) for the effects of mental health problems on social media use (SMU) one year later, across all adolescents and stratified by sex, are presented in Table 3.2.

Results indicated increased risk for high SMU (>2 hours) in adolescents with high vs low levels of depressive symptoms (RD=6.2 [2.1, 10.3]). Stratified analyses revealed a similar pattern of increased risk for both sexes with high depressive symptoms, although point estimates were more conclusive in females (RD=6.8 [2.1, 11.4]) than males (RD=5.6 [-1.3, 12.4]).

Increased risk for high SMU (>2 hours) was also identified in adolescents with poor vs good wellbeing (RD=6.7 [3.4, 10.1]), and sex-stratified analyses revealed slightly larger point estimates in females (RD=7.9 [3.6, 12.1]) relative to males (RD=5.4 [0.7, 10.1]).

While point estimates were largely consistent with increased risk for high SMU (>2 hours) in adolescents with high vs low anxiety symptoms, results were inconclusive overall for adolescents (RD=3.0 [-1.7, 7.8]) and when stratified by sex (male: RD=2.4 [-5.4, 10.2]; female: RD=3.6 [-1.1, 7.8]).

Table 3.2: *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥ 2 hours) during adolescence, overall and by sex.*

	RD*100 (95%CI)			RR (95%CI)		
	Overall	**Females**	**Males**	**Overall**	**Females**	**Males**
Depressive symptoms (high vs low)	6.2 (2.1, 10.3)	6.8 (2.1, 11.4)	5.6 (-1.3, 12.4)	1.21 (1.08, 1.37)	1.21 (1.06, 1.37)	1.22 (0.97, 1.53)
Anxiety symptoms (high vs low)	3.0 (-1.7, 7.8)	3.6 (-1.1, 8.3)	2.4 (-5.4, 10.2)	1.10 (0.95, 1.27)	1.11 (0.97, 1.26)	1.09 (0.82, 1.44)
Wellbeing (poor vs good)	6.7 (3.4, 10.1)	7.9 (3.6, 12.1)	5.4 (0.7, 10.1)	1.24 (1.12, 1.37)	1.25 (1.11, 1.40)	1.22 (1.03, 1.45)

3.5.2 Estimated effects of mental health problems by age period

Estimated risk for the effects of mental health problems on SMU one year later, stratified by age period and sex, are illustrated in Table 3.3.

Table 3.3. *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥ 2 hours) during adolescence, by sex and period of adolescence.*

	RD*100 (95%CI)		RR (95%CI)	
Early adolescence	**Females**	**Males**	**Females**	**Males**
Depressive symptoms (high vs low)	3.0 (-5.4, 11.4)	1.8 (-5.2, 8.8)	1.14 (0.79, 1.62)	1.12 (0.70, 1.80)
Anxiety symptoms (high vs low)	5.1 (-2.8, 12.9)	3.3 (-4.6, 11.1)	1.24 (0.90, 1.71)	1.24 (0.76, 2.03)
Wellbeing (poor vs good)	5.4 (-0.7, 11.4)	2.7 (-1.9, 7.3)	1.26 (0.98, 1.62)	1.22 (0.88, 1.68)
Mid adolescence				
Depressive symptoms (high vs low)	7.4 (1.1, 13.7)	6.1 (-2.5, 14.7)	1.20 (1.03, 1.41)	1.20 (0.94, 1.54)
Anxiety symptoms (high vs low)	2.6 (-3.6, 8.7)	1.7 (-7.5, 10.9)	1.07 (0.91, 1.25)	1.05 (0.78, 1.41)
Wellbeing (poor vs good)	9.2 (3.6, 14.9)	6.8 (0.5, 13.1)	1.27 (1.10, 1.46)	1.24 (1.03, 1.50)
Late adolescence				
Depressive symptoms (high vs low)	12.5 (4.7, 20.4)	11.5 (0.8, 22.3)	1.27 (1.09, 1.48)	1.31 (1.04, 1.66)
Anxiety symptoms	3.7 (-5.1, 12.6)	2.9 (-8.5, 14.2)	1.07	1.07

	(high vs low)			(0.91, 1.27)	(0.81, 1.42)
	Wellbeing (poor vs good)	8.8 (1.3, 16.3)	6.6 (-1.7, 14.9)	1.18 (1.02, 1.37)	1.18 (0.96, 1.45)

For both sexes, the risk for high SMU increased when comparing those with high vs low depressive symptoms from early adolescence (male: RD=1.8 [-5.2, 8.8]; female: RD=3.0 [-5.4, 11.4]) to late adolescence (male: RD=11.5 [0.8, 22.3]; female: RD=12.5 [4.7, 20.4]). Comparatively, point estimates were largely consistent across age periods when comparing the risk for high SMU in those with high vs low anxiety symptoms, and good vs poor wellbeing.

3.1.6.3 Sensitivity analyses

A broadly consistent pattern of associations was identified in sensitivity analyses comparing risk of ≥1 hour vs <1 hour of SMU, although differences across age period were no longer evident in those with high vs low depressive symptoms (see Appendices Tables S10 and S11). Finally, there were no notable differences to the patterns of associations when including the presence of other mental health problems (at the same wave as the exposure) as an additional confounder (see Appendices Table S12 and S13).

3.6 Discussion/Conclusion

The current study examined whether adolescents with mental health problems were at risk of greater social media use, using population-based longitudinal data spanning early to late adolescence. Overall, adolescents with high depressive symptoms or poor wellbeing were at modestly increased risk of reporting greater social media use (>2 hours per day) one year later. Point estimates were larger and/or more precise among females than males, and effects for depressive symptoms appeared to strengthen from early to late adolescence.

Our findings provide support for the hypothesis that mental health problems may precede increases in social media use. Across adolescents aged 12 to 18 years, results suggest that compared with those with lower levels of depressive symptoms, there were 6 to 7 additional individuals with greater social media use (>2 hours per day) at the subsequent annual wave for every 100 adolescents with high depressive symptoms. We also identified similar levels of risk for greater social media use when considering adolescents with poor versus good wellbeing. Direct comparison of effect sizes with prior literature is challenging as most studies to date have used correlation-based analyses rather than risk estimates. Although sex-stratified analyses suggested broadly similar patterns for males and females, point estimates for depressive symptoms and poor wellbeing were larger and/or more precise among females. This is consistent with prior work showing higher prevalence of internalising symptoms among adolescent females, as well as differences in social media behaviours and motivations for use, and susceptibility to online interpersonal stressors. However, confidence intervals overlapped across sexes, which cautions against overly sex-specific interpretations.

Findings align with conceptual models proposing that depressive symptoms, characterised by low energy, anhedonia, disrupted sleep and social withdrawal, may shift adolescents toward

more solitary, screen-based activities. Increased social media use may also reflect compensatory or regulatory behaviours, such as distraction from negative affect, reassurance and support seeking, or maintaining social connection when face-to-face interactions feel effortful or aversive. Given that similar patterns were observed for poor wellbeing, it is possible that broader impairments in emotional or functional health, beyond clinical-level symptoms, may also contribute to increases in online engagement. However, based on the current study, it is not possible to conclude whether increased social media use serves to alleviate or exacerbate emotional difficulties. Thus, further research is needed that examines the motives and consequences of adolescents' social media use.

Interestingly, the current risk estimates were of similar magnitude to our prior findings on the effects of social media use on future mental health problems. Therefore, even modest absolute effects in each direction may accumulate across adolescence, which could reinforce both mental health challenges and greater levels of social media engagement over time. Thus, from a public health perspective, strategies focused solely on reducing time spent on social media may have limited impact without also addressing underlying emotional distress and motives driving social media use.

Additionally, the association between depressive symptoms and subsequent social media use appeared to strengthen from early to late adolescence for both sexes. These findings suggest that adolescents with depressive symptoms may increase their reliance on online spaces for connection or distraction as they grow older. Indeed, peer relationships become increasingly salient with age, and autonomy and access to social media platforms also increases. Interestingly, our prior study identified stronger effects of social media use on subsequent mental health problems in early compared to later adolescence, suggesting that role of social media may shift from a significant exposure in early adolescence to a coping or compensatory behaviour in later adolescence. Interventions and policies to mitigate potential harms of social media use may thus also be more effective earlier in adolescence, whereas addressing mental health difficulties may be more critical in later adolescence.

A key strength of the current study is the explicit focus on the mental health-to-social media use pathway and estimating effects on the risk difference scale, which helps inform the magnitude and public health relevance of effects. However, findings should also be interpreted in the context of several limitations. Social media use was self-reported and focused on duration, which may obscure variation in specific platforms, activities, or motivations for use. Further, residual confounding cannot be ruled out, from unmeasured factors such as personality traits or contemporaneous life stressors. In addition, it is possible that some effects operate over shorter time scales than annual intervals. Future research would thus benefit from incorporating more granular measures of social media behaviour, including active versus passive engagement, platform-specific use and motivations for use, as well as shorter-term follow-up which can better capture potential feedback loops. Integrating passive sensing or ecological momentary assessment may also help disentangle when and for whom mental health problems lead to increased social media use, and under what conditions this engagement may be adaptive versus maladaptive.

In summary, the current findings highlight the importance of considering mental health problems not only as potential outcomes of social media use, but also as antecedents that may shape adolescents' engagement with online environments over time. The observed developmental variation suggests that the pathways linking social media use and mental health may also shift across adolescence, with implications for the timing and targets of interventions and policies.

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Appendices

Table 3.4. *Frequency and percent of missing data in analytic sample for all variables used in the analysis (overall, and by sex).*

	N (%)		
	Overall	**Females**	**Males**
Wave 3 Social media use (≥ 2hrs)	340 (28.5%)	165 (25.7%)	175 (31.7%)
Wave 4 Social media use (≥ 2hrs)	135 (11.3%)	82 (12.8%)	53 (9.6%)
Wave 5 Social media use (≥ 2hrs)	215 (18%)	119 (18.6%)	96 (17.4%)
Wave 6 Social media use (≥ 2hrs)	202 (16.9%)	120 (18.7%)	82 (14.9%)
Wave 7 Social media use (≥ 2hrs)	313 (26.2%)	169 (26.4%)	144 (26.1%)
Wave 8 Social media use (≥ 2hrs)	351 (29.4%)	180 (28.1%)	171 (31%)
Wave 9 Social media use (≥ 2hrs)	358 (30%)	172 (26.8%)	186 (33.7%)
Wave 10 Social media use (≥ 2hrs)	375 (31.4%)	179 (27.9%)	196 (35.5%)
Wave 3 depressive symptoms	125 (10.5%)	66 (10.3%)	59 (10.7%)
Wave 4 depressive symptoms	142 (11.9%)	86 (13.4%)	56 (10.1%)
Wave 5 depressive symptoms	261 (21.9%)	145 (22.6%)	116 (21%)
Wave 6 depressive symptoms	217 (18.2%)	125 (19.5%)	92 (16.7%)
Wave 7 depressive symptoms	317 (26.6%)	172 (26.8%)	145 (26.3%)
Wave 8 depressive symptoms	360 (30.2%)	185 (28.9%)	175 (31.7%)
Wave 9 depressive symptoms	363 (30.4%)	175 (27.3%)	188 (34.1%)
Wave 3 anxiety symptoms	114 (9.6%)	60 (9.4%)	54 (9.8%)
Wave 4 anxiety symptoms	151 (12.7%)	86 (13.4%)	65 (11.8%)
Wave 5 anxiety symptoms	212 (17.8%)	119 (18.6%)	93 (16.8%)
Wave 6 anxiety symptoms	205 (17.2%)	119 (18.6%)	86 (15.6%)
Wave 7 anxiety symptoms	310 (26%)	169 (26.4%)	141 (25.5%)
Wave 8 anxiety symptoms	349 (29.3%)	182 (28.4%)	167 (30.3%)
Wave 9 anxiety symptoms	359 (30.1%)	174 (27.1%)	185 (33.5%)
Wave 3 poor wellbeing	77 (6.5%)	41 (6.4%)	36 (6.5%)
Wave 4 poor wellbeing	126 (10.6%)	79 (12.3%)	47 (8.5%)
Wave 5 poor wellbeing	207 (17.4%)	116 (18.1%)	91 (16.5%)
Wave 6 poor wellbeing	198 (16.6%)	116 (18.1%)	82 (14.9%)
Wave 7 poor wellbeing	306 (25.6%)	166 (25.9%)	140 (25.4%)
Wave 8 poor wellbeing	345 (28.9%)	177 (27.6%)	168 (30.4%)
Wave 9 poor wellbeing	356 (29.8%)	171 (26.7%)	185 (33.5%)
Wave 3 parental support	89 (7.5%)	51 (8%)	38 (6.9%)
Wave 4 parental support	138 (11.6%)	86 (13.4%)	52 (9.4%)
Wave 5 parental support	220 (18.4%)	127 (19.8%)	93 (16.8%)
Wave 6 parental support	216 (18.1%)	128 (20%)	88 (15.9%)
Wave 7 parental support	324 (27.2%)	181 (28.2%)	143 (25.9%)
Wave 8 parental support	364 (30.5%)	185 (28.9%)	179 (32.4%)
Wave 3 peer victimisation/frequently bullied	97 (8.1%)	55 (8.6%)	42 (7.6%)
Wave 4 peer victimisation/frequently bullied	132 (11.1%)	83 (12.9%)	49 (8.9%)

	N (%)		
	Overall	**Females**	**Males**
Wave 5 peer victimisation/frequently bullied	228 (19.1%)	127 (19.8%)	101 (18.3%)
Wave 6 peer victimisation/frequently bullied	205 (17.2%)	120 (18.7%)	85 (15.4%)
Wave 7 peer victimisation/frequently bullied	316 (26.5%)	170 (26.5%)	146 (26.4%)
Wave 8 peer victimisation/frequently bullied	352 (29.5%)	179 (27.9%)	173 (31.3%)
Wave 3 sleep duration	169 (14.2%)	83 (12.9%)	86 (15.6%)
Wave 4 sleep duration	132 (11.1%)	80 (12.5%)	52 (9.4%)
Wave 5 sleep duration	216 (18.1%)	121 (18.9%)	95 (17.2%)
Wave 6 sleep duration	214 (17.9%)	121 (18.9%)	93 (16.8%)
Wave 7 sleep duration	308 (25.8%)	169 (26.4%)	139 (25.2%)
Wave 8 sleep duration	360 (30.2%)	181 (28.2%)	179 (32.4%)
Wave 3 physical activity	96 (8%)	52 (8.1%)	44 (8%)
Wave 4 physical activity	174 (14.6%)	105 (16.4%)	69 (12.5%)
Wave 5 physical activity	245 (20.5%)	129 (20.1%)	116 (21%)
Wave 6 physical activity	213 (17.9%)	121 (18.9%)	92 (16.7%)
Wave 7 physical activity	311 (26.1%)	171 (26.7%)	140 (25.4%)
Wave 8 physical activity	354 (29.7%)	182 (28.4%)	172 (31.2%)
Wave 4 age at survey completion	126 (10.6%)	79 (12.3%)	47 (8.5%)
Wave 5 age at survey completion	200 (16.8%)	114 (17.8%)	86 (15.6%)
Wave 6 age at survey completion	196 (16.4%)	115 (17.9%)	81 (14.7%)
Wave 7 age at survey completion	294 (24.6%)	163 (25.4%)	131 (23.7%)
Wave 8 age at survey completion	337 (28.2%)	173 (27%)	164 (29.7%)
Wave 9 age at survey completion	347 (29.1%)	166 (25.9%)	181 (32.8%)
Wave 4 any concurrent mental health problems (anxiety and/or wellbeing)	148 (12.4%)	86 (13.4%)	62 (11.2%)
Wave 5 any concurrent mental health problems (anxiety and/or wellbeing)	214 (17.9%)	120 (18.7%)	94 (17%)
Wave 6 any concurrent mental health problems (anxiety and/or wellbeing)	205 (17.2%)	118 (18.4%)	87 (15.8%)
Wave 7 any concurrent mental health problems (anxiety and/or wellbeing)	311 (26.1%)	169 (26.4%)	142 (25.7%)
Wave 8 any concurrent mental health problems (anxiety and/or wellbeing)	350 (29.3%)	182 (28.4%)	168 (30.4%)
Wave 9 any concurrent mental health problems (anxiety and/or wellbeing)	358 (30%)	172 (26.8%)	186 (33.7%)
Wave 4 any concurrent mental health problems (depression and/or wellbeing)	139 (11.7%)	85 (13.3%)	54 (9.8%)
Wave 5 any concurrent mental health problems (depression and/or wellbeing)	255 (21.4%)	139 (21.7%)	116 (21%)
Wave 6 any concurrent mental health problems (depression and/or wellbeing)	214 (17.9%)	124 (19.3%)	90 (16.3%)
Wave 7 any concurrent mental health problems (depression and/or wellbeing)	313 (26.2%)	169 (26.4%)	144 (26.1%)

	N (%)		
	Overall	**Females**	**Males**
Wave 8 any concurrent mental health problems (depression and/or wellbeing)	359 (30.1%)	184 (28.7%)	175 (31.7%)
Wave 9 any concurrent mental health problems (depression and/or wellbeing)	360 (30.2%)	173 (27%)	187 (33.9%)
Wave 4 any concurrent mental health problems (depression and/or anxiety)	162 (13.6%)	92 (14.4%)	70 (12.7%)
Wave 5 any concurrent mental health problems (depression and/or anxiety)	263 (22%)	145 (22.6%)	118 (21.4%)
Wave 6 any concurrent mental health problems (depression and/or anxiety)	219 (18.4%)	125 (19.5%)	94 (17%)
Wave 7 any concurrent mental health problems (depression and/or anxiety)	319 (26.7%)	173 (27%)	146 (26.4%)
Wave 8 any concurrent mental health problems (depression and/or anxiety)	361 (30.3%)	187 (29.2%)	174 (31.5%)
Wave 9 any concurrent mental health problems (depression and/or anxiety)	361 (30.3%)	173 (27%)	188 (34.1%)
Country of birth	34 (2.8%)	15 (2.3%)	19 (3.4%)
Sex assigned at birth	0 (0%)	0 (0%)	0 (0%)
SEIFA IRSAD	0 (0%)	0 (0%)	0 (0%)
Missing data in at least one variable	893 (74.9%)	471 (73.5%)	422 (76.4%)

Note. SEIFA IRSAD – Socio-Economic Index for Areas - Index of Relative Socio-Economic Advantage and Disadvantage.

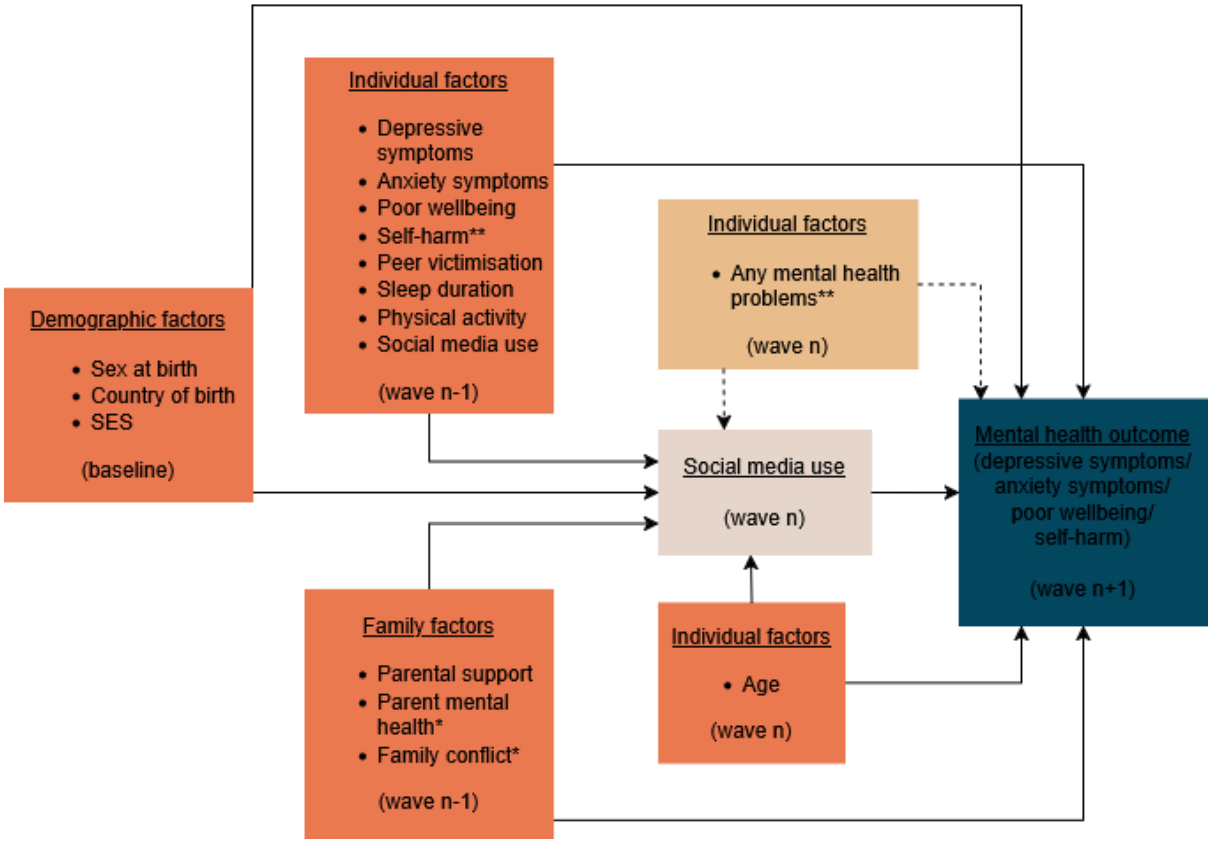
Table 3.5: *Information on how the different mental health outcomes (depressive symptoms, anxiety symptoms, poor wellbeing and self-harm), effect modifiers (any diversity, discrimination, and frequently bullied) and confounders were included in the analytic models*

Construct	Measure	Waves included in	Additional information
Depressive symptoms	Short Mood and Feelings Questionnaire (SMFQ)	4-9 (exposure) 3-8 (confounder)	All 13 items of the SMFQ were included in the survey. Items were scored on a 5-point Likert scale (0 (never) to 4 (almost always)) and responses were then recoded to a 3-point scale (0 (not true), 1 (sometimes), and 2 (true)) to match the original SMFQ scoring. The total score (ranging from 0-26) was dichotomised at a threshold of ≥12 to define the presence of high levels of depressive symptoms (Thabrew et al. 2018).
Anxiety symptoms	Spence Children's Anxiety Scale (SCAS)	4-9 (exposure) 3-8 (confounder)	All 8 items of the SCAS were included in the survey. Items were scored on a 5-point Likert scale, ranging from 0 (never) to 4 (almost always). They were recoded to a 4-point scale (0 (never) to 3 (always)) to match the original SCAS scoring. The total score (ranging from 0-21) was dichotomised at a threshold of ≥10 to define the presence of high levels of anxiety symptoms (Kroenke et al. 2007).
Poor wellbeing	Paediatric Quality of Life General Wellbeing Scale	4-9 (exposure) 3-8 (confounder)	All 6 items of the Paediatric Quality of Life General Wellbeing Scale were included in the survey. Items were scored on a 5-point scale (ranging from 0-4),and then were linearly transformed to range between 0-100. Finally, values on this expanded scale were dichotomised at <60 to define poor wellbeing.
Frequently bullied (peer victimisation)	Selected items from the Gatehouse Bullying Scale (Bond, Wolfe, Tollit, Butler, & Patton, 2007)	3-8 (confounder)	Participants were asked if they experienced each of the following types of bullying in the past 4 months: - Being teased or called names - Being talked about behind their back - Being purposely left out - Being physically hurt. - Being/experiencing cyberbullied If yes, participants were also asked to endorse the frequency of the related

			bullying (less than once a week, about once a week, most days). This was used to generate a binary variable indicating the presence of experiencing any frequent bullying (once a week or more).
Parent support	Study specific	3-8 (confounder)	Participants were asked questions regarding whether they talk about their feelings with their mum and whether they talk about their feelings with their dad. Participants were regarded as having parental support if they responded "yes" to either question.
Sleep duration		3-8 (confounder)	Participants were asked about their usual time they went to sleep and usual time they woke up on school days during the past 4 weeks. Sleep duration was calculated as the difference between these two times.
Physical activity		3-8 (confounder)	Participants were asked about the number of days they were physically active for at least 60 minutes over the past week.
Age		4-9 (confounder)	A continuous measure of age based on the participants date of birth and the date in which they completed the survey
Birthplace		1 (baseline)	Participants place of birth was obtained at the start of the study, with possible values 0 (other) and 1 (Australia). Was considered a baseline variable.
Socioeconomic status	Australian Bureau of Statistics Socio-Economic Index for Areas (SEIFA) 2011: Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) (based on home postcode) (population mean = 1000, SD = 100) (Australian Bureau of Statistics)	1 (baseline)	Participant SES was based on home postcode, with higher values indicating greater SES. Scores were collapsed into a binary measure indicating more disadvantaged or more advantaged.

Sex at birth		1 (baseline)	Participants' sext at birth was obtained at the start of the study, with possible values 0 (female) and 1 (male). Was considered a baseline variable.
Age group		Static	A binary measure indicating whether the data was obtained in mid adolescence (waves 7, 8) or late adolescence (wave 9).
Any concurrent mental health problems (depression, anxiety, poor wellbeing)		4-9 (confounder)	A combined measure indicating the presence of at least one mental health outcome at the same wave as the exposure. Mental health measures used are mutually exclusive with the exposure: - Depression exposure: anxiety and wellbeing - Anxiety exposure: depression and wellbeing - Wellbeing exposure: depression and anxiety

Figure 3.1. Causal diagram showing the proposed relationships between the exposure (tan), outcome (teal) and confounding (orange) variables. Any mental health problems at wave n was only included as a confounding variable in the sensitivity analysis.



Note.
* Parent mental health and family conflict were not measured across relevant waves and thus were not included as covariates in models.
** Any mental health problems at wave n was mutually exclusive to the mental health exposure

Table 3.6. *Missing data percentage, and the resulting number of datasets imputed, calculated during each mental health exposure imputation procedure.*

	Missing data % (No. imputed datasets)		
Mental health outcome	**Depression**	**Anxiety**	**Poor wellbeing**
	74.5% (80)	74.5% (80)	74.4% (80)

Table 3.7: *Frequency and percent of study participants in each category of social media use at each wave, by sex (n = 1,193).*

	wave 5		**wave 6**		**wave 7**		**wave 8**	
Social media use	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
<2 hr	439 (84.1%)	425 (93.2%)	398 (76.4%)	397 (84.5%)	367 (77.8%)	327 (80.1%)	287 (62.3%)	279 (73.2%)
≥ 2hrs	83 (15.9%)	31 (6.8%)	123 (23.6%)	73 (15.5%)	105 (22.2%)	81 (19.9%)	174 (37.7%)	102 (26.8%)
Missing	119 (18.6%)	96 (17.4%)	120 (18.7%)	82 (14.9%)	169 (26.4%)	144 (26.1%)	180 (28.1%)	171 (31.0%)
	wave 9		wave 10					
Social media use	Females	Males	Females	Males				
<2 hr	243 (51.8%)	232 (63.4%)	224 (48.5%)	225 (63.2%)				
≥ 2hrs	226 (48.2%)	134 (36.6%)	238 (51.5%)	131 (36.8%)				
Missing	172 (26.8%)	186 (33.7%)	179 (27.9%)	196 (35.5%)				

Note. Missing percentage based on total sample

Response category percentage based on non-missing responses (available cases)

Table 3.8. *Frequency and percent of study participants in each category of (sensitivity) social media use at each wave, by sex (n = 1,193).*

	wave 5		wave 6		wave 7		wave 8		wave 9		wave 10	
Social media use	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
<1 hr	350 (67.0%)	368 (80.7%)	256 (49.1%)	290 (61.7%)	208 (44.1%)	229 (56.1%)	144 (31.2%)	165 (43.3%)	97 (20.7%)	109 (29.8%)	77 (16.7%)	90 (25.3%)
≥ 1hr	172 (33.0%)	88 (19.3%)	265 (50.9%)	180 (38.3%)	264 (55.9%)	179 (43.9%)	317 (68.8%)	216 (56.7%)	372 (79.3%)	257 (70.2%)	385 (83.3%)	266 (74.7%)
Missing	119 (18.6%)	96 (17.4%)	120 (18.7%)	82 (14.9%)	169 (26.4%)	144 (26.1%)	180 (28.1%)	171 (31.0%)	172 (26.8%)	186 (33.7%)	179 (27.9%)	196 (35.5%)

Note. Missing percentage based on total sample

Response category percentage based on non-missing responses (available cases)

Table 3.9: *Frequency and percent of study participants reporting a mental health outcome (depressive symptoms, anxiety symptoms and poor wellbeing) at each wave, by sex (n = 1,193).*

	wave 4		wave 5		wave 6		wave 7		wave 8		wave 9	
Depressive symptoms	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
No	514 (92.6%)	476 (96.0%)	441 (88.9%)	418 (95.9%)	419 (81.2%)	435 (94.6%)	370 (78.9%)	384 (94.3%)	312 (68.4%)	344 (91.2%)	251 (53.9%)	315 (86.5%)
Yes	41 (7.4%)	20 (4.0%)	55 (11.1%)	18 (4.1%)	97 (18.8%)	25 (5.4%)	99 (21.1%)	23 (5.7%)	144 (31.6%)	33 (8.8%)	215 (46.1%)	49 (13.5%)
Missing	86 (13.4%)	56 (10.1%)	145 (22.6%)	116 (21.0%)	125 (19.5%)	92 (16.7%)	172 (26.8%)	145 (26.3%)	185 (28.9%)	175 (31.7%)	175 (27.3%)	188 (34.1%)
	wave 4		**wave 5**		**wave 6**		**wave 7**		**wave 8**		**wave 9**	
Anxiety symptoms	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
No	488 (87.9%)	472 (96.9%)	468 (89.7%)	443 (96.5%)	440 (84.3%)	446 (95.7%)	377 (79.9%)	389 (94.6%)	329 (71.7%)	352 (91.4%)	305 (65.3%)	325 (88.6%)
Yes	67 (12.1%)	15 (3.1%)	54 (10.3%)	16 (3.5%)	82 (15.7%)	20 (4.3%)	95 (20.1%)	22 (5.4%)	130 (28.3%)	33 (8.6%)	162 (34.7%)	42 (11.4%)
Missing	86 (13.4%)	65 (11.8%)	119 (18.6%)	93 (16.8%)	119 (18.6%)	86 (15.6%)	169 (26.4%)	141 (25.5%)	182 (28.4%)	167 (30.3%)	174 (27.1%)	185 (33.5%)
	wave 4		**wave 5**		**wave 6**		**wave 7**		**wave 8**		**wave 9**	
Poor wellbeing	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**	**Females**	**Males**
No	485 (86.3%)	431 (85.3%)	422 (80.4%)	399 (86.6%)	368 (70.1%)	390 (83.0%)	351 (73.9%)	344 (83.5%)	318 (68.5%)	316 (82.3%)	243 (51.7%)	255 (69.5%)
Yes	77 (13.7%)	74 (14.7%)	103 (19.6%)	62 (13.4%)	157 (29.9%)	80 (17.0%)	124 (26.1%)	68 (16.5%)	146 (31.5%)	68 (17.7%)	227 (48.3%)	112 (30.5%)
Missing	79 (12.3%)	47 (8.5%)	116 (18.1%)	91 (16.5%)	116 (18.1%)	82 (14.9%)	166 (25.9%)	140 (25.4%)	177 (27.6%)	168 (30.4%)	171 (26.7%)	185 (33.5%)

Table 3.10.: *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥ 1 hr) during adolescence, overall and by sex*

	RD*100 (95%CI)			RR (95%CI)		
	Overall	**Females**	**Males**	**Overall**	**Females**	**Males**
Depressive symptoms (high vs low)	7.2 (2.6, 11.7)	9.0 (4.3, 13.8)	5.0 (-3.4, 13.4)	1.13 (1.05, 1.21)	1.15 (1.07, 1.23)	1.10 (0.94, 1.28)
Anxiety symptoms (high vs low)	5.4 (0.4, 10.4)	6.2 (0.9, 11.5)	4.4 (-4.2, 13.1)	1.09 (1.01, 1.19)	1.10 (1.02, 1.19)	1.09 (0.93, 1.27)
Wellbeing (poor vs good)	3.4 (-0.1, 6.9)	5.5 (1.0, 9.9)	1.0 (-4.4, 6.4)	1.06 (1.00, 1.13)	1.09 (1.02, 1.17)	1.02 (0.92, 1.13)

Table 3.11: *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥1 hr) during adolescence, by sex and period of adolescence*

	RD*100 (95%CI)		RR (95%CI)	
Early adolescence	**Females**	**Males**	**Females**	**Males**
Depressive symptoms (high vs low)	8.9 (-0.6, 18.5)	3.0 (-7.7, 13.6)	1.21 (1.00, 1.46)	1.09 (0.79, 1.51)
Anxiety symptoms (high vs low)	11.8 (2.6, 21.0)	8.9 (-1.8, 19.6)	1.28 (1.07, 1.54)	1.30 (0.98, 1.73)
Wellbeing (poor vs good)	8.3 (1.2, 15.4)	2.7 (-4.2, 9.6)	1.20 (1.03, 1.39)	1.09 (0.88, 1.36)
Mid adolescence				
Depressive symptoms (high vs low)	9.9 (4.9, 14.9)	6.4 (-3.5, 16.2)	1.15 (1.07, 1.23)	1.11 (0.95, 1.30)
Anxiety symptoms (high vs low)	3.5 (-2.6, 9.6)	2.1 (-8.0, 12.2)	1.05 (0.96, 1.15)	1.03 (0.87, 1.23)
Wellbeing (poor vs good)	3.8 (-1.4, 9.0)	-0.6 (-7.1, 5.9)	1.06 (0.98, 1.14)	0.99 (0.88, 1.11)
Late adolescence				
Depressive symptoms (high vs low)	6.7 (0.7, 12.8)	4.8 (-4.4, 13.9)	1.08 (1.01, 1.16)	1.06 (0.94, 1.20)
Anxiety symptoms (high vs low)	3.1 (-3.5, 9.6)	2.5 (-7.7, 12.8)	1.04 (0.96, 1.12)	1.03 (0.90, 1.18)
Wellbeing (poor vs good)	4.7 (-0.6, 10.1)	2.4 (-5.0, 9.8)	1.06 (0.99, 1.13)	1.03 (0.94, 1.14)

Table 3.12: *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥ 2 hrs) during adolescence, overall and by sex, when controlling for any other mental health problems*

High social media usage (>= 2hrs) - sensitivity analysis	**RD*100 (95%CI)**			**RR (95%CI)**		
	Overall	**Females**	**Males**	**Overall**	**Females**	**Males**
Depressive symptoms (high vs low)	4.2 (0.2, 8.3)	4.6 (-0.2, 9.4)	3.8 (-2.9, 10.4)	1.14 (1.01, 1.29)	1.14 (1.00, 1.30)	1.15 (0.91, 1.44)
Anxiety symptoms (high vs low)	0.2 (-4.4, 4.9)	0.5 (-4.2, 5.2)	-0.1 (-7.6, 7.4)	1.01 (0.86, 1.17)	1.01 (0.89, 1.16)	0.99 (0.74, 1.33)
Wellbeing (poor vs good)	5.0 (1.6, 8.5)	5.7 (1.4, 10.0)	4.3 (-0.4, 9.0)	1.17 (1.06, 1.31)	1.17 (1.04, 1.32)	1.18 (0.99, 1.40)

Table 3.13.: *Estimated risk differences (RD, 95% CI) and risk ratios (RR, 95% CI) of various mental health measures (depressive symptoms, anxiety symptoms, poor wellbeing) on future weekday social media usage (≥ 2 hrs) during adolescence, by sex and period of adolescence, when controlling for any other mental health problems*

	RD*100 (95%CI)		RR (95%CI)	
Early adolescence	**Females**	**Males**	**Females**	**Males**
Depressive symptoms (high vs low)	0.8 (-7.2, 8.9)	0.3 (-6.1, 6.7)	1.03 (0.72, 1.49)	1.01 (0.63, 1.63)
Anxiety symptoms (high vs low)	2.0 (-5.5, 9.6)	1.2 (-5.9, 8.4)	1.09 (0.78, 1.53)	1.08 (0.65, 1.81)
Wellbeing (poor vs good)	3.6 (-2.4, 9.6)	2.0 (-2.5, 6.6)	1.18 (0.91, 1.52)	1.16 (0.84, 1.61)
Mid adolescence				
Depressive symptoms (high vs low)	e	4.3 (-4.0, 12.7)	1.15 (0.98, 1.35)	1.14 (0.89, 1.47)
Anxiety symptoms (high vs low)	-0.6 (-6.7, 5.4)	-1.0 (-9.9, 7.9)	0.98 (0.84, 1.16)	0.96 (0.71, 1.30)
Wellbeing (poor vs good)	6.9 (1.1, 12.8)	5.6 (-0.7, 11.9)	1.20 (1.03, 1.38)	1.20 (0.99, 1.45)
Late adolescence				
Depressive symptoms (high vs low)	9.9 (1.7, 18.0)	8.9 (-1.8, 19.7)	1.21 (1.03, 1.41)	1.24 (0.97, 1.58)
Anxiety symptoms (high vs low)	0.7 (-8.3, 9.7)	0.1 (-11.2, 11.3)	1.01 (0.85, 1.20)	1.00 (0.75, 1.34)
Wellbeing (poor vs good)	6.0 (-1.6, 13.7)	4.9 (-3.3, 13.2)	1.12 (0.97, 1.30)	1.13 (0.92, 1.40)

Chapter 3.C. RAW Dataset

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3.1 Background

It is both an important and challenging task to disentangle the longitudinal relationships between digital technology use and mental health outcomes in young people. This research is important because interventions in policy and practice should be informed by research that provides evidence for causal associations. Despite this requirement, interventions may be developed in response to data that are predominantly cross-sectional and are often based on the assumption that digital technology use causes mental health problems (Chhabra et al., 2025).

However, the validity of this assumption – and therefore these interventions – may be undermined if the relationship between digital technology use and mental health is not strongly driven by temporal precedence of digital technology use, and effects are instead found to be in the opposite direction or if there are confounding variables which impact both digital technology use and mental health.

Longitudinal studies can help illuminate directionality in these relationships and – at least to some extent – exclude the confounding influence of other variables (Glass et al., 2013); however, they require considerable amounts of time and resources for participants and researchers. As such, existing longitudinal studies have typically relied upon brief and broad measures of digital technology and mental health (e.g., Plackett et al., 2023). These designs may minimise resource burdens, but they can also be limited because they do not account for heterogeneity in the types of digital technologies that young people use and the mental health outcomes that they experience, nor how these might change over the course of their adolescent development. This heterogeneity is reflected in the Project Consultation findings outlined in Chapter 1 and previous research (Rideout et al., 2022).

Further, existing longitudinal studies have primarily focused on effects examining differences between adolescents (i.e., between-person) rather than the effects of within-person fluctuations in digital technology use and mental health outcomes over time. Analyses which examine these within-person fluctuations are well aligned with the causal assumptions of interventions – i.e., a reduction in an adolescent's exposure to digital technologies will lead to improvements in their mental health.

It is also likely that the strength and direction of relationships between digital technology use and mental health will differ between adolescents. As discussed in Chapter 1, young people report that digital technology use can have positive and negative impacts on mental health. This is supported by previous research showing a mix of negative, neutral, and positive effects (Haddock et al., 2022; Valkenburg et al., 2022). It is important that future studies also explore individual differences in the links between digital technology use and mental health.

This study aims to investigate the longitudinal relationships between adolescents' use of specific digital technologies with various mental health outcomes, with a focus on these within-person effects and exploration of data that reflects heterogeneity in engagement with digital technologies by young people. A secondary aim of this study was to investigate whether the relationships between the use of different digital technologies and mental health vary between adolescents. The study uses data from the Risk to Adolescent Wellbeing (RAW) project, a broader longitudinal study which included measures of adolescents' use of social media, video

games, and specific social media platforms such as Instagram, Snapchat, and YouTube, as well as five separate indicators of mental wellbeing (anxiety, depression, body dissatisfaction, life satisfaction, eating disorder symptoms). Data were collected over six timepoints, from Grade 6 (*M* = 11.2 years old) to Grade 11 (*M* = 16.8 years). Through a series of random intercept cross-lagged panel models (RI-CLPM; outlined in more detail below), we investigated the reciprocal within-person effects between each of these factors, accounting for individual differences and changes throughout the span of their adolescent development. We also examined variability in those relationships between adolescents using linear mixed-effects analyses.

3.2 Method

3.2.1 Participants and Procedure

A convenience sampling procedure was used to recruit participants via advertisements in school newsletters, after-school care centres, sports clubs, medical centres, and on social media. Adolescents in the RAW project completed six waves of surveys, each approximately 12 months apart from August 2016 to August 2022. A total of 528 adolescents in Grade 6 (51.1% male, Mage = 11.19 years, SD = 0.55, range = 10-12 years) completed the baseline survey, with completion rates of 94.3% (*N* = 498), 90.5% (*N* = 478), 82.8% (*N* = 437), 79.9% (*N* = 422), and 74.1% (*N* = 391) at waves 2-6, respectively. Most adolescents were of white European background (81.8%) and were from middle- to high- income families (~80%).

The RAW project received ethical approval from the Macquarie University Human Research Ethics Committee. Written informed consent was obtained from parents, and assent was obtained from adolescents prior to their involvement in the study. Adolescents provided re-assent at each subsequent wave prior to data collection. At each wave, adolescents completed online questionnaires in their natural environments (e.g., at home) administered via Qualtrics. Additional components of the broader project (annual parent surveys, clinical interviews, and in-person laboratory assessments) were beyond the scope of the present study. Families received AUD$100 per year for participation in the RAW Project and each child received a small gift bag valued at approximately AUD$10–15.

3.2.2 Measures

3.2.2.1 Digital technology use

Adolescents were asked about their duration of use for social media and video games on 'a normal weekday/school day' and 'a normal day of the weekend' using an ordinal scale (0 = no time, 1 = less than 5m, 2 = 5-15m, 3 = 15-30m, 4 = 30m-1h, 5 = 1-2h, 6 = 2-4h, 7 = 4-6h, 8 = 6-8h, 9 = 8-10h, 10 = 10-12h or more). The ordinal scale was converted to minutes by averaging the range for each point (e.g., 4 = the average of 30m and 60m = 45m). Scores for daily social media use and video games use were calculated using a weighted average (i.e., [5*weekday minutes score + 2*weekend minutes score]/7). Adolescents were also asked about their duration of use for specific social media platforms, including Instagram, Snapchat, and YouTube. The same ordinal scale, converted to average minutes, was used but adolescents were only asked about 'a normal day' rather than differentiating between weekdays and weekends. Scores for adolescents who did not have a relevant account for each platform were coded as 0.

Adolescents who played video games were asked how often they played video games with fighting or shooting in them using a 5-point response scale (1 = never – 5 = always). For waves 2-6, adolescents who reported using YouTube were also asked to provide free-text descriptions of the types of videos they usually watched. These responses were used to provide context for the types of video games and YouTube videos that adolescents engaged with over time.

3.2.2.2 Mental health outcomes

Depression was measured using the Short Mood Feelings Questionnaire (SMFQ; Angold et al., 1995). The SMFQ includes 13 items, each measured on a 3-point response scale (0 = not true, 1 = sometimes true, 2 = mostly true). Total scores were summed (possible range = 0-26), with higher scores indicating greater symptoms of depression. The SMFQ has been validated previously in adolescent boys and girls (Angold et al., 1995). Internal consistency in the current study was good across all timepoints (T1 ω = .88, T2 ω = .89, T3 ω = .92, T4 ω = .94, T5 ω = .94, T6 ω = .93).

Anxiety was measured using the Generalised Anxiety, Separation Anxiety, and Social Anxiety subscales from the Spence Children's Anxiety Scale (SCAS; Spence, 1998). Each of the three subscales includes 6 items measured on a 4-point response scale (0 = never true – 4 = always true). A combined score was summed (possible range = 0-54), with higher scores indicating greater symptoms of anxiety. The SCAS, including each of its subscales, has been validated previously in boys and girls (Spence, 1998). Internal consistency for the combined scale in the current study was good across all timepoints (T1 ω = .87, T2 ω = .99, T3 ω = .90, T4 ω = .89, T5 ω = .91, T6 ω = .91).

Body dissatisfaction was measured using the Appearance subscale from the Body Esteem Scale for Adolescents and Adults (BESAA; Mendelson et al., 2001). The subscale includes 10 items, each measured on a 5-point response scale (1 = never – 5 = always). Responses to the positively worded items were reverse coded then all items were averaged (possible range = 1-5), with higher scores indicating greater body dissatisfaction. The BESAA has been validated previously in adolescent boys and girls (Mendelson et al., 2001). Internal consistency in the current study was good across all timepoints (T1 ω = .95, T2 ω = .96, T3 ω = .96, T4 ω = .97, T5 ω = .96, T6 ω = .96).

Life satisfaction was measured using the Student's Life Satisfaction Scale (SLSS; Huebner, 1991). The subscale includes 9 items, each measured on a 7-point Likert scale (1 = strongly disagree – 7 = strongly agree). Relevant items were reverse coded then all items were averaged (possible range = 1-7), with higher scores indicating greater life satisfaction. The SLSS has been validated previously in child and adolescent boys and girls (Huebner, 1991). Internal consistency in the current study was good across all timepoints (T1 ω = .91, T2 ω = .93, T3 ω = .94, T4 ω = .99, T5 ω = .93, T6 ω = .93).

Eating disorder symptoms were measured using the Children's Eating Attitudes Test (chEAT; Maloney et al., 1988). The chEAT includes 26 items, each measured on a 6-point response scale (1 = never [scored 0], 2 = rarely [scored 0], 3 = sometimes [scored 0], 4 = often [scored 1], 5 = very often [scored 2], 6 = always [scored 3]). Relevant items were reverse coded then all items were summed (possible range = 0-78), with higher scores indicating eating disorder symptoms. The chEAT has been validated previously in child and adolescent boys and girls (Maloney et al., 1988).

Internal consistency in the current study was adequate or good across all timepoints (T1 ω = .74, T2 ω = .76, T3 ω = .81, T4 ω = .88, T5 ω = .91, T6 ω = .90).

3.2.3 Analysis plan

Descriptive statistics were calculated using means and standard deviations. None of the study variables were normally distributed, thus bivariate relationships were calculated using Spearman's correlations. Effects were interpreted as statistically significant at $p < .05$.

Longitudinal analyses were conducted using random intercept cross-lagged panel models (RI-CLPM; Hamaker et al., 2015) via the lavaan package in R (Rosseel, 2012). RI-CLPM estimate how two variables predict each other over time, by separating stable trait between-person differences (random intercepts) from within-person fluctuations (Hamaker et al., 2015). The covariances between the random intercepts allows us to examine whether adolescents who are consistently high on digital technology use also tend to experience consistently poor mental health, controlling for the auto-regressive and cross-lagged within-person effects. The cross-lagged pathways (t-1) between the within-person fluctuations allow us to examine 1) whether young people experience an improvement or deterioration in their mental health after a period of using digital technology more than they usually do, and conversely 2) whether they increase or decrease their digital technology use after a period of worse-than-usual mental health. Separate models were conducted to examine the relationships between duration of use for each type of digital technology (social media, Instagram, Snapchat, YouTube, video) and mental health outcome (depression, anxiety, body dissatisfaction, life satisfaction, eating disorder symptoms). To aid interpretation of the regression coefficients, scores for duration of use were multiplied by 15 so that each one-unit increase represented a quarter of an hour. Fit indices were interpreted according to Hu and Bentler (1999), including the comparative fit index (CFI; acceptable > 0.90, good > 0.95), the standardized root mean square residual (SRMR; acceptable < 0.08, good < 0.05), Tucker–Lewis index (TLI; acceptable > 0.90, good > 0.95), and the root mean square error of approximation (RMSEA; acceptable < 0.08, good < 0.05). Because we anticipated that the effects would differ over time, all models were tested for the assumption of stationarity (comparing fit between models with constrained versus unconstrained autoregressive and cross-lagged parameters across waves) using Satorra and Bentler's (2001) scaled chi-squared difference test. As expected, the assumption was not met for any models (all p values < .028) except for the model with Snapchat use and life satisfaction ($\chi^2(16) = 23.41$, $p = .103$), suggesting that effects were only consistent across time for Snapchat use and life satisfaction. We then tested the moderating effect of gender by comparing fit between models with parameters unconstrainted over time, and constrained versus unconstrained between the adolescent boys and girls. Models constraining all parameters to equality between the boys and girls did not worsen the model fit (all p values > .142) except for the model investigating YouTube use and life satisfaction ($\chi^2(37) = 71.45$, $p < .001$). Thus, we have reported results for the time-invariant model for Snapchat use and life satisfaction, but otherwise report the time-varying models, including the moderation of gender for YouTube and life satisfaction. Standardised autoregressive and cross-lagged coefficients were interpreted as 0.1 = small effect, 0.3 = moderate effect, and 0.5 = large effect (Cohen, 1988; Mulder, 2023).

We also explored whether there was individual variation in the strength of associations between digital technology use and mental health symptoms using contemporaneous linear mixed-effects analyses. Predictor variables were person-mean-centred, allowing examination of the relationships between 1) within-person fluctuations in digital technology use and mental health symptoms, and 2) within-person fluctuations in mental health symptoms and digital technology use. Model fit between random-intercept-only and random-slope models was compared using the lme4 R package (Bates et al., 2015), with a significant likelihood ratio test indicating that the strength of associations varied between adolescents.

3.3 Results

Across all study variables, there was 0.8-1.5% missing data at T1, 6.4-6.6% at T2, 10.2-10.5% at T3, 17.9-18.4% at T4, 20.7-21.2% at T5, and 26.5-27.3% at T6. Missing data was mostly attributable to participant attrition across timepoints. Missing data were handled with pairwise deletion for descriptive statistics and bivariate correlations, and using full information maximum likelihood (FIML) estimation for the RI-CLPM in R.

As seen in Figure 3.1, almost half of the adolescents used social media daily in Grade 6, with usage increasing over time. Girls used social media – including Instagram and Snapchat – more than boys, but boys used YouTube more than girls. The most common types of videos that adolescents watched on YouTube were 'entertainment' and 'gaming', although engagement with these videos appeared to decline over time whilst engagement with 'beauty and fashion' and 'fitness and health' videos seemed to increase over time (see Figure 3.2). Video game use was high in Grade 6, with almost 80% of adolescents reporting daily use, although this declined in Grade 11 to just over 60%. Boys played video games more than girls. Engagement with video games with fighting or shooting in them was fairly consistent over time, with approximately 40-60% of video game users reporting playing those games at least 'sometimes' (see Figure 3.3). Further descriptive statistics for digital technology use, as well as mental health outcomes, are presented in Table 3.1. Bivariate correlations are presented in Appendix A.

Figure 3.1. *Ordinal distributions for adolescents' use of A) social media, B) video games, C) Instagram, D) Snapchat, and E) YouTube*

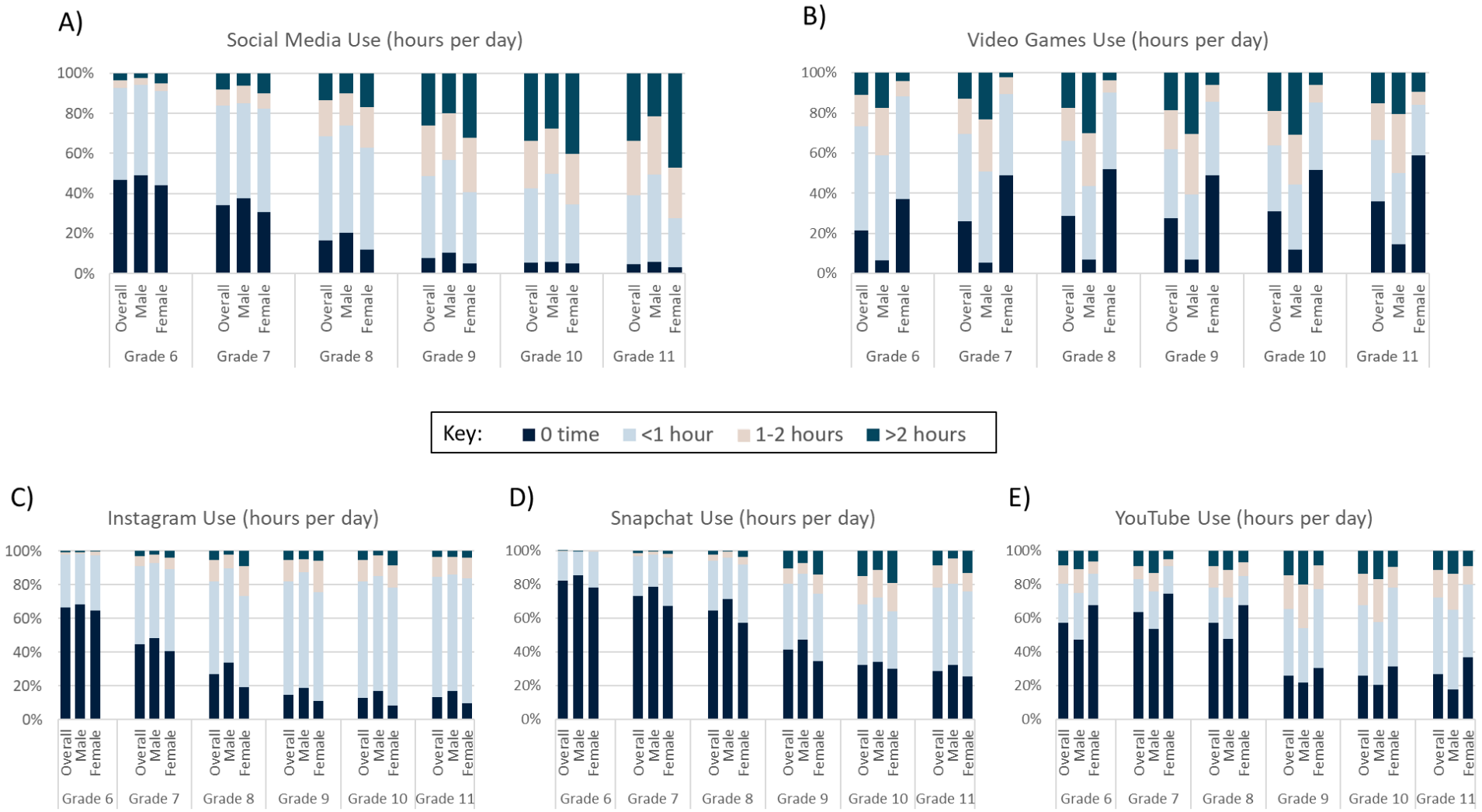


Figure 3.2. *Categories of types of videos that adolescent YouTube users watched across timepoints.*

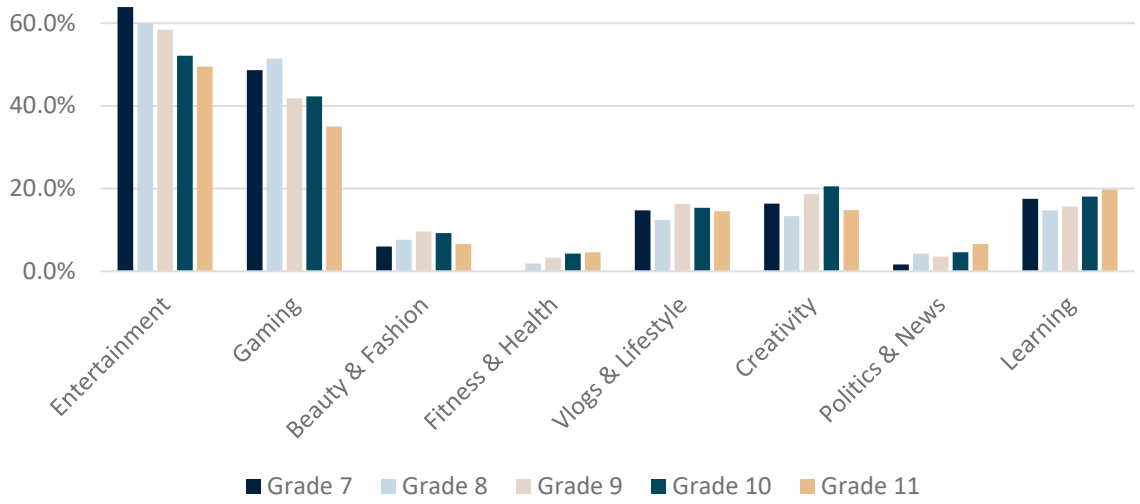


Figure 3.3. *Descriptive statistics of how often adolescent video game users play games with fighting or shooting in them across timepoints.*

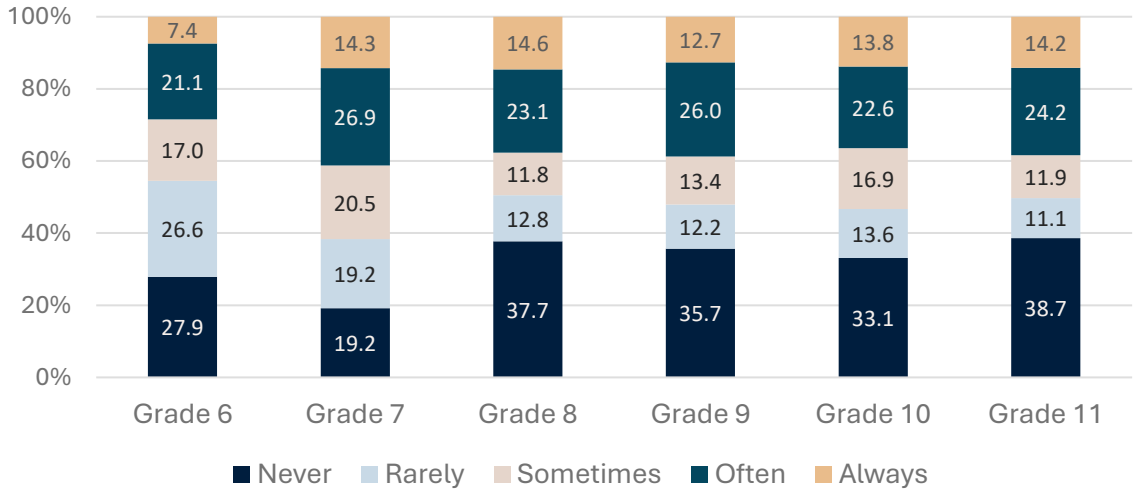


Table 3.1. *Descriptive statistics for the hours of daily digital technology use and mental health outcomes.*

	Grade 6 (M_{age} = 11.2y)		Grade 7 (M_{age} = 12.1y)		Grade 8 (M_{age} = 13.7y)		Grade 9 (M_{age} = 14.8y)		Grade 10 (M_{age} = 15.8y)		Grade 11 (M_{age} = 16.8y)	
	Mean hours (SD)	Min-Max	Mean hours (SD)	Min-Max	Mean hours (SD)	Min-Max	Mean hours (SD)	Min-Max	Mean hours (SD)	Min-Max	Mean hours (SD)	Min-Max
Social media	0.38 (0.92)	0-7.3	0.65 (1.18)	0-7.6	1.14 (1.49)	0-9	1.73 (1.77)	0-11	2.01 (1.90)	0-11	1.98 (1.59)	0-7.6
Instagram	0.14 (0.38)	0-5	0.34 (0.68)	0-5	0.65 (1.07)	0-11	0.67 (0.90)	0-7	0.69 (0.97)	0-11	0.57 (0.72)	0-7
Snapchat	0.05 (0.20)	0-3	0.13 (0.46)	0-5	0.24 (0.81)	0-11	0.69 (1.31)	0-11	0.93 (1.37)	0-11	0.71 (1.15)	0-11
YouTube	0.60 (1.23)	0-11	0.55 (1.16)	0-11	0.66 (1.24)	0-9	1.06 (1.43)	0-11	0.98 (1.27)	0-7	0.85 (1.23)	0-9
Video games	0.91 (1.38)	0-11	1.03 (1.53)	0-11	1.17 (1.75)	0-11	1.29 (1.82)	0-11	1.25 (1.70)	0-9.6	1.06 (1.48)	0-8.1

	Grade 6 (M_{age} = 11.2y)		Grade 7 (M_{age} = 12.1y)		Grade 8 (M_{age} = 13.7y)		Grade 9 (M_{age} = 14.8y)		Grade 10 (M_{age} = 15.8y)		Grade 11 (M_{age} = 16.8y)	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max
Anxiety	14.24 (8.25)	0-52	11.85 (8.20)	0-43	11.63 (8.41)	0-45	12.91 (9.33)	0-52	13.47 (9.39)	0-41	13.07 (9.28)	0-46
Depression	4.60 (4.54)	0-26	3.85 (4.50)	0-23	4.26 (5.10)	0-26	5.65 (6.22)	0-26	6.57 (6.63)	0-26	6.39 (6.11)	0-26
Body dissatisfaction	1.91 (0.80)	1-5	1.94 (0.80)	1-5	2.13 (0.86)	1-5	2.42 (0.98)	1-5	2.60 (0.96)	1-5	2.60 (0.95)	1-5
Life satisfaction	5.65 (1.00)	1.7-7.0	5.62 (1.08)	1.6-7.0	5.48 (1.11)	1.3-7.0	5.30 (1.11)	1-7	5.19 (1.13)	1.7-7.0	5.04 (1.13)	1.4-7.0
Eating disorder symptoms	5.05 (5.19)	0-48	4.49 (5.03)	0-53	4.23 (4.95)	0-39	5.18 (7.29)	0-52	5.81 (8.26)	0-65	5.63 (7.93)	0-52

Note. y = years

3.3.1 Random intercept cross-lagged panel models (RI-CLPM)

As seen in Table 3.2, the CFI indices of fit were acceptable or good fit for all models. TLI scores indicated acceptable or good fit for all models, except for those including Instagram use with life satisfaction and eating disorder symptoms, and Snapchat use with depression, body dissatisfaction, life satisfaction, and eating disorder symptoms. RMSEA scores indicated acceptable or good fit for all models, except for the model with Snapchat use and body dissatisfaction. SRMR scores indicated acceptable or good fit for all models, except for the model with Snapchat use and life satisfaction.

Table 3.2. *Estimates of fit for the RI-CLPM models.*

	CFI	TLI	RMSEA	SRMR
Social media & Anxiety	0.975	0.955	0.054	0.053
Social media & Depression	0.970	0.947	0.050	0.052
Social media & Body dissatisfaction	0.969	0.945	0.063	0.055
Social media & Life satisfaction	0.966	0.940	0.055	0.055
Social media & Eating disorder symptoms	0.979	0.962	0.039	0.047
Instagram & Anxiety	0.962	0.931	0.066	0.061
Instagram & Depression	0.951	0.913	0.065	0.059
Instagram & Body dissatisfaction	0.959	0.926	0.073	0.059
Instagram & Life satisfaction	0.936	0.886*	0.077	0.071
Instagram & Eating disorder symptoms	0.942	0.897*	0.066	0.059
Snapchat & Anxiety	0.945	0.902	0.079	0.068
Snapchat & Depression	0.925	0.867*	0.079	0.066
Snapchat & Body dissatisfaction	0.943	0.898*	0.085*	0.068
Snapchat & Life satisfaction^	0.900	0.876*	0.079	0.087*
Snapchat & Eating disorder symptoms	0.922	0.860*	0.076	0.069
YouTube & Anxiety	0.988	0.979	0.035	0.035
YouTube & Depression	0.985	0.973	0.034	0.040
YouTube & Body dissatisfaction	0.985	0.974	0.042	0.042
YouTube & Life satisfaction+	0.950	0.910	0.065	0.061
YouTube & Eating disorder symptoms	0.995	0.991	0.019	0.031
Video games & Anxiety	0.975	0.955	0.059	0.057
Video games & Depression	0.957	0.923	0.068	0.072
Video games & Body dissatisfaction	0.964	0.935	0.073	0.061
Video games & Life satisfaction	0.955	0.921	0.071	0.061
Video games & Eating disorder symptoms	0.976	0.958	0.047	0.051

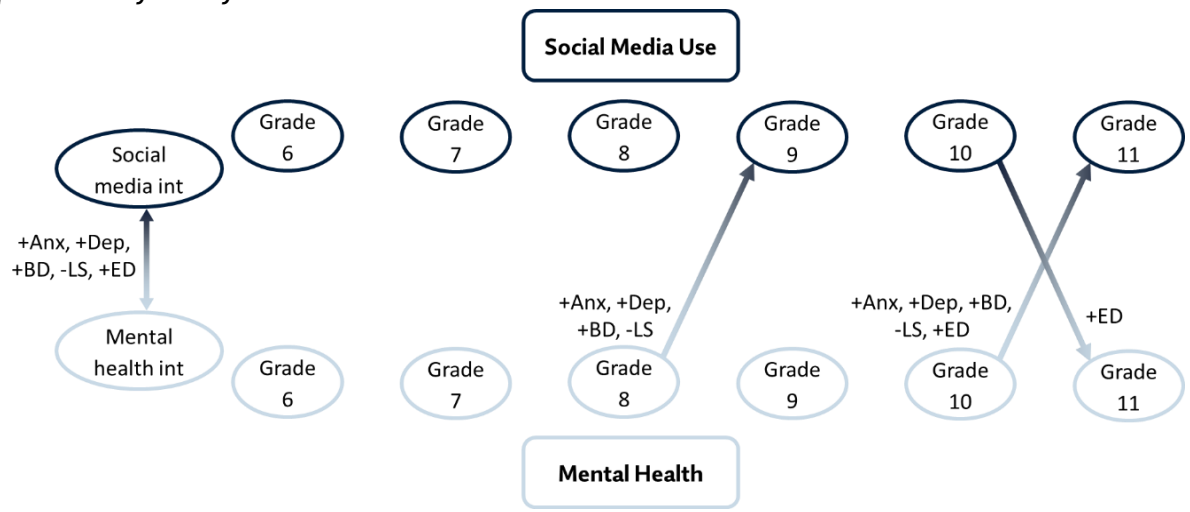
*Notes. ^ indicates that these results are from the time-invariant model, whilst all other models presented here are time-varying. + indicates that this model included gender as a moderator. * indicates that estimates are outside the conventional cut-offs for acceptable fit.*

3.3.1.1 Social media

Figure 3.4 presents the significant random intercept covariances and cross-lagged parameters for each model with social media use, synthesised across each mental health outcome. The parameters for each model are presented in full in Appendices 3.B – 3.F. The random intercepts

(between-person effects) were significantly correlated for all five models, indicating that trait social media use was associated with worse trait anxiety (medium effect), depression (small effect), body dissatisfaction (medium effect), life satisfaction (small effect), and eating disorder symptoms (small effect). The cross-lagged pathways (within-person effects) indicated that spikes in anxiety, depression, body dissatisfaction, and worse life satisfaction in Grade 8 (T3, M_{age} = 13.7) each predicted significant increases in social media use (all small effects) in Grade 9 (T4, M_{age} = 14.8). Similarly, spikes in anxiety, depression, body dissatisfaction, worse life satisfaction, and eating disorder symptoms in Grade 10 (T5, M_{age} = 15.8) each predicted significant increases in social media use (all small effects) in Grade 11 (T6, M_{age} = 16.8). Conversely, adolescents who had a spike in social media use in Grade 10 (T5, M_{age} = 15.8) experienced significant increases in their eating disorder symptoms (very small effect) in Grade 11 (T6, M_{age} = 16.8).

Figure 3.4. *A visual synthesis of the significant random intercept covariances and cross-lagged parameters for the five models which included social media use and each mental health outcome.*

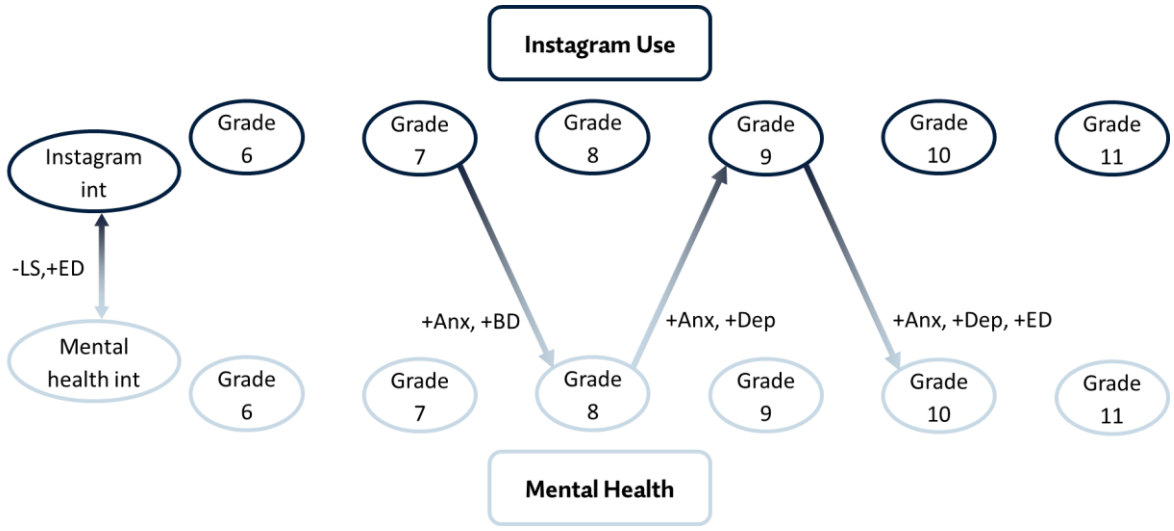


Note. Models were run individually and are presented here together to aid comparisons across mental health outcomes. + indicates a positive relationship, – indicates a negative relationship. Anx = anxiety, Dep = depression, BD = body dissatisfaction, LS = life satisfaction, ED = eating disorder symptoms, int = intercept.

3.3.1.2 Instagram

Figure 3.5 presents the significant random intercept covariances and cross-lagged parameters for each model with Instagram use, synthesised across each mental health outcome. The parameters for each model are presented in full in Appendices 3.G – 3.K. The random intercepts (between-person effects) were significantly correlated for 2 out of 5 models, indicating that trait Instagram use was associated with worse trait life satisfaction (medium effect) and greater eating disorder symptoms (medium effect). The cross-lagged pathways (within-person effects) indicated that a spike in Instagram use in Grade 7 (T2, M_{age} = 12.1) predicted significant increases in anxiety and body dissatisfaction in Grade 8 (T3, M_{age} = 13.7). Conversely, spikes in anxiety and depression in Grade 8 (T3, M_{age} = 13.7) each predicted a significant increase in Instagram use in Grade 9 (T4, M_{age} = 14.8). Finally, a spike in Instagram use in Grade 9 (T4, M_{age} = 14.8) predicted another significant deterioration in anxiety, as well as depression and eating disorder symptoms, in Grade 10 (T5, M_{age} = 15.8). All of the significant cross-lagged effects were small.

Figure 3.5. *A visual synthesis of the significant random intercept covariances and cross-lagged parameters for the five models which included Instagram use and each mental health outcome.*

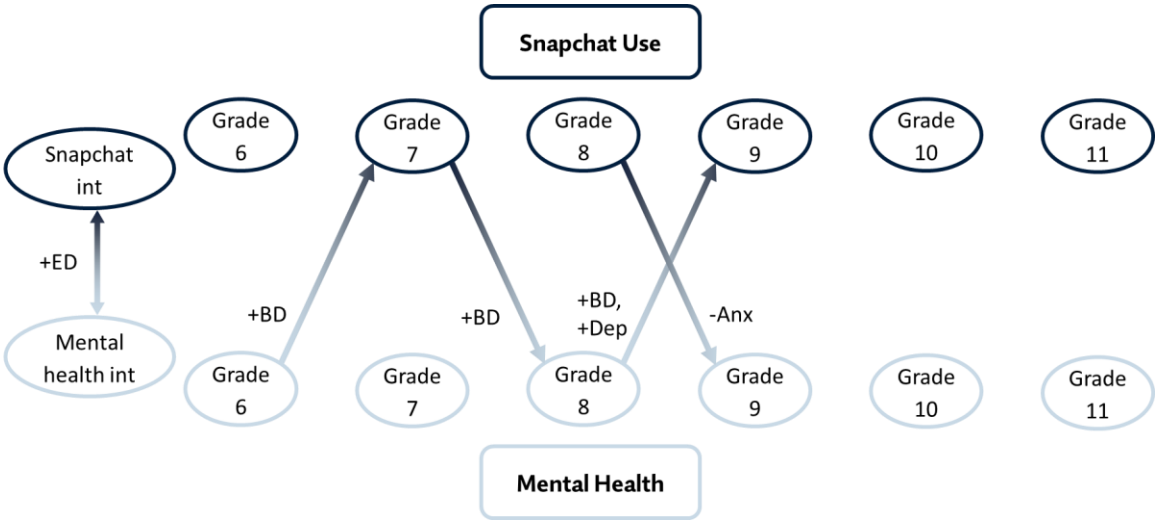


Note. Models were run individually and are presented here together to aid comparisons across mental health outcomes. + indicates a positive relationship, – indicates a negative relationship. Anx = anxiety, Dep = depression, BD = body dissatisfaction, LS = life satisfaction, ED = eating disorder symptoms, int = intercept.

3.3.1.3 Snapchat

Figure 3.6 presents the significant random intercept covariances and cross-lagged parameters for each model with Snapchat use, synthesised across each mental health outcome. The parameters for each model are presented in full in Appendices 3.L – 3.P. The random intercepts (between-person effects) were significantly correlated for 1 out of 5 models, indicating that trait Snapchat use was associated with worse trait eating disorder symptoms (small effect). The cross-lagged pathways (within-person effects) indicated that a spike in body dissatisfaction in Grade 6 (T1, M_{age} = 11.2) predicted a significant increase in Snapchat use in Grade 7 (T2, M_{age} = 12.1), which in turn predicted a significant increase in body dissatisfaction in Grade 8 (T3, M_{age} = 13.7). Spikes in body dissatisfaction and depression in Grade 8 (T3, M_{age} = 13.7) each predicted a significant increase in Snapchat use in Grade 9 (T4, M_{age} = 14.8). Conversely, a spike in Snapchat use in Grade 8 (T3, M_{age} = 13.7) predicted a significant decrease in anxiety in Grade 9 (T4, M_{age} = 14.8). All of the significant cross-lagged effects were small.

Figure 3.6. *A visual synthesis of the significant random intercept covariances and cross-lagged parameters for the five models which included Snapchat use and each mental health outcome.*

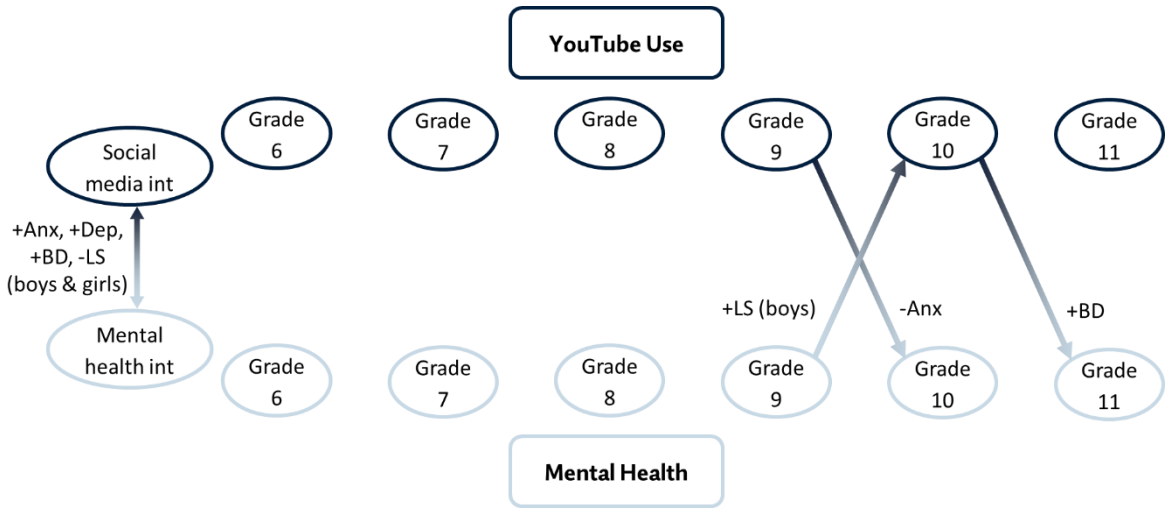


Note. Models were run individually and are presented here together to aid comparisons across mental health outcomes. + indicates a positive relationship, – indicates a negative relationship. Anx = anxiety, Dep = depression, BD = body dissatisfaction, LS = life satisfaction, ED = eating disorder symptoms, int = intercept.

3.3.1.4 YouTube

Figure 3.7 presents the significant random intercept covariances and cross-lagged parameters for each model with YouTube use, synthesised across each mental health outcome. The parameters for each model are presented in full in Appendices 3.Q – 3.U. The random intercepts (between-person effects) were significantly correlated for 4 out of 5 models, indicating that trait YouTube use was associated with worse trait anxiety (small effect), depression (medium effect), body dissatisfaction (small effect), and life satisfaction (for both boys [medium effect] and girls [large effect]). The cross-lagged pathways (within-person effects) indicated that a spike in YouTube use in Grade 9 (T4, M_{age} = 14.8) predicted significant decreases in anxiety in Grade 10 (T5, M_{age} = 15.8), but similar spikes in Grade 10 (T5, M_{age} = 15.8) predicted significant increases in body dissatisfaction in Grade 11 (T6, M_{age} = 16.8). For boys only, better-than-usual life satisfaction in Grade 9 (T4, M_{age} = 14.8) predicted a significant increase in YouTube use in Grade 10 (T5, M_{age} = 15.8). All of the significant cross-lagged effects were small.

Figure 3.7. *A visual synthesis of the significant random intercept covariances and cross-lagged parameters for the five models which included YouTube use and each mental health outcome.*

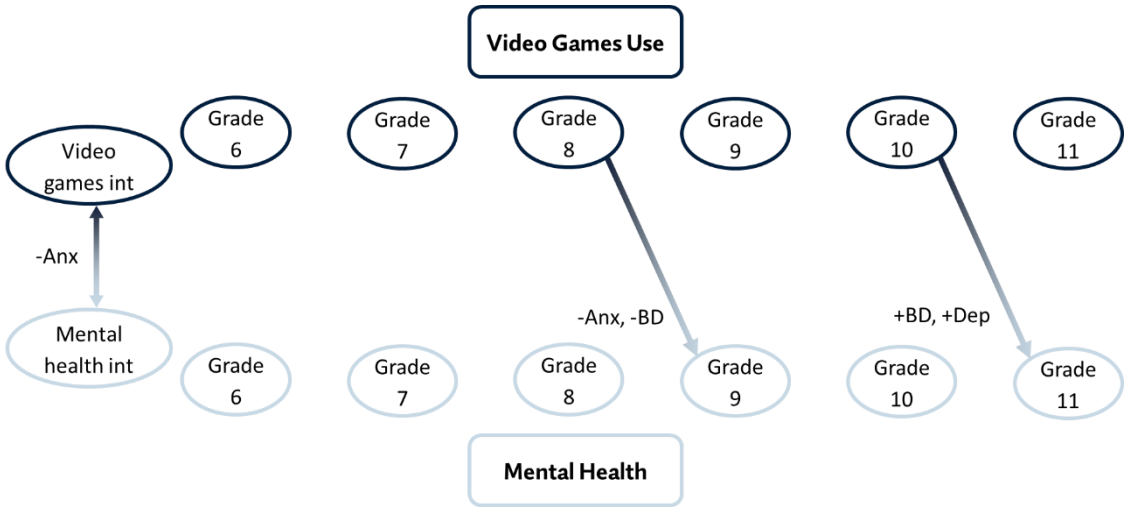


Note. Models were run individually and are presented here together to aid comparisons across mental health outcomes. + indicates a positive relationship, – indicates a negative relationship. Anx = anxiety, Dep = depression, BD = body dissatisfaction, LS = life satisfaction, ED = eating disorder symptoms, int = intercept.

3.3.1.5 Video games

Figure 3.8 presents the significant random intercept covariances and cross-lagged parameters for each model with video games use, synthesised across each mental health outcome. The parameters for each model are presented in full in Appendices 3.V – 3.Z. The random intercepts (between-person effects) were significantly correlated for 1 out of 5 models, indicating that trait video games use was associated with lower trait anxiety (small effect). The cross-lagged pathways (within-person effects) indicated that a spike in video game use in Grade 8 (T3, M_{age} = 13.7) predicted significant improvements in anxiety and body dissatisfaction in Grade 9 (T4, M_{age} = 14.8), but similar spikes in Grade 10 (T5, M_{age} = 15.8) predicted significantly worse body dissatisfaction and depression in Grade 11 (T6, M_{age} = 16.8). All of the significant cross-lagged effects were small.

Figure 3.8. *A visual synthesis of the significant random intercept covariances and cross-lagged parameters for the five models which included video games use and each mental health outcome.*



Note. Models were run individually and are presented here together to aid comparisons across mental health outcomes. + indicates a positive relationship, – indicates a negative relationship. Anx = anxiety, Dep = depression, BD = body dissatisfaction, LS = life satisfaction, ED = eating disorder symptoms, int = intercept.

3.3.2 Linear mixed-effects analyses

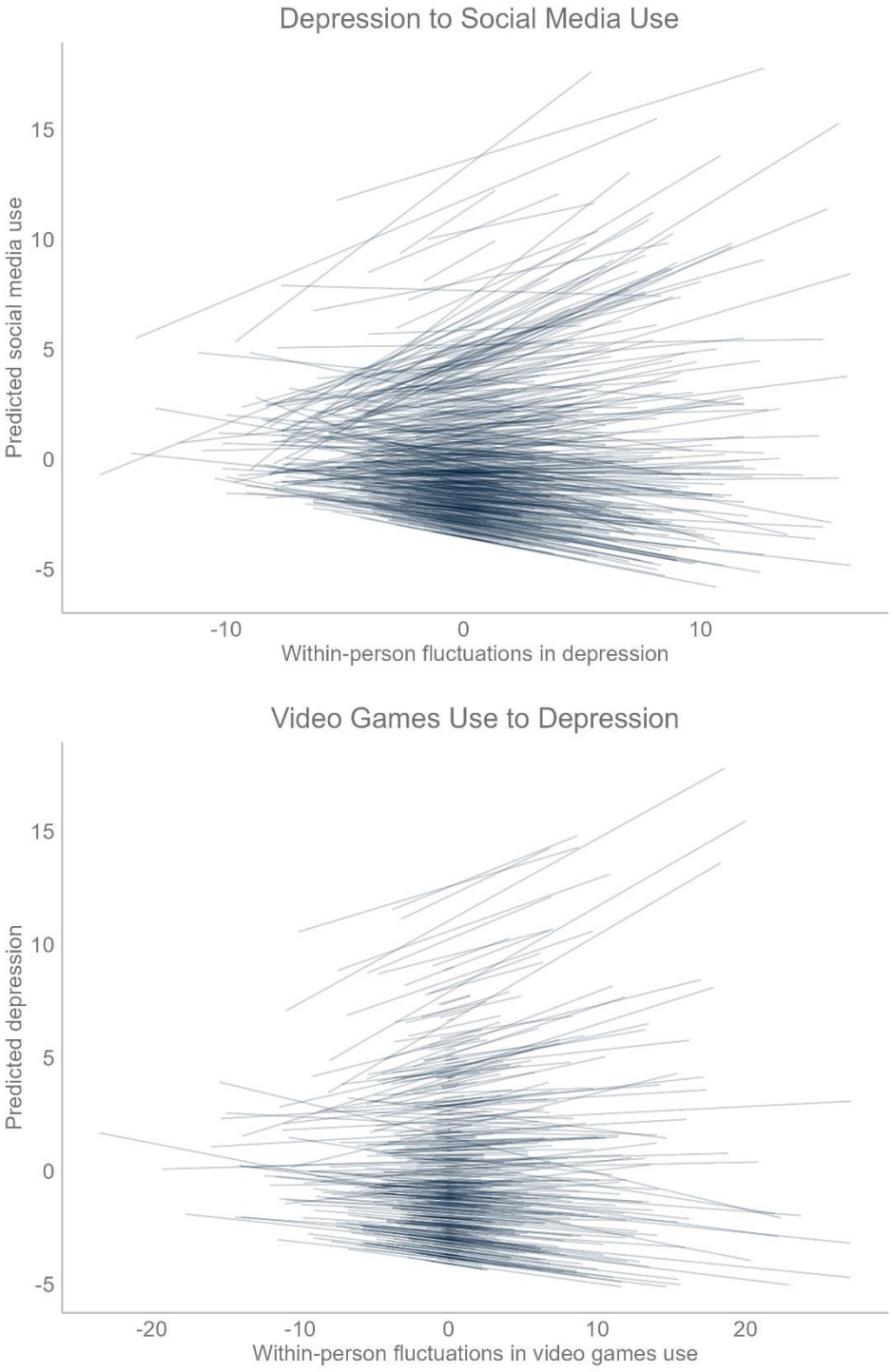
As seen in Table 3.3, the addition of random slopes significantly improved model fit for almost all models (44/50), indicating that the strength of associations between digital technology use and mental health symptoms varied between adolescents. Some adolescents had a positive relationship, others had negative relationships, and some had null relationships between digital technology use and mental health. Figure 3.9 provides some illustrated examples of this individual variation. The inclusion of random slopes did not significantly improve fit for the models of anxiety and eating disorder symptoms to video games use, Snapchat use to life satisfaction, YouTube use to anxiety, and anxiety and eating disorder symptoms to YouTube use.

Table 3.3. *Likelihood ratio tests comparing fit for the addition of random slopes to the random intercept-only models.*

	χ^2	*df*	*p*
Social media -> Depression	74.16	2	<.001
Social media -> Anxiety	60.78	2	<.001
Social media -> Body dissatisfaction	76.05	2	<.001
Social media -> Eating disorder symptoms	123.36	2	<.001
Social media -> Life satisfaction	33.98	2	<.001
Depression -> Social media	57.53	2	<.001
Anxiety -> Social media	72.22	2	<.001
Body dissatisfaction -> Social media	87.37	2	<.001
Eating disorder symptoms -> Social media	28.51	2	<.001
Life satisfaction -> Social media	34.05	2	<.001
Instagram -> Depression	39.26	2	<.001
Instagram -> Anxiety	10.50	2	.005

Instagram -> Body dissatisfaction	37.58	2	<.001
Instagram -> Eating disorder symptoms	80.06	2	<.001
Instagram -> Life satisfaction	30.68	2	<.001
Depression -> Instagram	91.27	2	<.001
Anxiety -> Instagram	12.15	2	.002
Body dissatisfaction -> Instagram	128.16	2	<.001
Eating disorder symptoms -> Instagram	13.28	2	.001
Life satisfaction -> Instagram	40.30	2	<.001
Snapchat -> Depression	52.52	2	<.001
Snapchat -> Anxiety	23.48	2	<.001
Snapchat -> Body dissatisfaction	22.83	2	<.001
Snapchat -> Eating disorder symptoms	38.40	2	<.001
Snapchat -> Life satisfaction	1.81	2	.404
Depression -> Snapchat	59.71	2	<.001
Anxiety -> Snapchat	62.27	2	<.001
Body dissatisfaction -> Snapchat	234.62	2	<.001
Eating disorder symptoms -> Snapchat	31.19	2	<.001
Life satisfaction -> Snapchat	31.06	2	<.001
Youtube -> Depression	10.85	2	.004
Youtube -> Anxiety	2.56	2	.278
Youtube -> Body dissatisfaction	23.93	2	<.001
Youtube -> Eating disorder symptoms	10.27	2	.006
Youtube -> Life satisfaction	23.15	2	<.001
Depression -> Youtube	20.70	2	<.001
Anxiety -> Youtube	5.76	2	.056
Body dissatisfaction -> Youtube	19.71	2	<.001
Eating disorder symptoms -> Youtube	1.34	2	.510
Life satisfaction -> Youtube	24.67	2	<.001
Video games -> Depression	30.46	2	<.001
Video games -> Anxiety	9.15	2	.010
Video games -> Body dissatisfaction	22.52	2	<.001
Video games -> Eating disorder symptoms	14.36	2	.001
Video games -> Life satisfaction	24.12	2	<.001
Depression -> Video games	21.09	2	<.001
Anxiety -> Video games	0.47	2	.791
Body dissatisfaction -> Video games	15.61	2	<.001
Eating disorder symptoms -> Video games	4.77	2	.092
Life satisfaction -> Video games	27.38	2	<.001

Figure 3.9. *Illustrative examples showing how the relationships between digital technology use and mental health symptoms varied across adolescents.*



Note. The x-axis represents within-adolescent deviations in scores (person-mean centered). A value of 0 indicates an adolescent's average level, positive values indicate higher-than-usual scores, and negative values indicate lower-than-usual scores. The y-axis shows model-predicted scores. Because predictions are derived from a linear mixed model, some values fall below 0 and can be interpreted as very low predicted levels. Each line represents the predicted relationship for a given adolescent.

3.4 Discussion

This study investigated the longitudinal relationships between duration of use for specific digital technologies and various mental health outcomes in adolescent boys and girls, with a focus on the effects of within-person fluctuations. Young people seemed to increase their engagement with social media over time, with over half using it for at least an hour each day by Grade 9 (14.8 years). Video games use appeared fairly consistent over time, with boys showing greater engagement than girls.

When examining overall social media use, adolescents who consistently used social media more than others in the sample also reported consistently poorer mental health. However, the within-person effects indicated that it was typically an exacerbation in mental health problems during mid and late adolescence that predicted an increase in social media use, rather than the opposite direction. This reverse effect (i.e., predictions in the opposite direction to that typically assumed) has also been found in previous research (Heffer et al., 2019), and may suggest that adolescents use social media as a way of coping in response to periods of emotional distress. These effects differed across social media platforms, with evidence of cyclic patterns of aversive effects for Instagram use and Snapchat use during early and mid adolescence. The harmful effects of Instagram and Snapchat use may be due to their features such as photo-sharing and profile curation which emphasise appearance and facilitate social comparisons – known mechanisms for mental health problems such as body dissatisfaction (Vandenbosch et al., 2022).

For video games and YouTube use, there were protective effects during mid adolescence (e.g., reduced anxiety) but harmful effects during late adolescence (e.g., increased body dissatisfaction). Whilst video games and YouTube are visual platforms, there may be greater variety in the types of content that young people engage with on these platforms in comparison with Snapchat and Instagram. For example, adolescents in our study mostly reported watching YouTube videos for entertainment, gaming, and education, which may offer positive emotional experiences. Interestingly, engagement with YouTube videos focused on beauty, fashion, fitness, and health increased in Grades 10 and 11. The observed harmful effects of video game and YouTube use during late adolescence may be due to increased engagement with appearance-focused content on these platforms during this time.

The results of the linear-mixed effects analyses provided further support for heterogeneity in the relationships between digital technology use and mental health, with the strength of these associations varying between adolescents. Thus, for some adolescents the relationships between the use of different digital technologies and aspects of mental health were positive, for others they were negative, and for many, they had no relationship with their mental health. This diversity highlights the complexity of these relationships and the need to examine individual differences in experiences and motives for using digital technologies. Strengths for this study include the use of validated measures for a variety of mental health outcomes, the use of six waves of data over six years with adolescent boys and girls, and the use of RI-CLPM to examine within-person effects. However, the interpretation of causality for these effects may be undermined if there are time-varying unobserved confounders (e.g., the COVID pandemic) or if the interval between timepoints (one year) is inappropriate to capture the effects of interest (Timmons & Preacher, 2015). Another limitation of the study was our reliance on single-item

measures for digital technology use, which can increase measurement error and potentially create spurious cross-lagged effects (Lucas, 2023). Future studies should replicate these effects with more comprehensive measures of digital technology, in a more diverse sample, across a variety of time intervals.

3.5 Conclusion

The relationships between digital technology use and mental health outcomes were mixed in our sample of adolescent boys and girls, with some bi-directional harmful effects, and other protective effects. The relationships also varied between adolescents. These findings support a more nuanced approach to interventions in policy and practice, which target specific harmful platforms – and their associated features – during specific periods of adolescent development.

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Appendices

Appendix A. Spearman's correlations between variables within each timepoint

T1		SM	IG	SC	YT	VG	Anx	Dep	BD	LS
IG	***r***	.72								
	p	<.001								
SC	***r***	.46	.50							
	p	<.001	<.001							
YT	***r***	.37	.34	.24						
	p	<.001	<.001	<.001						
VG	***r***	.07	.01	.03	.25					
	p	.098	.794	.537	<.001					
Anx	***r***	.03	-.02	<.001	.08	-.03				
	p	.468	.721	.989	.064	.432				
Dep	***r***	.05	-.01	.01	.11	.07	.58			
	p	.219	.825	.819	.009	.105	<.001			
BD	***r***	.15	.12	.10	.13	-.03	.44	.50		
	p	.001	.006	.020	.003	.430	<.001	<.001		
LS	***r***	-.05	-.04	-.05	-.11	-.07	-.37	-.53	-.53	
	p	.230	.384	.210	.012	.092	<.001	<.001	<.001	
ED	***r***	.04	.07	.11	.08	.05	.28	.33	.29	-.26
	p	.317	.108	.014	.069	.280	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

T2		SM	IG	SC	YT	VG	Anx	Dep	BD	LS
IG	***r***	.82								
	p	<.001								
SC	***r***	.48	.52							
	p	<.001	<.001							
YT	***r***	.28	.15	.16						
	p	<.001	.001	<.001						
VG	***r***	.05	-.04	-.05	.28					
	p	.236	.428	.249	<.001					
Anx	***r***	.07	.05	.01	.08	-.12				
	p	.108	.297	.745	.073	.007				
Dep	***r***	.12	.08	.06	.19	.02	.58			
	p	.010	.085	.201	<.001	.726	<.001			
BD	***r***	.14	.11	.13	.15	-.03	.56	.58		
	p	.002	.012	.003	.001	.463	<.001	<.001		
LS	***r***	-.08	-.06	-.07	-.19	-.10	-.38	-.59	-.63	
	p	.059	.149	.099	<.001	.024	<.001	<.001	<.001	
ED	***r***	.13	.08	.11	.10	.08	.30	.35	.35	-.26

	p	.005	.094	.011	.030	.069	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

T_3		SM	IG	SC	YT	VG	Anx	Dep	BD	LS
IG	*r*	.79								
	p	<.001								
SC	*r*	.46	.44							
	p	<.001	<.001							
YT	*r*	.19	.03	.04						
	p	<.001	.506	.436						
VG	*r*	.04	-.09	-.05	.34					
	p	.372	.039	.324	<.001					
Anx	*r*	.15	.12	.07	.03	-.16				
	p	.001	.011	.116	.542	.001				
Dep	*r*	.19	.16	.10	.06	-.04	.61			
	p	<.001	<.001	.033	.199	.339	<.001			
BD	*r*	.29	.28	.18	.09	-.13	.55	.57		
	p	<.001	<.001	<.001	.048	.003	<.001	<.001		
LS	*r*	-.13	-.10	-.06	-.17	-.01	-.43	-.59	-.60	
	p	.005	.035	.220	<.001	.906	<.001	<.001	<.001	
ED	*r*	.18	.17	.14	.10	-.01	.36	.37	.40	-.32
	p	<.001	<.001	.002	.037	.767	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

T_4		SM	IG	SC	YT	VG	Anx	Dep	BD	LS
IG	*r*	.65								
	p	<.001								
SC	*r*	.56	.36							
	p	<.001	<.001							
YT	*r*	.24	.17	.13						
	p	<.001	<.001	.005						
VG	*r*	.00	-.03	-.13	.33					
	p	.999	.490	.005	<.001					
Anx	*r*	.12	.07	.07	.01	-.21				
	p	.012	.162	.150	.830	<.001				
Dep	*r*	.20	.12	.13	.04	-.11	.66			
	p	<.001	.012	.005	.448	.019	<.001			
BD	*r*	.20	.09	.15	.01	-.18	.68	.69		
	p	<.001	.061	.002	.894	<.001	<.001	<.001		
LS	*r*	-.12	-.06	-.07	-.11	.02	-.52	-.68	-.66	
	p	.011	.179	.148	.017	.692	<.001	<.001	<.001	

ED	***r***	.17	.15	.17	.07	-.08	.40	.46	.53	-.40
	p	<.001	.002	<.001	.161	.111	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

T_5		**SM**	**IG**	**SC**	**YT**	**VG**	**Anx**	**Dep**	**BD**	**LS**
IG	***r***	.67								
	p	<.001								
SC	***r***	.56	.37							
	p	<.001	<.001							
YT	***r***	.18	.14	.07						
	p	<.001	.004	.138						
VG	***r***	-.07	-.04	-.13	.40					
	p	.128	.427	.007	<.001					
Anx	***r***	.15	.16	-.04	-.03	-.08				
	p	.002	.001	.389	.516	.122				
Dep	***r***	.19	.15	.01	.02	-.03	.69			
	p	<.001	.002	.888	.644	.556	<.001			
BD	***r***	.24	.15	.11	-.02	-.12	.62	.67		
	p	<.001	.002	.022	.718	.018	<.001	<.001		
LS	***r***	-.12	-.08	.05	-.10	.01	-.45	-.64	-.56	
	p	.011	.099	.314	.037	.789	<.001	<.001	<.001	
ED	***r***	.17	.07	.14	-.03	.02	.37	.41	.53	-.29
	p	.001	.128	.003	.565	.736	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

T6		**SM**	**IG**	**SC**	**YT**	**VG**	**Anx**	**Dep**	**BD**	**LS**
IG	***r***	.53								
	p	<.001								
SC	***r***	.53	.33							
	p	<.001	<.001							
YT	***r***	.07	.08	-.04						
	p	.163	.139	.412						
VG	***r***	-.12	-.05	-.16	.35					
	p	.017	.319	.001	<.001					
Anx	***r***	.25	.11	-.03	.02	-.16				
	p	<.001	.031	.513	.662	.002				
Dep	***r***	.29	.16	.03	.01	-.05	.66			
	p	<.001	.002	.587	.792	.367	<.001			
BD	***r***	.32	.16	.03	.05	-.12	.59	.65		
	p	<.001	.002	.526	.322	.015	<.001	<.001		
LS	***r***	-.21	-.16	.02	-.15	-.09	-.42	-.62	-.55	

	p	<.001	.002	.724	.003	.091	<.001	<.001	<.001	
ED	***r***	.21	.10	.13	-.03	-.02	.37	.40	.57	-.31
	p	<.001	.058	.009	.581	.767	<.001	<.001	<.001	<.001

Note. SM = social media, IG = Instagram, SC = Snapchat, YT = YouTube, VG = video games, Anx = anxiety, Dep = depression, BD = body dissatisfaction, ED = eating disorder symptoms

Appendix B. RI-CLPM Parameters for Social Media Use and Anxiety Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Social media -> T2 Anxiety	0.01 (-0.34 - 0.36)	0.18	0.00	.961
T2 Social media -> T3 Anxiety	0.22 (-0.05 - 0.49)	0.14	0.14	.109
T3 Social media -> T4 Anxiety	-0.11 (-0.27 - 0.06)	0.08	-0.08	.201
T4 Social media -> T5 Anxiety	0.00 (-0.15 - 0.14)	0.07	0.00	.969
T5 Social media -> T6 Anxiety	0.07 (-0.03 - 0.18)	0.05	0.07	.180
T1 Anxiety -> T2 Social media	-0.04 (-0.15 - 0.07)	0.05	-0.07	.445
T2 Anxiety -> T3 Social media	0.02 (-0.09 - 0.14)	0.06	0.03	.691
T3 Anxiety -> T4 Social media	0.21 (0.05 - 0.37)	0.08	0.19	.012
T4 Anxiety -> T5 Social media	-0.02 (-0.13 - 0.10)	0.06	-0.02	.789
T5 Anxiety -> T6 Social media	0.12 (0.04 - 0.21)	0.04	0.15	.006
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Anxiety -> T2 Anxiety	0.30 (0.14 - 0.47)	0.09	0.31	<.001
T2 Anxiety -> T3 Anxiety	0.29 (0.11 - 0.48)	0.10	0.29	.002
T3 Anxiety -> T4 Anxiety	0.58 (0.45 - 0.72)	0.07	0.50	<.001
T4 Anxiety -> T5 Anxiety	0.63 (0.51 - 0.74)	0.06	0.61	<.001
T5 Anxiety -> T6 Anxiety	0.65 (0.56 - 0.74)	0.05	0.66	<.001
T1 Social media -> T2 Social media	-0.23 (-0.64 - 0.19)	0.21	-0.16	.286
T2 Social media -> T3 Social media	0.48 (0.27 - 0.70)	0.11	0.35	<.001
T3 Social media -> T4 Social media	0.52 (0.34 - 0.69)	0.09	0.42	<.001
T4 Social media -> T5 Social media	0.49 (0.31 - 0.66)	0.09	0.46	<.001
T5 Social media -> T6 Social media	0.46 (0.37 - 0.54)	0.05	0.54	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Anxiety int <-> Social media int	4.20 (1.28 - 7.12)	1.49	0.31	.005
T1 Anxiety <-> T1 Social media	-3.15 (-5.92 - -0.38)	1.41	-0.18	.026
T2 Anxiety <-> T2 Social media	-1.16 (-4.67 - 2.35)	1.79	-0.05	.517
T3 Anxiety <-> T3 Social media	1.74 (-1.97 - 5.45)	1.89	0.06	.358
T4 Anxiety <-> T4 Social media	4.81 (-0.96 - 10.58)	2.94	0.13	.102
T5 Anxiety <-> T5 Social media	3.61 (-2.63 - 9.85)	3.18	0.10	.257
T6 Anxiety <-> T6 Social media	3.10 (0.00 - 6.20)	1.58	0.12	.050

Appendix C. RI-CLPM Parameters for Social Media Use and Depression Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Social media -> T2 Depression	-0.01 (-0.26 - 0.24)	0.13	-0.01	.955
T2 Social media -> T3 Depression	0.04 (-0.11 - 0.20)	0.08	0.04	.580
T3 Social media -> T4 Depression	0.01 (-0.08 - 0.10)	0.05	0.01	.852

T4 Social media -> T5 Depression	0.03 (-0.08 - 0.14)	0.06	0.03	.596
T5 Social media -> T6 Depression	0.06 (-0.02 - 0.15)	0.04	0.08	.158
T1 Depression -> T2 Social media	-0.07 (-0.24 - 0.11)	0.09	-0.06	.452
T2 Depression -> T3 Social media	0.12 (-0.07 - 0.31)	0.10	0.08	.214
T3 Depression -> T4 Social media	0.35 (0.12 - 0.59)	0.12	0.22	.003
T4 Depression -> T5 Social media	-0.02 (-0.16 - 0.12)	0.07	-0.02	.772
T5 Depression -> T6 Social media	0.11 (0.03 - 0.20)	0.04	0.11	.009
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Depression -> T2 Depression	0.24 (0.07 - 0.40)	0.08	0.25	.005
T2 Depression -> T3 Depression	0.26 (0.05 - 0.46)	0.10	0.21	.015
T3 Depression -> T4 Depression	0.54 (0.37 - 0.71)	0.09	0.40	<.001
T4 Depression -> T5 Depression	0.59 (0.47 - 0.71)	0.06	0.54	<.001
T5 Depression -> T6 Depression	0.51 (0.41 - 0.61)	0.05	0.55	<.001
T1 Social media -> T2 Social media	-0.27 (-0.69 - 0.16)	0.22	-0.19	.220
T2 Social media -> T3 Social media	0.48 (0.26 - 0.70)	0.11	0.34	<.001
T3 Social media -> T4 Social media	0.50 (0.32 - 0.67)	0.09	0.40	<.001
T4 Social media -> T5 Social media	0.48 (0.31 - 0.66)	0.09	0.46	<.001
T5 Social media -> T6 Social media	0.46 (0.36 - 0.55)	0.05	0.54	<.001
Covariances	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
Depression int <-> Social media int	1.91 (0.32 - 3.50)	0.81	0.27	.018
T1 Depression <-> T1 Social media	-0.21 (-1.89 - 1.48)	0.86	-0.02	.811
T2 Depression <-> T2 Social media	0.65 (-1.98 - 3.27)	1.34	0.05	.629
T3 Depression <-> T3 Social media	2.18 (-0.20 - 4.56)	1.22	0.11	.073
T4 Depression <-> T4 Social media	6.30 (1.74 - 10.85)	2.32	0.21	.007
T5 Depression <-> T5 Social media	4.25 (0.61 - 7.89)	1.86	0.14	.022
T6 Depression <-> T6 Social media	3.91 (1.34 - 6.49)	1.31	0.17	.003

Appendix D. RI-CLPM Parameters for Social Media Use and Body Dissatisfaction Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Social media -> T2 Body dissatisfaction	0.01 (-0.01 - 0.03)	0.01	0.04	.483
T2 Social media -> T3 Body dissatisfaction	0.02 (0.00 - 0.04)	0.01	0.12	.084
T3 Social media -> T4 Body dissatisfaction	-0.01 (-0.02 - 0.01)	0.01	-0.05	.316
T4 Social media -> T5 Body dissatisfaction	0.00 (-0.02 - 0.02)	0.01	-0.01	.909
T5 Social media -> T6 Body dissatisfaction	0.01 (0.00 - 0.01)	0.00	0.05	.183
T1 Body dissatisfaction -> T2 Social media	0.33 (-0.86 - 1.51)	0.61	0.05	.591
T2 Body dissatisfaction -> T3 Social media	-0.21 (-1.50 - 1.09)	0.66	-0.02	.753
T3 Body dissatisfaction -> T4 Social media	2.02 (0.54 - 3.50)	0.75	0.19	.007
T4 Body dissatisfaction -> T5 Social media	0.10 (-0.88 - 1.07)	0.50	0.01	.846
T5 Body dissatisfaction -> T6 Social media	0.88 (0.11 - 1.66)	0.40	0.12	.026
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Body dissatisfaction -> T2 Body dissatisfaction	0.36 (0.17 - 0.55)	0.10	0.38	<.001
T2 Body dissatisfaction -> T3 Body dissatisfaction	0.31 (0.07 - 0.55)	0.12	0.28	.011
T3 Body dissatisfaction -> T4 Body dissatisfaction	0.70 (0.55 - 0.84)	0.07	0.55	<.001
T4 Body dissatisfaction -> T5 Body dissatisfaction	0.68 (0.59 - 0.78)	0.05	0.66	<.001
T5 Body dissatisfaction -> T6 Body dissatisfaction	0.70 (0.61 - 0.78)	0.04	0.72	<.001

T1 Social media -> T2 Social media	-0.21 (-0.60 - 0.17)	0.20	-0.15	.282
T2 Social media -> T3 Social media	0.49 (0.27 - 0.70)	0.11	0.35	<.001
T3 Social media -> T4 Social media	0.50 (0.32 - 0.67)	0.09	0.41	<.001
T4 Social media -> T5 Social media	0.48 (0.30 - 0.65)	0.09	0.45	<.001
T5 Social media -> T6 Social media	0.45 (0.35 - 0.54)	0.05	0.53	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Body dissatisfaction int <-> Social media int	0.41 (0.08 - 0.74)	0.17	0.30	.015
T1 Body dissatisfaction <-> T1 Social media	0.13 (-0.17 - 0.42)	0.15	0.07	.405
T2 Body dissatisfaction <-> T2 Social media	0.17 (-0.15 - 0.49)	0.16	0.08	.307
T3 Body dissatisfaction <-> T3 Social media	0.41 (0.07 - 0.75)	0.17	0.14	.018
T4 Body dissatisfaction <-> T4 Social media	0.45 (0.01 - 0.90)	0.23	0.12	.047
T5 Body dissatisfaction <-> T5 Social media	0.73 (0.14 - 1.33)	0.30	0.19	.015
T6 Body dissatisfaction <-> T6 Social media	0.46 (0.15 - 0.77)	0.16	0.18	.003

Appendix E. RI-CLPM Parameters for Social Media Use and Life Satisfaction Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Social media -> T2 Life satisfaction	0.01 (-0.02 - 0.04)	0.02	0.03	.551
T2 Social media -> T3 Life satisfaction	-0.01 (-0.04 - 0.03)	0.02	-0.03	.646
T3 Social media -> T4 Life satisfaction	0.01 (-0.01 - 0.02)	0.01	0.04	.388
T4 Social media -> T5 Life satisfaction	-0.01 (-0.02 - 0.01)	0.01	-0.04	.540
T5 Social media -> T6 Life satisfaction	-0.01 (-0.03 - 0.00)	0.01	-0.08	.123
T1 Life satisfaction -> T2 Social media	0.17 (-0.60 - 0.94)	0.39	0.04	.668
T2 Life satisfaction -> T3 Social media	-0.24 (-0.84 - 0.35)	0.30	-0.04	.423
T3 Life satisfaction -> T4 Social media	-1.23 (-2.25 - -0.20)	0.52	-0.16	.019
T4 Life satisfaction -> T5 Social media	0.14 (-0.66 - 0.93)	0.40	0.02	.736
T5 Life satisfaction -> T6 Social media	-0.82 (-1.45 - -0.18)	0.32	-0.13	.012
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Life satisfaction -> T2 Life satisfaction	0.35 (0.18 - 0.52)	0.09	0.33	<.001
T2 Life satisfaction -> T3 Life satisfaction	0.36 (0.20 - 0.51)	0.08	0.35	<.001
T3 Life satisfaction -> T4 Life satisfaction	0.44 (0.30 - 0.59)	0.07	0.43	<.001
T4 Life satisfaction -> T5 Life satisfaction	0.51 (0.38 - 0.64)	0.07	0.49	<.001
T5 Life satisfaction -> T6 Life satisfaction	0.46 (0.35 - 0.58)	0.06	0.46	<.001
T1 Social media -> T2 Social media	-0.23 (-0.63 - 0.17)	0.20	-0.17	.256
T2 Social media -> T3 Social media	0.49 (0.27 - 0.71)	0.11	0.35	<.001
T3 Social media -> T4 Social media	0.52 (0.34 - 0.70)	0.09	0.42	<.001
T4 Social media -> T5 Social media	0.48 (0.31 - 0.65)	0.09	0.46	<.001
T5 Social media -> T6 Social media	0.46 (0.37 - 0.55)	0.05	0.55	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Life satisfaction int <-> Social media int	-0.42 (-0.78 - -0.06)	0.18	-0.28	.021
T1 Life satisfaction <-> T1 Social media	-0.04 (-0.35 - 0.28)	0.16	-0.02	.820
T2 Life satisfaction <-> T2 Social media	0.03 (-0.43 - 0.49)	0.24	0.01	.907
T3 Life satisfaction <-> T3 Social media	-0.17 (-0.62 - 0.28)	0.23	-0.04	.450
T4 Life satisfaction <-> T4 Social media	-0.64 (-1.23 - -0.05)	0.30	-0.13	.033
T5 Life satisfaction <-> T5 Social media	-0.06 (-0.62 - 0.50)	0.29	-0.01	.833
T6 Life satisfaction <-> T6 Social media	-0.35 (-0.81 - 0.10)	0.23	-0.08	.130

Appendix F. RI-CLPM Parameters for Social Media Use and ED Symptoms Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 Social media -> T2 ED symptoms	0.08 (-0.08 - 0.24)	0.08	0.05	.345
T2 Social media -> T3 ED symptoms	0.03 (-0.10 - 0.15)	0.06	0.03	.655
T3 Social media -> T4 ED symptoms	-0.06 (-0.18 - 0.05)	0.06	-0.05	.282
T4 Social media -> T5 ED symptoms	0.03 (-0.12 - 0.18)	0.08	0.03	.695
T5 Social media -> T6 ED symptoms	0.09 (0.01 - 0.17)	0.04	0.09	.025
T1 ED symptoms -> T2 Social media	-0.06 (-0.20 - 0.08)	0.07	-0.06	.409
T2 ED symptoms -> T3 Social media	0.00 (-0.15 - 0.15)	0.08	0.00	.976
T3 ED symptoms -> T4 Social media	0.17 (-0.10 - 0.45)	0.14	0.10	.207
T4 ED symptoms -> T5 Social media	0.06 (-0.07 - 0.19)	0.07	0.06	.365
T5 ED symptoms -> T6 Social media	0.08 (0.00 - 0.16)	0.04	0.10	.049
Autoregressive Pathways	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
T1 ED symptoms -> T2 ED symptoms	0.27 (-0.11 - 0.66)	0.19	0.29	.158
T2 ED symptoms -> T3 ED symptoms	-0.13 (-0.33 - 0.08)	0.10	-0.13	.222
T3 ED symptoms -> T4 ED symptoms	0.24 (-0.05 - 0.54)	0.15	0.14	.104
T4 ED symptoms -> T5 ED symptoms	0.49 (0.24 - 0.75)	0.13	0.43	<.001
T5 ED symptoms -> T6 ED symptoms	0.55 (0.38 - 0.72)	0.09	0.60	<.001
T1 Social media -> T2 Social media	-0.28 (-0.69 - 0.13)	0.21	-0.20	.186
T2 Social media -> T3 Social media	0.48 (0.25 - 0.70)	0.11	0.34	<.001
T3 Social media -> T4 Social media	0.51 (0.33 - 0.69)	0.09	0.42	<.001
T4 Social media -> T5 Social media	0.46 (0.30 - 0.63)	0.09	0.44	<.001
T5 Social media -> T6 Social media	0.45 (0.36 - 0.54)	0.05	0.54	<.001
Covariances	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
ED symptoms int <-> Social media int	1.73 (0.46 - 3.01)	0.65	0.22	.008
T1 ED symptoms <-> T1 Social media	-0.98 (-2.41 - 0.46)	0.73	-0.08	.183
T2 ED symptoms <-> T2 Social media	-0.10 (-1.91 - 1.71)	0.92	-0.01	.912
T3 ED symptoms <-> T3 Social media	2.97 (0.34 - 5.60)	1.34	0.16	.027
T4 ED symptoms <-> T4 Social media	7.21 (1.05 - 13.36)	3.14	0.18	.022
T5 ED symptoms <-> T5 Social media	3.68 (-0.92 - 8.29)	2.35	0.09	.117
T6 ED symptoms <-> T6 Social media	1.01 (-2.02 - 4.04)	1.55	0.04	.514

Appendix G. RI-CLPM Parameters for Instagram Use and Anxiety Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 Instagram -> T2 Anxiety	0.03 (-0.55 - 0.60)	0.30	0.01	.931
T2 Instagram -> T3 Anxiety	0.50 (0.04 - 0.96)	0.23	0.20	.033
T3 Instagram -> T4 Anxiety	-0.05 (-0.24 - 0.13)	0.09	-0.03	.555
T4 Instagram -> T5 Anxiety	0.23 (0.06 - 0.40)	0.09	0.10	.009
T5 Instagram -> T6 Anxiety	0.08 (-0.07 - 0.24)	0.08	0.04	.289
T1 Anxiety -> T2 Instagram	0.01 (-0.06 - 0.09)	0.04	0.03	.745
T2 Anxiety -> T3 Instagram	0.03 (-0.06 - 0.12)	0.05	0.04	.536
T3 Anxiety -> T4 Instagram	0.11 (0.01 - 0.22)	0.05	0.20	.039
T4 Anxiety -> T5 Instagram	0.07 (-0.01 - 0.15)	0.04	0.14	.067
T5 Anxiety -> T6 Instagram	0.01 (-0.03 - 0.05)	0.02	0.02	.691

Autoregressive Pathways	β (LCI – UCI)	SE	Std. β	p
T1 Anxiety -> T2 Anxiety	0.29 (0.12 - 0.46)	0.09	0.30	.001
T2 Anxiety -> T3 Anxiety	0.28 (0.07 - 0.48)	0.11	0.26	.009
T3 Anxiety -> T4 Anxiety	0.57 (0.43 - 0.71)	0.07	0.49	<.001
T4 Anxiety -> T5 Anxiety	0.61 (0.49 - 0.74)	0.06	0.59	<.001
T5 Anxiety -> T6 Anxiety	0.65 (0.56 - 0.74)	0.05	0.66	<.001
T1 Instagram -> T2 Instagram	0.06 (-0.42 - 0.55)	0.25	0.03	.796
T2 Instagram -> T3 Instagram	0.86 (0.56 - 1.16)	0.15	0.50	<.001
T3 Instagram -> T4 Instagram	0.37 (0.12 - 0.62)	0.13	0.45	.004
T4 Instagram -> T5 Instagram	0.52 (0.21 - 0.82)	0.16	0.47	.001
T5 Instagram -> T6 Instagram	0.42 (0.28 - 0.57)	0.07	0.59	<.001
Covariances	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
Anxiety int <-> Instagram int	0.91 (-0.24 - 2.05)	0.58	0.17	.120
T1 Anxiety <-> T1 Instagram	-1.07 (-2.18 - 0.04)	0.57	-0.14	.059
T2 Anxiety <-> T2 Instagram	-0.04 (-2.13 - 2.05)	1.07	0.00	.970
T3 Anxiety <-> T3 Instagram	2.05 (-0.47 - 4.57)	1.29	0.09	.111
T4 Anxiety <-> T4 Instagram	0.29 (-1.63 - 2.21)	0.98	0.02	.767
T5 Anxiety <-> T5 Instagram	1.11 (-0.87 - 3.09)	1.01	0.06	.273
T6 Anxiety <-> T6 Instagram	0.52 (-1.20 - 2.23)	0.87	0.04	.556

Appendix H. RI-CLPM Parameters for Instagram Use and Depression Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 Instagram -> T2 Depression	-0.10 (-0.45 - 0.25)	0.18	-0.03	.589
T2 Instagram -> T3 Depression	0.21 (-0.07 - 0.50)	0.14	0.13	.139
T3 Instagram -> T4 Depression	0.03 (-0.11 - 0.17)	0.07	0.02	.709
T4 Instagram -> T5 Depression	0.22 (0.07 - 0.38)	0.08	0.13	.003
T5 Instagram -> T6 Depression	0.00 (-0.17 - 0.17)	0.08	0.00	1.000
T1 Depression -> T2 Instagram	0.03 (-0.08 - 0.15)	0.06	0.05	.569
T2 Depression -> T3 Instagram	0.06 (-0.06 - 0.18)	0.06	0.05	.302
T3 Depression -> T4 Instagram	0.16 (0.01 - 0.30)	0.07	0.19	.033
T4 Depression -> T5 Instagram	0.06 (-0.02 - 0.13)	0.04	0.08	.150
T5 Depression -> T6 Instagram	0.02 (-0.02 - 0.06)	0.02	0.05	.229
Autoregressive Pathways	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
T1 Depression -> T2 Depression	0.24 (0.06 - 0.41)	0.09	0.25	.008
T2 Depression -> T3 Depression	0.25 (0.04 - 0.46)	0.11	0.21	.020
T3 Depression -> T4 Depression	0.53 (0.36 - 0.71)	0.09	0.40	<.001
T4 Depression -> T5 Depression	0.58 (0.46 - 0.71)	0.06	0.53	<.001
T5 Depression -> T6 Depression	0.52 (0.43 - 0.62)	0.05	0.57	<.001
T1 Instagram -> T2 Instagram	0.08 (-0.37 - 0.53)	0.23	0.04	.729
T2 Instagram -> T3 Instagram	0.85 (0.56 - 1.15)	0.15	0.50	<.001
T3 Instagram -> T4 Instagram	0.36 (0.11 - 0.61)	0.13	0.44	.004
T4 Instagram -> T5 Instagram	0.52 (0.19 - 0.85)	0.17	0.48	.002
T5 Instagram -> T6 Instagram	0.42 (0.28 - 0.56)	0.07	0.59	<.001
Covariances	**β (LCI – UCI)**	**SE**	**Std. β**	**p**

Depression int <-> Instagram int	0.48 (-0.23 - 1.19)	0.36	0.18	.186
T1 Depression <-> T1 Instagram	-0.01 (-0.88 - 0.86)	0.44	0.00	.981
T2 Depression <-> T2 Instagram	0.82 (-0.75 - 2.39)	0.80	0.10	.305
T3 Depression <-> T3 Instagram	2.90 (0.68 - 5.12)	1.13	0.20	.010
T4 Depression <-> T4 Instagram	1.19 (-0.36 - 2.74)	0.79	0.08	.133
T5 Depression <-> T5 Instagram	0.55 (-0.79 - 1.89)	0.68	0.03	.422
T6 Depression <-> T6 Instagram	1.01 (-0.22 - 2.25)	0.63	0.10	.108

Appendix I. RI-CLPM Parameters for Instagram Use and Body Dissatisfaction Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Instagram -> T2 Body dissatisfaction	0.02 (-0.03 - 0.07)	0.03	0.05	.366
T2 Instagram -> T3 Body dissatisfaction	0.06 (0.02 - 0.10)	0.02	0.24	.003
T3 Instagram -> T4 Body dissatisfaction	-0.01 (-0.03 - 0.01)	0.01	-0.06	.205
T4 Instagram -> T5 Body dissatisfaction	0.03 (0.00 - 0.05)	0.01	0.12	.057
T5 Instagram -> T6 Body dissatisfaction	-0.01 (-0.02 - 0.01)	0.01	-0.03	.398
T1 Body dissatisfaction -> T2 Instagram	0.44 (-0.24 - 1.12)	0.35	0.10	.208
T2 Body dissatisfaction -> T3 Instagram	-0.09 (-0.93 - 0.76)	0.43	-0.01	.841
T3 Body dissatisfaction -> T4 Instagram	0.82 (-0.18 - 1.81)	0.51	0.14	.108
T4 Body dissatisfaction -> T5 Instagram	0.19 (-0.26 - 0.65)	0.23	0.04	.406
T5 Body dissatisfaction -> T6 Instagram	0.03 (-0.28 - 0.33)	0.16	0.01	.858
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Body dissatisfaction -> T2 Body dissatisfaction	0.33 (0.14 - 0.53)	0.10	0.36	.001
T2 Body dissatisfaction -> T3 Body dissatisfaction	0.26 (0.00 - 0.52)	0.13	0.23	.051
T3 Body dissatisfaction -> T4 Body dissatisfaction	0.70 (0.55 - 0.85)	0.07	0.56	<.001
T4 Body dissatisfaction -> T5 Body dissatisfaction	0.68 (0.58 - 0.77)	0.05	0.65	<.001
T5 Body dissatisfaction -> T6 Body dissatisfaction	0.71 (0.63 - 0.79)	0.04	0.74	<.001
T1 Instagram -> T2 Instagram	0.09 (-0.34 - 0.51)	0.22	0.04	.694
T2 Instagram -> T3 Instagram	0.87 (0.56 - 1.17)	0.16	0.51	<.001
T3 Instagram -> T4 Instagram	0.36 (0.10 - 0.62)	0.13	0.44	.007
T4 Instagram -> T5 Instagram	0.53 (0.20 - 0.86)	0.17	0.49	.002
T5 Instagram -> T6 Instagram	0.43 (0.28 - 0.57)	0.07	0.59	<.001
Covariances	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
Body dissatisfaction int <-> Instagram int	0.11 (-0.01 - 0.23)	0.06	0.21	.083
T1 Body dissatisfaction <-> T1 Instagram	0.07 (-0.04 - 0.18)	0.05	0.10	.197
T2 Body dissatisfaction <-> T2 Instagram	0.18 (-0.01 - 0.37)	0.10	0.14	.070
T3 Body dissatisfaction <-> T3 Instagram	0.49 (0.24 - 0.74)	0.13	0.23	<.001
T4 Body dissatisfaction <-> T4 Instagram	-0.02 (-0.23 - 0.19)	0.11	-0.01	.854
T5 Body dissatisfaction <-> T5 Instagram	0.14 (-0.05 - 0.33)	0.10	0.07	.143
T6 Body dissatisfaction <-> T6 Instagram	0.17 (0.02 - 0.31)	0.07	0.14	.027

Appendix J. RI-CLPM Parameters for Instagram Use and Life Satisfaction Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***

T1 Instagram -> T2 Life satisfaction	0.05 (-0.05 - 0.15)	0.05	0.07	.359
T2 Instagram -> T3 Life satisfaction	-0.03 (-0.07 - 0.02)	0.02	-0.08	.218
T3 Instagram -> T4 Life satisfaction	0.02 (0.00 - 0.04)	0.01	0.08	.091
T4 Instagram -> T5 Life satisfaction	-0.01 (-0.03 - 0.02)	0.01	-0.02	.649
T5 Instagram -> T6 Life satisfaction	-0.01 (-0.03 - 0.02)	0.01	-0.03	.559
T1 Life satisfaction -> T2 Instagram	-0.05 (-0.54 - 0.45)	0.25	-0.02	.849
T2 Life satisfaction -> T3 Instagram	0.07 (-0.28 - 0.43)	0.18	0.01	.690
T3 Life satisfaction -> T4 Instagram	-0.44 (-1.03 - 0.15)	0.30	-0.11	.146
T4 Life satisfaction -> T5 Instagram	-0.13 (-0.52 - 0.26)	0.20	-0.03	.510
T5 Life satisfaction -> T6 Instagram	0.11 (-0.12 - 0.34)	0.12	0.04	.362
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Life satisfaction -> T2 Life satisfaction	0.35 (0.18 - 0.52)	0.09	0.33	<.001
T2 Life satisfaction -> T3 Life satisfaction	0.36 (0.22 - 0.51)	0.08	0.36	<.001
T3 Life satisfaction -> T4 Life satisfaction	0.45 (0.31 - 0.60)	0.07	0.44	<.001
T4 Life satisfaction -> T5 Life satisfaction	0.53 (0.40 - 0.65)	0.07	0.50	<.001
T5 Life satisfaction -> T6 Life satisfaction	0.47 (0.36 - 0.59)	0.06	0.47	<.001
T1 Instagram -> T2 Instagram	0.09 (-0.35 - 0.53)	0.23	0.05	.689
T2 Instagram -> T3 Instagram	0.87 (0.57 - 1.16)	0.15	0.51	<.001
T3 Instagram -> T4 Instagram	0.38 (0.13 - 0.64)	0.13	0.47	.003
T4 Instagram -> T5 Instagram	0.53 (0.20 - 0.86)	0.17	0.49	.002
T5 Instagram -> T6 Instagram	0.43 (0.29 - 0.57)	0.07	0.60	<.001
Covariances	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
Life satisfaction int <-> Instagram int	-0.17 (-0.32 - -0.02)	0.08	-0.31	.023
T1 Life satisfaction <-> T1 Instagram	0.04 (-0.08 - 0.16)	0.06	0.04	.516
T2 Life satisfaction <-> T2 Instagram	-0.09 (-0.39 - 0.21)	0.15	-0.04	.570
T3 Life satisfaction <-> T3 Instagram	-0.48 (-0.86 - -0.10)	0.19	-0.16	.012
T4 Life satisfaction <-> T4 Instagram	-0.14 (-0.40 - 0.13)	0.14	-0.06	.315
T5 Life satisfaction <-> T5 Instagram	-0.17 (-0.45 - 0.11)	0.14	-0.06	.237
T6 Life satisfaction <-> T6 Instagram	-0.35 (-0.55 - -0.14)	0.10	-0.18	.001

Appendix K. RI-CLPM Parameters for Instagram Use and ED Symptoms Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Instagram -> T2 ED symptoms	0.03 (-0.31 - 0.38)	0.18	0.01	.857
T2 Instagram -> T3 ED symptoms	0.07 (-0.19 - 0.32)	0.13	0.04	.615
T3 Instagram -> T4 ED symptoms	0.06 (-0.09 - 0.21)	0.08	0.04	.454
T4 Instagram -> T5 ED symptoms	0.26 (0.02 - 0.50)	0.12	0.12	.033
T5 Instagram -> T6 ED symptoms	0.03 (-0.10 - 0.16)	0.06	0.02	.649
T1 ED symptoms -> T2 Instagram	-0.02 (-0.10 - 0.05)	0.04	-0.04	.556
T2 ED symptoms -> T3 Instagram	0.02 (-0.07 - 0.10)	0.04	0.01	.698
T3 ED symptoms -> T4 Instagram	0.10 (-0.05 - 0.24)	0.07	0.11	.178
T4 ED symptoms -> T5 Instagram	0.02 (-0.03 - 0.07)	0.02	0.03	.398
T5 ED symptoms -> T6 Instagram	0.01 (-0.03 - 0.04)	0.02	0.01	.748
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 ED symptoms -> T2 ED symptoms	0.26 (-0.12 - 0.64)	0.20	0.28	.182

T2 ED symptoms -> T3 ED symptoms	-0.14 (-0.36 - 0.08)	0.11	-0.15	.207
T3 ED symptoms -> T4 ED symptoms	0.22 (-0.08 - 0.51)	0.15	0.12	.146
T4 ED symptoms -> T5 ED symptoms	0.49 (0.23 - 0.74)	0.13	0.42	<.001
T5 ED symptoms -> T6 ED symptoms	0.56 (0.39 - 0.73)	0.09	0.61	<.001
T1 Instagram -> T2 Instagram	0.05 (-0.43 - 0.52)	0.24	0.02	.851
T2 Instagram -> T3 Instagram	0.87 (0.57 - 1.17)	0.15	0.51	<.001
T3 Instagram -> T4 Instagram	0.38 (0.12 - 0.64)	0.13	0.47	.004
T4 Instagram -> T5 Instagram	0.53 (0.20 - 0.86)	0.17	0.48	.002
T5 Instagram -> T6 Instagram	0.42 (0.28 - 0.56)	0.07	0.59	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
ED symptoms int <-> Instagram int	0.91 (0.31 - 1.51)	0.31	0.30	.003
T1 ED symptoms <-> T1 Instagram	-0.26 (-1.03 - 0.52)	0.40	-0.05	.519
T2 ED symptoms <-> T2 Instagram	-0.55 (-1.47 - 0.36)	0.47	-0.06	.234
T3 ED symptoms <-> T3 Instagram	2.06 (0.60 - 3.53)	0.75	0.15	.006
T4 ED symptoms <-> T4 Instagram	1.49 (-0.29 - 3.27)	0.91	0.08	.102
T5 ED symptoms <-> T5 Instagram	1.46 (-0.75 - 3.67)	1.13	0.06	.195
T6 ED symptoms <-> T6 Instagram	0.63 (-0.49 - 1.76)	0.57	0.05	.272

Appendix L. RI-CLPM Parameters for Snapchat Use and Anxiety Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Snapchat -> T2 Anxiety	3.08 (-13.14 - 19.30)	8.27	0.19	.710
T2 Snapchat -> T3 Anxiety	0.21 (-0.33 - 0.76)	0.28	0.06	.444
T3 Snapchat -> T4 Anxiety	-0.29 (-0.53 - -0.04)	0.13	-0.13	.021
T4 Snapchat -> T5 Anxiety	-0.03 (-0.17 - 0.12)	0.07	-0.02	.704
T5 Snapchat -> T6 Anxiety	0.06 (-0.06 - 0.18)	0.06	0.04	.327
T1 Anxiety -> T2 Snapchat	0.01 (-0.11 - 0.13)	0.06	0.04	.869
T2 Anxiety -> T3 Snapchat	-0.02 (-0.08 - 0.03)	0.03	-0.04	.429
T3 Anxiety -> T4 Snapchat	0.13 (0.00 - 0.26)	0.07	0.15	.059
T4 Anxiety -> T5 Snapchat	-0.05 (-0.13 - 0.04)	0.04	-0.06	.257
T5 Anxiety -> T6 Snapchat	0.00 (-0.05 - 0.05)	0.03	0.00	.948
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Anxiety -> T2 Anxiety	0.32 (0.08 - 0.56)	0.12	0.34	.008
T2 Anxiety -> T3 Anxiety	0.27 (0.07 - 0.47)	0.10	0.26	.009
T3 Anxiety -> T4 Anxiety	0.57 (0.43 - 0.71)	0.07	0.49	<.001
T4 Anxiety -> T5 Anxiety	0.62 (0.49 - 0.74)	0.06	0.60	<.001
T5 Anxiety -> T6 Anxiety	0.65 (0.56 - 0.73)	0.04	0.66	<.001
T1 Snapchat -> T2 Snapchat	-0.72 (-10.31 - 8.86)	4.89	-0.16	.882
T2 Snapchat -> T3 Snapchat	1.07 (0.27 - 1.87)	0.41	0.55	.009
T3 Snapchat -> T4 Snapchat	0.60 (0.29 - 0.92)	0.16	0.38	<.001
T4 Snapchat -> T5 Snapchat	0.51 (0.33 - 0.70)	0.10	0.50	<.001
T5 Snapchat -> T6 Snapchat	0.49 (0.32 - 0.67)	0.09	0.59	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Anxiety int <-> Snapchat int	0.20 (-0.54 - 0.95)	0.38	0.05	.594
T1 Anxiety <-> T1 Snapchat	-0.50 (-1.17 - 0.18)	0.34	-0.21	.150
T2 Anxiety <-> T2 Snapchat	0.14 (-4.39 - 4.67)	2.31	0.01	.952
T3 Anxiety <-> T3 Snapchat	1.02 (-1.23 - 3.28)	1.15	0.06	.374

T4 Anxiety <-> T4 Snapchat	5.06 (-0.13 - 10.25)	2.65	0.17	.056
T5 Anxiety <-> T5 Snapchat	-1.15 (-3.68 - 1.37)	1.29	-0.04	.371
T6 Anxiety <-> T6 Snapchat	1.70 (-0.83 - 4.24)	1.30	0.08	.188

Appendix M. RI-CLPM Parameters for Snapchat Use and Depression Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Snapchat -> T2 Depression	0.41 (-3.43 - 4.25)	1.96	0.04	.834
T2 Snapchat -> T3 Depression	0.14 (-0.18 - 0.47)	0.17	0.06	.388
T3 Snapchat -> T4 Depression	0.00 (-0.13 - 0.14)	0.07	0.00	.977
T4 Snapchat -> T5 Depression	0.01 (-0.10 - 0.11)	0.06	0.01	.900
T5 Snapchat -> T6 Depression	-0.01 (-0.11 - 0.10)	0.05	-0.01	.891
T1 Depression -> T2 Snapchat	0.03 (-0.07 - 0.12)	0.05	0.06	.592
T2 Depression -> T3 Snapchat	0.01 (-0.08 - 0.10)	0.05	0.01	.791
T3 Depression -> T4 Snapchat	0.27 (0.07 - 0.47)	0.10	0.21	.008
T4 Depression -> T5 Snapchat	-0.06 (-0.15 - 0.03)	0.05	-0.06	.196
T5 Depression -> T6 Snapchat	0.00 (-0.08 - 0.07)	0.04	0.00	.929
Autoregressive Pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Depression -> T2 Depression	0.22 (0.06 - 0.39)	0.08	0.24	.007
T2 Depression -> T3 Depression	0.24 (0.03 - 0.45)	0.11	0.20	.024
T3 Depression -> T4 Depression	0.53 (0.36 - 0.70)	0.09	0.40	<.001
T4 Depression -> T5 Depression	0.59 (0.47 - 0.72)	0.06	0.55	<.001
T5 Depression -> T6 Depression	0.51 (0.42 - 0.61)	0.05	0.56	<.001
T1 Snapchat -> T2 Snapchat	-1.04 (-15.05 - 12.98)	7.15	-0.21	.884
T2 Snapchat -> T3 Snapchat	1.08 (0.25 - 1.90)	0.42	0.55	.011
T3 Snapchat -> T4 Snapchat	0.61 (0.30 - 0.92)	0.16	0.38	<.001
T4 Snapchat -> T5 Snapchat	0.52 (0.32 - 0.72)	0.10	0.50	<.001
T5 Snapchat -> T6 Snapchat	0.50 (0.32 - 0.67)	0.09	0.59	<.001
Covariances	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
Depression int <-> Snapchat int	0.08 (-0.29 - 0.44)	0.19	0.04	.676
T1 Depression <-> T1 Snapchat	-0.04 (-0.36 - 0.28)	0.16	-0.03	.791
T2 Depression <-> T2 Snapchat	0.16 (-0.91 - 1.24)	0.55	0.03	.765
T3 Depression <-> T3 Snapchat	0.16 (-1.03 - 1.36)	0.61	0.01	.788
T4 Depression <-> T4 Snapchat	4.16 (1.28 - 7.05)	1.47	0.18	.005
T5 Depression <-> T5 Snapchat	1.89 (-0.54 - 4.32)	1.24	0.08	.128
T6 Depression <-> T6 Snapchat	1.16 (-1.06 - 3.38)	1.13	0.07	.304

Appendix N. RI-CLPM Parameters for Snapchat Use and Body Dissatisfaction Without Constraining for Time

Cross-lagged pathways	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Snapchat -> T2 Body dissatisfaction	0.15 (-0.22 - 0.51)	0.19	0.12	.429
T2 Snapchat -> T3 Body dissatisfaction	0.06 (0.00 - 0.11)	0.03	0.16	.035
T3 Snapchat -> T4 Body dissatisfaction	-0.01 (-0.03 - 0.01)	0.01	-0.03	.375
T4 Snapchat -> T5 Body dissatisfaction	0.00 (-0.02 - 0.01)	0.01	-0.03	.603

T5 Snapchat -> T6 Body dissatisfaction	0.00 (-0.01 - 0.01)	0.01	0.01	.694
T1 Body dissatisfaction -> T2 Snapchat	0.70 (0.07 - 1.34)	0.32	0.25	.030
T2 Body dissatisfaction -> T3 Snapchat	-0.09 (-0.75 - 0.57)	0.34	-0.02	.787
T3 Body dissatisfaction -> T4 Snapchat	1.52 (0.15 - 2.90)	0.70	0.18	.030
T4 Body dissatisfaction -> T5 Snapchat	-0.09 (-0.79 - 0.60)	0.36	-0.01	.791
T5 Body dissatisfaction -> T6 Snapchat	0.00 (-0.54 - 0.54)	0.28	0.00	.998
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Body dissatisfaction -> T2 Body dissatisfaction	0.33 (0.17 - 0.50)	0.08	0.36	<.001
T2 Body dissatisfaction -> T3 Body dissatisfaction	0.28 (0.04 - 0.52)	0.12	0.25	.022
T3 Body dissatisfaction -> T4 Body dissatisfaction	0.69 (0.55 - 0.83)	0.07	0.55	<.001
T4 Body dissatisfaction -> T5 Body dissatisfaction	0.68 (0.58 - 0.78)	0.05	0.66	<.001
T5 Body dissatisfaction -> T6 Body dissatisfaction	0.70 (0.62 - 0.78)	0.04	0.73	<.001
T1 Snapchat -> T2 Snapchat	-0.31 (-4.93 - 4.32)	2.36	-0.08	.896
T2 Snapchat -> T3 Snapchat	1.07 (0.26 - 1.89)	0.42	0.55	.010
T3 Snapchat -> T4 Snapchat	0.58 (0.27 - 0.90)	0.16	0.37	<.001
T4 Snapchat -> T5 Snapchat	0.51 (0.31 - 0.71)	0.10	0.49	<.001
T5 Snapchat -> T6 Snapchat	0.50 (0.32 - 0.67)	0.09	0.59	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Body dissatisfaction int <-> Snapchat int	0.01 (-0.05 - 0.08)	0.03	0.04	.658
T1 Body dissatisfaction <-> T1 Snapchat	0.03 (-0.03 - 0.09)	0.03	0.12	.286
T2 Body dissatisfaction <-> T2 Snapchat	0.11 (-0.03 - 0.25)	0.07	0.13	.124
T3 Body dissatisfaction <-> T3 Snapchat	0.10 (-0.08 - 0.28)	0.09	0.06	.283
T4 Body dissatisfaction <-> T4 Snapchat	0.39 (0.01 - 0.76)	0.19	0.12	.045
T5 Body dissatisfaction <-> T5 Snapchat	0.15 (-0.17 - 0.47)	0.16	0.05	.356
T6 Body dissatisfaction <-> T6 Snapchat	0.06 (-0.19 - 0.32)	0.13	0.03	.635

Appendix O. RI-CLPM Parameters for Snapchat Use and Life Satisfaction Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Snapchat -> Life satisfaction	-0.01 (-0.02 - 0.00)	0.01	-0.00	.251
Life satisfaction -> Snapchat	-0.20 (-0.42 – 0.02)	0.11	-0.10	.069
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Life satisfaction -> Life satisfaction	0.43 (0.32 - 0.53)	0.06	0.40	<.001
Snapchat -> Snapchat	0.55 (0.42 - 0.69)	0.07	0.33	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Life satisfaction int <-> Snapchat int	-0.03 (-0.07 - 0.02)	0.02	-0.09	.234
T1 Life satisfaction <-> T1 Snapchat	-0.01 (-0.07 - 0.05)	0.03	-0.01	.839
T2 Life satisfaction <-> T2 Snapchat	0.05 (-0.10 - 0.19)	0.08	0.03	.549
T3 Life satisfaction <-> T3 Snapchat	-0.04 (-0.20 - 0.11)	0.08	-0.02	.603
T4 Life satisfaction <-> T4 Snapchat	-0.36 (-0.72 - 0.01)	0.19	-0.09	.053
T5 Life satisfaction <-> T5 Snapchat	0.21 (-0.18 - 0.60)	0.20	0.05	.289
T6 Life satisfaction <-> T6 Snapchat	-0.14 (-0.48 - 0.20)	0.17	-0.05	.418

Appendix P. RI-CLPM Parameters for Snapchat Use and ED Symptoms Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 Snapchat -> T2 ED symptoms	6.61 (-17.71 - 30.94)	12.41	0.23	.594
T2 Snapchat -> T3 ED symptoms	0.10 (-0.20 - 0.39)	0.15	0.04	.520
T3 Snapchat -> T4 ED symptoms	-0.08 (-0.26 - 0.09)	0.09	-0.04	.353
T4 Snapchat -> T5 ED symptoms	0.00 (-0.14 - 0.15)	0.07	0.00	.961
T5 Snapchat -> T6 ED symptoms	0.05 (-0.04 - 0.14)	0.05	0.04	.264
T1 ED symptoms -> T2 Snapchat	0.05 (-0.28 - 0.38)	0.17	0.13	.758
T2 ED symptoms -> T3 Snapchat	0.01 (-0.06 - 0.07)	0.03	0.01	.865
T3 ED symptoms -> T4 Snapchat	0.19 (-0.01 - 0.39)	0.10	0.13	.068
T4 ED symptoms -> T5 Snapchat	0.04 (-0.02 - 0.11)	0.03	0.05	.180
T5 ED symptoms -> T6 Snapchat	0.01 (-0.04 - 0.06)	0.02	0.01	.755
Autoregressive Pathways	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
T1 ED symptoms -> T2 ED symptoms	0.25 (0.00 - 0.51)	0.13	0.27	.050
T2 ED symptoms -> T3 ED symptoms	-0.14 (-0.34 - 0.07)	0.11	-0.14	.197
T3 ED symptoms -> T4 ED symptoms	0.23 (-0.06 - 0.52)	0.15	0.13	.114
T4 ED symptoms -> T5 ED symptoms	0.50 (0.24 - 0.75)	0.13	0.43	<.001
T5 ED symptoms -> T6 ED symptoms	0.56 (0.39 - 0.73)	0.09	0.61	<.001
T1 Snapchat -> T2 Snapchat	-12.31 (-44.90 - 20.29)	16.63	-1.05	.459
T2 Snapchat -> T3 Snapchat	1.09 (0.32 - 1.85)	0.39	0.54	.005
T3 Snapchat -> T4 Snapchat	0.60 (0.26 - 0.94)	0.17	0.38	.001
T4 Snapchat -> T5 Snapchat	0.49 (0.30 - 0.69)	0.10	0.48	<.001
T5 Snapchat -> T6 Snapchat	0.50 (0.32 - 0.67)	0.09	0.59	<.001
Covariances	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
ED symptoms int <-> Snapchat int	0.49 (0.10 - 0.87)	0.20	0.19	.014
T1 ED symptoms <-> T1 Snapchat	0.05 (-0.44 - 0.54)	0.25	0.09	.838
T2 ED symptoms <-> T2 Snapchat	1.86 (-3.99 - 7.70)	2.98	1.03	.533
T3 ED symptoms <-> T3 Snapchat	1.17 (-0.60 - 2.93)	0.90	0.11	.195
T4 ED symptoms <-> T4 Snapchat	3.69 (0.10 - 7.28)	1.83	0.12	.044
T5 ED symptoms <-> T5 Snapchat	1.78 (-1.17 - 4.74)	1.51	0.05	.237
T6 ED symptoms <-> T6 Snapchat	-0.22 (-2.07 - 1.64)	0.95	-0.01	.818

Appendix Q. RI-CLPM Parameters for YouTube Use and Anxiety Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 YouTube -> T2 Anxiety	-0.05 (-0.22 - 0.11)	0.08	-0.04	.522
T2 YouTube -> T3 Anxiety	-0.05 (-0.27 - 0.16)	0.11	-0.03	.643
T3 YouTube -> T4 Anxiety	-0.07 (-0.28 - 0.14)	0.11	-0.04	.510
T4 YouTube -> T5 Anxiety	-0.18 (-0.32 - -0.05)	0.07	-0.13	.007
T5 YouTube -> T6 Anxiety	0.04 (-0.11 - 0.18)	0.07	0.02	.616
T1 Anxiety -> T2 YouTube	0.03 (-0.04 - 0.11)	0.04	0.06	.369
T2 Anxiety -> T3 YouTube	0.04 (-0.06 - 0.14)	0.05	0.05	.460
T3 Anxiety -> T4 YouTube	-0.02 (-0.11 - 0.08)	0.05	-0.02	.714

T4 Anxiety -> T5 YouTube	0.00 (-0.07 - 0.08)	0.04	0.01	.915
T5 Anxiety -> T6 YouTube	0.01 (-0.04 - 0.06)	0.03	0.02	.605
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Anxiety -> T2 Anxiety	0.27 (0.10 - 0.43)	0.08	0.28	.001
T2 Anxiety -> T3 Anxiety	0.26 (0.05 - 0.46)	0.11	0.25	.016
T3 Anxiety -> T4 Anxiety	0.56 (0.41 - 0.70)	0.07	0.47	<.001
T4 Anxiety -> T5 Anxiety	0.61 (0.49 - 0.74)	0.06	0.59	<.001
T5 Anxiety -> T6 Anxiety	0.66 (0.57 - 0.74)	0.04	0.67	<.001
T1 YouTube -> T2 YouTube	0.21 (-0.04 - 0.46)	0.13	0.23	.105
T2 YouTube -> T3 YouTube	0.24 (-0.02 - 0.50)	0.14	0.21	.076
T3 YouTube -> T4 YouTube	0.14 (-0.08 - 0.36)	0.11	0.12	.226
T4 YouTube -> T5 YouTube	0.32 (0.17 - 0.47)	0.08	0.36	<.001
T5 YouTube -> T6 YouTube	0.49 (0.34 - 0.64)	0.08	0.51	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Anxiety int <-> YouTube int	2.52 (0.27 - 4.76)	1.15	0.18	.028
T1 Anxiety <-> T1 YouTube	0.13 (-3.68 - 3.93)	1.94	0.00	.949
T2 Anxiety <-> T2 YouTube	-1.20 (-4.07 - 1.68)	1.47	-0.06	.414
T3 Anxiety <-> T3 YouTube	-0.14 (-3.40 - 3.11)	1.66	-0.01	.931
T4 Anxiety <-> T4 YouTube	-2.22 (-5.77 - 1.33)	1.81	-0.07	.221
T5 Anxiety <-> T5 YouTube	-0.81 (-3.59 - 1.96)	1.42	-0.03	.565
T6 Anxiety <-> T6 YouTube	0.60 (-1.81 - 3.01)	1.23	0.03	.625

Appendix R. RI-CLPM Parameters for YouTube Use and Depression Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 YouTube -> T2 Depression	-0.04 (-0.15 - 0.07)	0.05	-0.05	.453
T2 YouTube -> T3 Depression	-0.11 (-0.26 - 0.04)	0.08	-0.10	.166
T3 YouTube -> T4 Depression	0.01 (-0.11 - 0.13)	0.06	0.01	.887
T4 YouTube -> T5 Depression	-0.02 (-0.14 - 0.09)	0.06	-0.02	.681
T5 YouTube -> T6 Depression	0.06 (-0.08 - 0.19)	0.07	0.05	.406
T1 Depression -> T2 YouTube	-0.05 (-0.19 - 0.10)	0.07	-0.04	.532
T2 Depression -> T3 YouTube	0.13 (-0.06 - 0.33)	0.10	0.11	.172
T3 Depression -> T4 YouTube	-0.07 (-0.23 - 0.08)	0.08	-0.06	.339
T4 Depression -> T5 YouTube	-0.05 (-0.15 - 0.05)	0.05	-0.06	.338
T5 Depression -> T6 YouTube	0.02 (-0.05 - 0.09)	0.03	0.02	.596
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Depression -> T2 Depression	0.22 (0.04 - 0.40)	0.09	0.23	.015
T2 Depression -> T3 Depression	0.23 (0.03 - 0.44)	0.11	0.20	.028
T3 Depression -> T4 Depression	0.54 (0.37 - 0.72)	0.09	0.40	<.001
T4 Depression -> T5 Depression	0.60 (0.47 - 0.72)	0.06	0.55	<.001
T5 Depression -> T6 Depression	0.52 (0.43 - 0.62)	0.05	0.57	<.001
T1 YouTube -> T2 YouTube	0.21 (-0.05 - 0.46)	0.13	0.23	.108
T2 YouTube -> T3 YouTube	0.23 (-0.03 - 0.49)	0.13	0.20	.087
T3 YouTube -> T4 YouTube	0.13 (-0.10 - 0.35)	0.12	0.11	.275
T4 YouTube -> T5 YouTube	0.31 (0.15 - 0.46)	0.08	0.35	<.001

T5 YouTube -> T6 YouTube	0.49 (0.34 - 0.64)	0.08	0.50	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Depression int <-> YouTube int	2.41 (1.12 - 3.69)	0.65	0.34	<.001
T1 Depression <-> T1 YouTube	0.13 (-2.08 - 2.35)	1.13	0.01	.906
T2 Depression <-> T2 YouTube	-0.50 (-2.04 - 1.04)	0.79	-0.04	.522
T3 Depression <-> T3 YouTube	0.30 (-2.54 - 3.14)	1.45	0.02	.836
T4 Depression <-> T4 YouTube	-2.98 (-5.79 - -0.17)	1.43	-0.12	.038
T5 Depression <-> T5 YouTube	0.90 (-1.48 - 3.28)	1.21	0.04	.460
T6 Depression <-> T6 YouTube	-0.07 (-1.77 - 1.62)	0.86	0.00	.931

Appendix S. RI-CLPM Parameters for YouTube Use and Body Dissatisfaction Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 YouTube -> T2 Body dissatisfaction	0.01 (-0.01 - 0.02)	0.01	0.06	.338
T2 YouTube -> T3 Body dissatisfaction	0.00 (-0.03 - 0.02)	0.01	-0.02	.753
T3 YouTube -> T4 Body dissatisfaction	0.00 (-0.02 - 0.02)	0.01	0.00	.987
T4 YouTube -> T5 Body dissatisfaction	-0.01 (-0.03 - 0.00)	0.01	-0.09	.084
T5 YouTube -> T6 Body dissatisfaction	0.02 (0.00 - 0.03)	0.01	0.10	.026
T1 Body dissatisfaction -> T2 YouTube	0.07 (-0.80 - 0.93)	0.44	0.01	.882
T2 Body dissatisfaction -> T3 YouTube	1.37 (-0.07 - 2.81)	0.73	0.17	.063
T3 Body dissatisfaction -> T4 YouTube	-0.61 (-1.83 - 0.61)	0.62	-0.07	.329
T4 Body dissatisfaction -> T5 YouTube	0.16 (-0.59 - 0.91)	0.38	0.03	.679
T5 Body dissatisfaction -> T6 YouTube	-0.29 (-0.86 - 0.29)	0.29	-0.05	.332
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Body dissatisfaction -> T2 Body dissatisfaction	0.33 (0.14 - 0.51)	0.09	0.35	<.001
T2 Body dissatisfaction -> T3 Body dissatisfaction	0.28 (0.05 - 0.52)	0.12	0.26	.018
T3 Body dissatisfaction -> T4 Body dissatisfaction	0.68 (0.54 - 0.83)	0.08	0.53	<.001
T4 Body dissatisfaction -> T5 Body dissatisfaction	0.66 (0.57 - 0.76)	0.05	0.64	<.001
T5 Body dissatisfaction -> T6 Body dissatisfaction	0.71 (0.64 - 0.79)	0.04	0.74	<.001
T1 YouTube -> T2 YouTube	0.21 (-0.04 - 0.46)	0.13	0.23	.096
T2 YouTube -> T3 YouTube	0.24 (-0.02 - 0.50)	0.13	0.21	.067
T3 YouTube -> T4 YouTube	0.14 (-0.08 - 0.37)	0.11	0.12	.203
T4 YouTube -> T5 YouTube	0.32 (0.17 - 0.47)	0.08	0.36	<.001
T5 YouTube -> T6 YouTube	0.48 (0.33 - 0.63)	0.08	0.50	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Body dissatisfaction int <-> YouTube int	0.31 (0.06 - 0.57)	0.13	0.22	.017
T1 Body dissatisfaction <-> T1 YouTube	0.10 (-0.28 - 0.47)	0.19	0.04	.620
T2 Body dissatisfaction <-> T2 YouTube	0.02 (-0.26 - 0.30)	0.14	0.01	.878
T3 Body dissatisfaction <-> T3 YouTube	0.05 (-0.32 - 0.42)	0.19	0.02	.788
T4 Body dissatisfaction <-> T4 YouTube	-0.45 (-0.83 - -0.06)	0.20	-0.13	.023

T5 Body dissatisfaction <-> T5 YouTube	-0.13 (-0.41 - 0.15)	0.14	-0.05	.351
T6 Body dissatisfaction <-> T6 YouTube	0.08 (-0.11 - 0.28)	0.10	0.04	.414

Appendix T. RI-CLPM Parameters for YouTube Use and Life Satisfaction Without Constraining for Time

Cross-lagged pathways (male)	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 YouTube -> T2 Life satisfaction	0.00 (-0.03 - 0.03)	0.01	0.00	.995
T2 YouTube -> T3 Life satisfaction	0.02 (-0.03 - 0.06)	0.02	0.08	.514
T3 YouTube -> T4 Life satisfaction	0.00 (-0.03 - 0.02)	0.01	-0.02	.848
T4 YouTube -> T5 Life satisfaction	0.01 (-0.01 - 0.03)	0.01	0.05	.598
T5 YouTube -> T6 Life satisfaction	-0.03 (-0.07 - 0.01)	0.02	-0.16	.094
T1 Life satisfaction -> T2 YouTube	0.07 (-0.62 - 0.77)	0.36	0.01	.838
T2 Life satisfaction -> T3 YouTube	-0.21 (-1.20 - 0.77)	0.50	-0.03	.671
T3 Life satisfaction -> T4 YouTube	0.63 (-1.07 - 2.33)	0.87	0.08	.467
T4 Life satisfaction -> T5 YouTube	0.97 (0.19 - 1.75)	0.40	0.16	.014
T5 Life satisfaction -> T6 YouTube	0.16 (-0.73 - 1.06)	0.46	0.03	.722
Autoregressive Pathways (male)	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 Life satisfaction -> T2 Life satisfaction	0.26 (0.06 - 0.45)	0.10	0.26	.010
T2 Life satisfaction -> T3 Life satisfaction	0.20 (-0.02 - 0.42)	0.11	0.21	.072
T3 Life satisfaction -> T4 Life satisfaction	0.36 (0.09 - 0.62)	0.14	0.35	.008
T4 Life satisfaction -> T5 Life satisfaction	0.32 (0.10 - 0.54)	0.11	0.34	.005
T5 Life satisfaction -> T6 Life satisfaction	0.34 (0.11 - 0.58)	0.12	0.29	.004
T1 YouTube -> T2 YouTube	0.11 (-0.15 - 0.38)	0.13	0.14	.404
T2 YouTube -> T3 YouTube	0.20 (-0.15 - 0.55)	0.18	0.16	.261
T3 YouTube -> T4 YouTube	0.14 (-0.15 - 0.42)	0.15	0.11	.339
T4 YouTube -> T5 YouTube	0.24 (0.07 - 0.42)	0.09	0.32	.006
T5 YouTube -> T6 YouTube	0.40 (0.20 - 0.59)	0.10	0.41	<.001
Covariances (male)	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
Life satisfaction int <-> YouTube int	-0.78 (-1.24 - -0.31)	0.24	-0.45	.001
T1 Life satisfaction <-> T1 YouTube	0.20 (-0.34 - 0.74)	0.28	0.05	.464
T2 Life satisfaction <-> T2 YouTube	0.21 (-0.37 - 0.79)	0.30	0.07	.473
T3 Life satisfaction <-> T3 YouTube	-0.47 (-1.38 - 0.45)	0.47	-0.13	.317
T4 Life satisfaction <-> T4 YouTube	0.09 (-0.51 - 0.70)	0.31	0.02	.766
T5 Life satisfaction <-> T5 YouTube	-0.31 (-0.87 - 0.25)	0.29	-0.11	.280
T6 Life satisfaction <-> T6 YouTube	-0.12 (-0.54 - 0.30)	0.21	-0.04	.563
Cross-lagged pathways (female)	***β* (LCI – UCI)**	***SE***	**Std. *β***	***p***
T1 YouTube -> T2 Life satisfaction	0.03 (-0.01 - 0.06)	0.02	0.11	.205
T2 YouTube -> T3 Life satisfaction	0.02 (-0.03 - 0.08)	0.03	0.10	.426
T3 YouTube -> T4 Life satisfaction	-0.02 (-0.08 - 0.03)	0.03	-0.09	.402
T4 YouTube -> T5 Life satisfaction	0.00 (-0.04 - 0.04)	0.02	-0.01	.933
T5 YouTube -> T6 Life satisfaction	0.00 (-0.04 - 0.04)	0.02	0.00	.971
T1 Life satisfaction -> T2 YouTube	0.08 (-0.80 - 0.96)	0.45	0.02	.864
T2 Life satisfaction -> T3 YouTube	-0.40 (-1.34 - 0.55)	0.48	-0.10	.408
T3 Life satisfaction -> T4 YouTube	-0.41 (-1.19 - 0.37)	0.40	-0.10	.306
T4 Life satisfaction -> T5 YouTube	0.19 (-0.49 - 0.87)	0.35	0.04	.589

T5 Life satisfaction -> T6 YouTube	0.03 (-0.48 - 0.53)	0.26	0.01	.921
Autoregressive Pathways (female)	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Life satisfaction -> T2 Life satisfaction	0.35 (0.08 - 0.63)	0.14	0.33	.011
T2 Life satisfaction -> T3 Life satisfaction	0.36 (0.11 - 0.62)	0.13	0.35	.005
T3 Life satisfaction -> T4 Life satisfaction	0.38 (0.17 - 0.59)	0.11	0.38	<.001
T4 Life satisfaction -> T5 Life satisfaction	0.54 (0.38 - 0.71)	0.08	0.48	<.001
T5 Life satisfaction -> T6 Life satisfaction	0.46 (0.31 - 0.60)	0.07	0.49	<.001
T1 YouTube -> T2 YouTube	0.45 (-0.02 - 0.93)	0.24	0.43	.062
T2 YouTube -> T3 YouTube	0.27 (0.00 - 0.55)	0.14	0.31	.050
T3 YouTube -> T4 YouTube	0.05 (-0.24 - 0.33)	0.15	0.04	.743
T4 YouTube -> T5 YouTube	0.42 (0.16 - 0.69)	0.14	0.36	.002
T5 YouTube -> T6 YouTube	0.65 (0.40 - 0.91)	0.13	0.63	<.001
Covariances (female)	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Life satisfaction int <-> YouTube int	-0.79 (-1.28 - -0.31)	0.25	-0.69	.001
T1 Life satisfaction <-> T1 YouTube	0.05 (-0.64 - 0.74)	0.35	0.01	.892
T2 Life satisfaction <-> T2 YouTube	0.18 (-0.40 - 0.77)	0.30	0.06	.541
T3 Life satisfaction <-> T3 YouTube	-0.11 (-0.68 - 0.47)	0.29	-0.04	.717
T4 Life satisfaction <-> T4 YouTube	0.10 (-0.41 - 0.61)	0.26	0.03	.693
T5 Life satisfaction <-> T5 YouTube	0.23 (-0.32 - 0.77)	0.28	0.06	.414
T6 Life satisfaction <-> T6 YouTube	-0.44 (-0.98 - 0.10)	0.28	-0.14	.110

Appendix U. RI-CLPM Parameters for YouTube Use and ED Symptoms Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 YouTube -> T2 ED symptoms	0.07 (-0.05 - 0.19)	0.06	0.08	.257
T2 YouTube -> T3 ED symptoms	0.10 (-0.06 - 0.26)	0.08	0.10	.238
T3 YouTube -> T4 ED symptoms	-0.07 (-0.24 - 0.10)	0.09	-0.05	.433
T4 YouTube -> T5 ED symptoms	-0.10 (-0.25 - 0.05)	0.08	-0.07	.186
T5 YouTube -> T6 ED symptoms	0.08 (-0.06 - 0.21)	0.07	0.05	.262
T1 ED symptoms -> T2 YouTube	0.04 (-0.07 - 0.16)	0.06	0.05	.467
T2 ED symptoms -> T3 YouTube	0.00 (-0.14 - 0.14)	0.07	0.00	.992
T3 ED symptoms -> T4 YouTube	-0.03 (-0.19 - 0.12)	0.08	-0.02	.665
T4 ED symptoms -> T5 YouTube	0.02 (-0.05 - 0.09)	0.04	0.03	.615
T5 ED symptoms -> T6 YouTube	-0.03 (-0.06 - 0.00)	0.02	-0.05	.066
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 ED symptoms -> T2 ED symptoms	0.26 (-0.13 - 0.64)	0.20	0.27	.189
T2 ED symptoms -> T3 ED symptoms	-0.15 (-0.37 - 0.07)	0.11	-0.16	.175
T3 ED symptoms -> T4 ED symptoms	0.24 (-0.06 - 0.53)	0.15	0.13	.111
T4 ED symptoms -> T5 ED symptoms	0.50 (0.24 - 0.75)	0.13	0.43	<.001
T5 ED symptoms -> T6 ED symptoms	0.56 (0.39 - 0.73)	0.09	0.61	<.001
T1 YouTube -> T2 YouTube	0.20 (-0.05 - 0.45)	0.13	0.22	.112
T2 YouTube -> T3 YouTube	0.22 (-0.04 - 0.49)	0.14	0.20	.102
T3 YouTube -> T4 YouTube	0.13 (-0.10 - 0.36)	0.12	0.11	.255
T4 YouTube -> T5 YouTube	0.32 (0.17 - 0.47)	0.08	0.36	<.001
T5 YouTube -> T6 YouTube	0.48 (0.33 - 0.63)	0.08	0.50	<.001

Covariances	β (LCI – UCI)	SE	Std. β	p
ED symptoms int <-> YouTube int	1.15 (-0.11 - 2.40)	0.64	0.14	.074
T1 ED symptoms <-> T1 YouTube	-0.03 (-1.80 - 1.75)	0.90	0.00	.976
T2 ED symptoms <-> T2 YouTube	-0.61 (-2.19 - 0.97)	0.80	-0.04	.449
T3 ED symptoms <-> T3 YouTube	1.92 (-0.86 - 4.70)	1.42	0.12	.175
T4 ED symptoms <-> T4 YouTube	-0.36 (-3.38 - 2.66)	1.54	-0.01	.815
T5 ED symptoms <-> T5 YouTube	-1.60 (-3.92 - 0.72)	1.18	-0.05	.176
T6 ED symptoms <-> T6 YouTube	0.77 (-1.96 - 3.50)	1.39	0.04	.581

Appendix V. RI-CLPM Parameters for Video Games Use and Anxiety Without Constraining for Time

Cross-lagged pathways	β (LCI – UCI)	SE	Std. β	p
T1 Video games -> T2 Anxiety	0.04 (-0.18 - 0.26)	0.11	0.02	.728
T2 Video games -> T3 Anxiety	-0.06 (-0.22 - 0.10)	0.08	-0.04	.481
T3 Video games -> T4 Anxiety	-0.17 (-0.33 - -0.02)	0.08	-0.13	.029
T4 Video games -> T5 Anxiety	-0.05 (-0.16 - 0.06)	0.06	-0.04	.349
T5 Video games -> T6 Anxiety	0.07 (-0.09 - 0.24)	0.09	0.06	.387
T1 Anxiety -> T2 Video games	-0.04 (-0.15 - 0.08)	0.06	-0.05	.528
T2 Anxiety -> T3 Video games	0.11 (-0.01 - 0.24)	0.06	0.13	.078
T3 Anxiety -> T4 Video games	0.02 (-0.09 - 0.12)	0.05	0.02	.772
T4 Anxiety -> T5 Video games	0.05 (-0.04 - 0.15)	0.05	0.07	.268
T5 Anxiety -> T6 Video games	-0.01 (-0.07 - 0.05)	0.03	-0.02	.641
Autoregressive Pathways	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
T1 Anxiety -> T2 Anxiety	0.29 (0.13 - 0.44)	0.08	0.30	<.001
T2 Anxiety -> T3 Anxiety	0.25 (0.05 - 0.46)	0.11	0.25	.016
T3 Anxiety -> T4 Anxiety	0.53 (0.38 - 0.68)	0.07	0.46	<.001
T4 Anxiety -> T5 Anxiety	0.61 (0.48 - 0.74)	0.07	0.58	<.001
T5 Anxiety -> T6 Anxiety	0.64 (0.55 - 0.73)	0.05	0.65	<.001
T1 Video games -> T2 Video games	-0.28 (-0.61 - 0.05)	0.17	-0.23	.094
T2 Video games -> T3 Video games	0.22 (-0.09 - 0.52)	0.16	0.18	.169
T3 Video games -> T4 Video games	0.34 (0.14 - 0.55)	0.10	0.31	.001
T4 Video games -> T5 Video games	0.44 (0.28 - 0.61)	0.08	0.46	<.001
T5 Video games -> T6 Video games	0.48 (0.34 - 0.63)	0.07	0.55	<.001
Covariances	**β (LCI – UCI)**	**SE**	**Std. β**	**p**
Anxiety int <-> Video games int	-5.27 (-8.54 - -1.99)	1.67	-0.22	.002
T1 Anxiety <-> T1 Video games	0.97 (-2.54 - 4.49)	1.79	0.04	.587
T2 Anxiety <-> T2 Video games	-0.36 (-4.27 - 3.56)	2.00	-0.01	.858
T3 Anxiety <-> T3 Video games	-0.58 (-4.32 - 3.15)	1.91	-0.02	.760
T4 Anxiety <-> T4 Video games	-1.45 (-4.58 - 1.69)	1.60	-0.04	.366
T5 Anxiety <-> T5 Video games	2.73 (-0.49 - 5.95)	1.64	0.09	.096
T6 Anxiety <-> T6 Video games	0.58 (-1.98 - 3.13)	1.31	0.03	.659

Appendix W. RI-CLPM Parameters for Video Games Use and Depression Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Video games -> T2 Depression	-0.08 (-0.22 - 0.06)	0.07	-0.08	.292
T2 Video games -> T3 Depression	0.00 (-0.13 - 0.12)	0.06	0.00	.954
T3 Video games -> T4 Depression	-0.05 (-0.15 - 0.05)	0.05	-0.04	.366
T4 Video games -> T5 Depression	0.02 (-0.09 - 0.13)	0.06	0.02	.754
T5 Video games -> T6 Depression	0.13 (0.01 - 0.25)	0.06	0.13	.041
T1 Depression -> T2 Video games	-0.17 (-0.36 - 0.02)	0.10	-0.14	.080
T2 Depression -> T3 Video games	0.04 (-0.16 - 0.25)	0.10	0.03	.666
T3 Depression -> T4 Video games	0.09 (-0.09 - 0.27)	0.09	0.07	.320
T4 Depression -> T5 Video games	0.09 (-0.06 - 0.24)	0.08	0.09	.234
T5 Depression -> T6 Video games	0.05 (-0.03 - 0.13)	0.04	0.06	.202
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Depression -> T2 Depression	0.24 (0.06 - 0.43)	0.09	0.25	.011
T2 Depression -> T3 Depression	0.27 (0.06 - 0.48)	0.11	0.23	.013
T3 Depression -> T4 Depression	0.55 (0.37 - 0.73)	0.09	0.41	<.001
T4 Depression -> T5 Depression	0.60 (0.48 - 0.73)	0.06	0.56	<.001
T5 Depression -> T6 Depression	0.50 (0.41 - 0.60)	0.05	0.55	<.001
T1 Video games -> T2 Video games	-0.29 (-0.62 - 0.05)	0.17	-0.24	.093
T2 Video games -> T3 Video games	0.20 (-0.11 - 0.51)	0.16	0.17	.205
T3 Video games -> T4 Video games	0.32 (0.12 - 0.52)	0.10	0.29	.002
T4 Video games -> T5 Video games	0.43 (0.26 - 0.60)	0.08	0.44	<.001
T5 Video games -> T6 Video games	0.47 (0.32 - 0.61)	0.07	0.53	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Depression int <-> Video games int	0.83 (-1.24 - 2.90)	1.06	0.07	.433
T1 Depression <-> T1 Video games	-0.65 (-2.81 - 1.50)	1.10	-0.05	.552
T2 Depression <-> T2 Video games	-1.72 (-4.01 - 0.56)	1.17	-0.12	.139
T3 Depression <-> T3 Video games	0.50 (-2.39 - 3.39)	1.48	0.02	.736
T4 Depression <-> T4 Video games	-1.88 (-4.59 - 0.84)	1.38	-0.07	.175
T5 Depression <-> T5 Video games	3.03 (0.45 - 5.61)	1.31	0.12	.021
T6 Depression <-> T6 Video games	-0.42 (-2.53 - 1.68)	1.07	-0.02	.695

Appendix X. RI-CLPM Parameters for Video Games Use and Body Dissatisfaction Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Video games -> T2 Body dissatisfaction	0.01 (-0.01 - 0.04)	0.01	0.10	.185
T2 Video games -> T3 Body dissatisfaction	-0.01 (-0.02 - 0.01)	0.01	-0.05	.441
T3 Video games -> T4 Body dissatisfaction	-0.02 (-0.03 - -0.01)	0.01	-0.14	<.001
T4 Video games -> T5 Body dissatisfaction	-0.01 (-0.03 - 0.01)	0.01	-0.08	.204
T5 Video games -> T6 Body dissatisfaction	0.02 (0.00 - 0.03)	0.01	0.12	.009
T1 Body dissatisfaction -> T2 Video games	-0.57 (-1.90 - 0.76)	0.68	-0.08	.400
T2 Body dissatisfaction -> T3 Video games	0.36 (-1.07 - 1.79)	0.73	0.04	.623
T3 Body dissatisfaction -> T4 Video games	-0.50 (-1.68 - 0.69)	0.61	-0.05	.413

T4 Body dissatisfaction -> T5 Video games	0.57 (-0.45 - 1.58)	0.52	0.08	.275
T5 Body dissatisfaction -> T6 Video games	-0.43 (-1.09 - 0.23)	0.34	-0.07	.202
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Body dissatisfaction -> T2 Body dissatisfaction	0.32 (0.14 - 0.50)	0.09	0.34	.001
T2 Body dissatisfaction -> T3 Body dissatisfaction	0.26 (0.03 - 0.49)	0.12	0.24	.026
T3 Body dissatisfaction -> T4 Body dissatisfaction	0.65 (0.51 - 0.80)	0.07	0.51	<.001
T4 Body dissatisfaction -> T5 Body dissatisfaction	0.66 (0.56 - 0.76)	0.05	0.64	<.001
T5 Body dissatisfaction -> T6 Body dissatisfaction	0.70 (0.62 - 0.77)	0.04	0.72	<.001
T1 Video games -> T2 Video games	-0.26 (-0.59 - 0.07)	0.17	-0.21	.120
T2 Video games -> T3 Video games	0.22 (-0.08 - 0.52)	0.15	0.18	.155
T3 Video games -> T4 Video games	0.33 (0.13 - 0.53)	0.10	0.31	.001
T4 Video games -> T5 Video games	0.44 (0.28 - 0.61)	0.08	0.46	<.001
T5 Video games -> T6 Video games	0.48 (0.33 - 0.63)	0.08	0.55	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Body dissatisfaction int <-> Video games int	-0.22 (-0.57 - 0.13)	0.18	-0.09	.216
T1 Body dissatisfaction <-> T1 Video games	0.05 (-0.24 - 0.35)	0.15	0.03	.716
T2 Body dissatisfaction <-> T2 Video games	0.09 (-0.30 - 0.47)	0.20	0.04	.652
T3 Body dissatisfaction <-> T3 Video games	-0.29 (-0.58 - 0.01)	0.15	-0.10	.058
T4 Body dissatisfaction <-> T4 Video games	-0.29 (-0.70 - 0.12)	0.21	-0.08	.170
T5 Body dissatisfaction <-> T5 Video games	0.22 (-0.08 - 0.51)	0.15	0.07	.149
T6 Body dissatisfaction <-> T6 Video games	0.00 (-0.23 - 0.24)	0.12	0.00	.972

Appendix Y. RI-CLPM Parameters for Video Games Use and Life Satisfaction Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Video games -> T2 Life satisfaction	0.03 (-0.01 - 0.06)	0.02	0.12	.121
T2 Video games -> T3 Life satisfaction	-0.01 (-0.03 - 0.02)	0.01	-0.03	.709
T3 Video games -> T4 Life satisfaction	0.01 (-0.01 - 0.03)	0.01	0.05	.308
T4 Video games -> T5 Life satisfaction	0.00 (-0.01 - 0.01)	0.01	0.00	.965
T5 Video games -> T6 Life satisfaction	-0.02 (-0.04 - 0.00)	0.01	-0.11	.096
T1 Life satisfaction -> T2 Video games	0.56 (-0.25 - 1.38)	0.42	0.10	.176
T2 Life satisfaction -> T3 Video games	-0.24 (-1.11 - 0.63)	0.45	-0.04	.591
T3 Life satisfaction -> T4 Video games	-0.35 (-1.34 - 0.64)	0.50	-0.05	.484
T4 Life satisfaction -> T5 Video games	-0.69 (-1.57 - 0.19)	0.45	-0.11	.124
T5 Life satisfaction -> T6 Video games	-0.34 (-0.77 - 0.10)	0.22	-0.07	.127
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Life satisfaction -> T2 Life satisfaction	0.34 (0.16 - 0.52)	0.09	0.32	<.001
T2 Life satisfaction -> T3 Life satisfaction	0.35 (0.19 - 0.51)	0.08	0.35	<.001
T3 Life satisfaction -> T4 Life satisfaction	0.43 (0.28 - 0.58)	0.08	0.42	<.001
T4 Life satisfaction -> T5 Life satisfaction	0.52 (0.39 - 0.65)	0.07	0.49	<.001
T5 Life satisfaction -> T6 Life satisfaction	0.46 (0.35 - 0.58)	0.06	0.46	<.001
T1 Video games -> T2 Video games	-0.28 (-0.62 - 0.06)	0.17	-0.23	.109
T2 Video games -> T3 Video games	0.21 (-0.10 - 0.51)	0.15	0.17	.182
T3 Video games -> T4 Video games	0.33 (0.13 - 0.54)	0.10	0.31	.001
T4 Video games -> T5 Video games	0.43 (0.27 - 0.59)	0.08	0.44	<.001

T5 Video games -> T6 Video games	0.47 (0.32 - 0.62)	0.08	0.54	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
Life satisfaction int <-> Video games int	-0.29 (-0.75 - 0.17)	0.24	-0.11	.221
T1 Life satisfaction <-> T1 Video games	0.08 (-0.33 - 0.48)	0.21	0.03	.718
T2 Life satisfaction <-> T2 Video games	-0.06 (-0.66 - 0.55)	0.31	-0.02	.853
T3 Life satisfaction <-> T3 Video games	0.20 (-0.47 - 0.87)	0.34	0.05	.554
T4 Life satisfaction <-> T4 Video games	-0.13 (-0.63 - 0.36)	0.25	-0.03	.598
T5 Life satisfaction <-> T5 Video games	-0.14 (-0.63 - 0.35)	0.25	-0.03	.579
T6 Life satisfaction <-> T6 Video games	-0.08 (-0.55 - 0.38)	0.24	-0.02	.723

Appendix Z. RI-CLPM Parameters for Video Games Use and ED Symptoms Without Constraining for Time

Cross-lagged pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 Video games -> T2 ED symptoms	0.04 (-0.06 - 0.14)	0.05	0.04	.439
T2 Video games -> T3 ED symptoms	0.18 (0.00 - 0.35)	0.09	0.21	.051
T3 Video games -> T4 ED symptoms	-0.04 (-0.17 - 0.09)	0.07	-0.03	.563
T4 Video games -> T5 ED symptoms	-0.02 (-0.14 - 0.11)	0.06	-0.01	.807
T5 Video games -> T6 ED symptoms	0.05 (-0.07 - 0.17)	0.06	0.04	.395
T1 ED symptoms -> T2 Video games	0.03 (-0.13 - 0.19)	0.08	0.03	.738
T2 ED symptoms -> T3 Video games	0.15 (-0.01 - 0.31)	0.08	0.11	.072
T3 ED symptoms -> T4 Video games	-0.01 (-0.18 - 0.15)	0.08	-0.01	.867
T4 ED symptoms -> T5 Video games	0.10 (-0.03 - 0.22)	0.06	0.12	.133
T5 ED symptoms -> T6 Video games	0.01 (-0.03 - 0.06)	0.02	0.02	.579
Autoregressive Pathways	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
T1 ED symptoms -> T2 ED symptoms	0.27 (-0.11 - 0.64)	0.19	0.28	.164
T2 ED symptoms -> T3 ED symptoms	-0.16 (-0.38 - 0.06)	0.11	-0.17	.164
T3 ED symptoms -> T4 ED symptoms	0.21 (-0.08 - 0.51)	0.15	0.12	.153
T4 ED symptoms -> T5 ED symptoms	0.50 (0.24 - 0.75)	0.13	0.43	<.001
T5 ED symptoms -> T6 ED symptoms	0.56 (0.38 - 0.73)	0.09	0.61	<.001
T1 Video games -> T2 Video games	-0.26 (-0.58 - 0.07)	0.16	-0.21	.120
T2 Video games -> T3 Video games	0.21 (-0.10 - 0.51)	0.16	0.17	.181
T3 Video games -> T4 Video games	0.34 (0.14 - 0.53)	0.10	0.31	.001
T4 Video games -> T5 Video games	0.43 (0.27 - 0.59)	0.08	0.45	<.001
T5 Video games -> T6 Video games	0.48 (0.33 - 0.62)	0.08	0.55	<.001
Covariances	**β (LCI – UCI)**	***SE***	**Std. β**	***p***
ED symptoms int <-> Video games int	-1.03 (-2.75 - 0.70)	0.88	-0.08	.243
T1 ED symptoms <-> T1 Video games	-0.61 (-2.38 - 1.16)	0.90	-0.04	.500
T2 ED symptoms <-> T2 Video games	0.25 (-1.75 - 2.24)	1.02	0.02	.810
T3 ED symptoms <-> T3 Video games	0.82 (-1.79 - 3.43)	1.33	0.04	.536
T4 ED symptoms <-> T4 Video games	-0.58 (-3.20 - 2.04)	1.34	-0.02	.664
T5 ED symptoms <-> T5 Video games	1.37 (-3.29 - 6.02)	2.37	0.04	.565
T6 ED symptoms <-> T6 Video games	-0.62 (-2.68 - 1.43)	1.05	-0.03	.552

Chapter 3.D. An Evaluation of Digital Technology Use and Mental Health via LSAC

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3.1 Background

In recent decades, digital technology has become an integral part of daily life, offering means for communication, information gathering, and entertainment. Here, we broadly define digital technology to include social media, TV, computers, and electronic gaming (hereafter referred to as gaming), and avenues to access, upload, distribute and share content. Thus, digital technology encompasses a range of tools, systems, devices and resources within digital environments and online platforms used for work, social life, and relaxation. Whereas older generations may have experienced a time where these tools were not commonplace and part of their everyday lives, children and young people aged 5 to 25 years (which coincides with the LSAC age range) are often described as 'digital natives', for whom life without digital technology was not something they have experienced.

As identified in our review of empirical literature (see Chapter 5 of the main report, and Chapter 2 of the technical report), considerable research attention has been given to characterising patterns of digital technology use, including focus on how digital technology use may influence child, adolescent, and young adult mental health and wellbeing.

The present study seeks to add to this literature by analysing and presenting data from the Longitudinal Study of Australian Children (LSAC; Department of Social Services, 2025), a large and nationally representative sample of Australian children followed over 10 waves of data collection spanning 20 years. LSAC's coverage of childhood, adolescence, and early adulthood enables comprehensive evaluation of how digital technology use across these key developmental stages influence mental health trajectories. Furthermore, given that LSAC's aims are broader than digital technology use, it is less susceptible to voluntary response bias from individuals who are more interested in digital technology impacts on mental health.

In the present technical chapter, this pre-existing data source is interrogated to evaluate:

- Motivations, types of use, and time use of digital technologies (computers, gaming, social media, and TV) across the sample and broken down by age and cohort;
- Ability of digital technology use to predict changes in mental health over time;
- Ability of mental health to predict digital technology use changes over time; and
- Ability of broader social, emotional, and behavioural difficulties associated with mental health to predict digital technology use changes over time.

We note that time use is commonly captured in LSAC across waves, cohorts, and digital technologies listed above. LSAC also provides some data on motivations and types of use specific to social media, which we include for broader context for amount of digital technology use. Furthermore, while LSAC captures data on mental health, it also provides a range of measures related to social, emotional, and behavioural difficulties that are common among individuals with mental health difficulties, and may thus provide a deeper understanding of the drivers of digital technology use than mental health indicators alone.

3.2 Methods

3.2.1 Dataset

The LSAC dataset is available as non-identifiable, downloadable data from the Australian Government Department of Social Services, Australian Data Archive (ADA). Access to this dataset required approval from the ADA based on the proposed use of the data and researchers involved. Ethics exemption was approved by Deakin University Human Ethics Committee (DUHREC) for use of these data for the present report.

Development for the LSAC commenced in March 2002 with a testing phase involving over 500 families that continued through 2003. Recruitment for LSAC's main study took place between March and November 2004, which involved a sample of 10,000 children selected from the Medicare enrolment database held by the Health Insurance Commission. Two cohorts were selected from children born within two 12-month periods:

- B cohort (infant cohort) were children born between March 2003–February 2004; and
- K cohort (child cohort) were children born between March 1999–February 2000.

The Health Insurance Commission selected children of the appropriate ages and sent a study invitation letter to the Medicare cardholder, along with a brochure on '*Growing Up in Australia*: The Longitudinal Study of Australian Children' that identified the research-related purposes of this data collection. Families had four weeks to register their withdrawal from the study. Interviewers subsequently contacted families who had not withdrawn to arrange an appointment for their first interview.

From 2004, participating families have been interviewed every two years, for a total of 10 waves (spread across 13 distinct data collection points; see Table 3.1) of data collection to date.

Table 3.1. *Sample sizes by wave and cohort.*

Cohort	Wave 1 2004	Wave 2 2006	Wave 2.5 2007	Wave 3 2008	Wave 3.5 2009	Wave 4 2010	Wave 5 2012
B	5,107	4,606	3,246	4,386	3,012	4,242	4,085
K	4,983	4,464	3,252	4,331	2,977	4,169	3,956
	Wave 6 2014	**Wave 7 2016**	**Wave 8 2018**	**Wave 9C1 2020**	**Wave 9C2 2021**	**Wave 10 2023**	
B	3,764	3,381	3,127	2,017	2,688	2,494	
K	3,537	3,089	3,037	1,789	2,463	2,332	

Notes: B = infant cohort, K = child cohort.

3.2.2 Measures

The present chapter focuses on data from all waves (1-10) as there are measures of digital technology use and/or mental health across these waves (see Tables 3.2-3.4 for digital technology, mental health

measures, and covariates, respectively, used across all waves). These 10 waves of data cover a large developmental window for participants (0-19 years for the B-cohort and 4-23 years for the K-cohort), where they transition from dependence on parents for completion of surveys to independence in reporting for themselves. The nature of different experiences across childhood, adolescence, and early adulthood means that the ways in which some key constructs are measured have changed over time (especially in terms of types of activities engaged in).

Where possible, we sought to retain versions of variables that allowed direct comparison over time, including similar response categories (whether originally coded or through recoding) for time spent using digital technology, and consistent measures of mental health, noting that a range of different measures are available across the 10 waves of data. For mental health, we chose the strengths and difficulties questionnaire because it was measured across most waves, and provides a detailed breakdown across five dimensions of psychological functioning. We note, however, that these are difficulties commonly associated with mental health but may not be considered direct measures of mental health. Thus, other mental health-related measures (psychological distress and quality of life) were also included, but measured at fewer waves.

It is also worth noting that the period 2004-2024 is characterised by a considerable shift in the sorts of digital technologies that are common for children and adolescents to use. We see this in early waves asking about computer and gaming use, but more recent waves (from Wave 8 onwards) also or instead ask about social media use. Because of this complexity in differences in measures across waves, we provide detailing of key measures of digital technology use across waves for the interested reader (see Tables 3.5-3.8). This information is also critical context for understanding differences over time in descriptive statistics pertaining to digital technology use. For further details of the full set of waves and measures available in LSAC, refer to Department of Social Services (2025).

LSAC includes a range of variables beyond our focus on mental health and digital technology. Here we use a curated list of covariates based on their relevance for mental health and digital technology. We included measures of child sex, whether they were born in Australia or elsewhere (coded as a binary variable), whether the child speaks a language other than English at home, whether they are of First Nations background, family socioeconomic status, and whether their parents completed high school (coded separately for both parents, where information was available).

We also included measures of physical activity of child, as both a potential influence on their mental health and as related to capacity to spend time engaged with digital technologies. For similar reasons, we also included covariates about other activities children and young people engage in (including homework and outdoors activities) which may be connected to time spent and time available for digital technology use. Parent physical activity estimates were also controlled for, premised on the notion that whether parents are active may influence (e.g., through role modelling and/or through opportunity for shared activities) child activity vs engagement in more sedentary behaviours that typically characterise digital technology use. Table 3.4 provides a complete list of these variables, and the waves and cohorts for which they were administered.

Table 3.2. *Digital technology use variables.*

	Year	***2004***	***2006***	***2007***	***2008***	***2009***	***2010***	***2012***	***2014***	***2016***	***2018***	***2020***	***2021***	***2023***
	Wave	***1***	***2***	***2.5***	***3***	***3.5***	***4***	***5***	***6***	***7***	***8***	***9C1***	***9C2***	***10***
Computers	Amount of use	K	K	B/K	B/K	B/K	B/K	K	K	B/K	B/K			
Electronic games	Amount of use		K	B	B/K	B/K	B/K	B/K	B/K	B/K	B/K			B/K
Social media	Amount of use									K	B/K	B/K	B/K	B/K
	Activities of social media											B/K	B/K	B/K
	Info seeking										B/K			
	Negative experiences													B/K
	Protective behaviours										K			
TV / DVD	Amount of use	K	B/K	B	B/K	B/K	B/K	B/K	B	B/K	B			

Notes. B = infant cohort, K = child cohort. All measures are completed with reference to the study child.

Table 3.3. *Mental health and wellbeing variables.*

	Year	***2004***	***2006***	***2007***	***2008***	***2009***	***2010***	***2012***	***2014***	***2016***	***2018***	***2020***	***2021***	***2023***
	Wave	***1***	***2***	***2.5***	***3***	***3.5***	***4***	***5***	***6***	***7***	***8***	***9C1***	***9C2***	***10***
Mental health	Psychological distress (K6, K10)													
	Parent	B/K	B/K		B/K		B/K	B/K	B/K	B/K	B/K			
	Child										K	B/K	B/K	B
	Strengths and difficulties (SDQ)	K	K		B/K		B/K	B/K	B/K	B/K	B			
	Quality of life								B/K	B/K	B/K			

Notes. K6/K10 refers to the Kessler Distress Scale 6- and 10-item versions respectively. SDQ refers to the strengths and difficulties questionnaire. B = infant cohort, K = child cohort. SDQ Is separated into subscales for: (1) emotional symptoms, (2) conduct problems, (3) hyperactivity/inattention, (4) peer problems, and (5) prosocial behaviour. The first four are measures of difficulties, whereas the fifth subscale is a measure of a strength. All measures are completed with reference to the study child, unless otherwise indicated (e.g., parent mental health, using mother and father data separately).

Table 3.4. *Covariates.*

	Year	2004	2006	2007	2008	2009	2010	2012	2014	2016	2018	2020	2021	2023
	Wave	1	2	2.5	3	3.5	4	5	6	7	8	9CI	9C2	10
Activities at home	Home activities index	K	B/K		B/K		B/K	B/K						
	Homework		K		K		B/K	B/K	B/K	B/K	B/K			
Activities outside the home	Out of home activities index	K	B/K		B/K		B/K	B/K	B/K	B	B			
Help seeking	Help seeking behaviour								K	K	B/K			B/K
	Would seek help if needed								K	K	K			
Physical activity	Moderate/intense activity (>30 mins)													
	Parent	B/K	B/K		B/K		B/K	B/K	B					
	Child									B/K	B/K		B/K	B/K
	Moderate/intense activity (>60 mins)													
	Parent									B/K	B/K			
	Child									B/K	B/K		B/K	B/K
Unstructured and structured activities	Organised activities								K	K	B/K		B/K	B/K
Demographics	Child sex at birth	B/K												
	Socioeconomic position of family	B/K												

	Highest education attained	B/K												
		B/K												
	Country of birth	B/K												
	Speak language other than English	B/K												
	Aboriginal or Torres Strait Islander	B/K												

Notes. B = infant cohort, K = child cohort. All measures are completed with reference to the study child, unless otherwise indicated (e.g., parent physical activity, using mother and father data separately).

Table 3.5 summarises computer use measures in LSAC used in the present chapter. While all of these measures ask about time use, this is achieved in several different ways. In some instances (i.e., Waves 2.5 [B cohort only], 3, 3.5, and 4), a free response option for minutes of computer use was used, whether asking about a typical week (single item) or separating the question into weekdays and weekend days (two separate items). Other waves asked about use on a 1-5 response scale for daily use in hours (e.g., Wave 1) or frequency ranging from *never use* to *(almost) daily use* (e.g., Waves 6 and 7). A number of waves – especially later waves (from Wave 5 onwards) - asked about frequency of use for a range of computer-based tasks.

Given the focus on frequency of digital technology use in some planned analyses for Aims 2 and 3 (ability of digital technology use to predict mental health change over time; ability of mental health to predict changes in digital technology use over time), we attempted to derive a comparable score in terms of hours of use where possible. This was achieved by converting free response of minutes of computer use into the 1-5 response bands in the waves that asked about hours of use with constrained categories. This means that frequency of use from never to (almost) daily was not used for cross-wave frequency comparisons. This frequency format (never to almost daily) was used, however, in correlational analyses (Aims 2 and 3), where the emphasis was on the strength of association with mental health variables, rather than point estimates of computer use frequency.

Tables 3.6-3.8 provide similar summaries for measures of gaming, TV use, and social media, respectively. Each of these measures varied in format, as was seen for computer use. The same decisions as for computer use were applied for these measures for enabling estimates of use (in terms of hours) versus retaining other response formats when the research aim instead focused on associations with mental health constructs.

We note further that a range of social media constructs were available in Waves 8-10 and were used to broaden understanding of context of social media time use. In Wave 8, a set of items asked about harmful information seen or shared on social media. We provide descriptive breakdown of frequency for seeing and sharing content related to ways to be very thin, ways to access illicit substances, and ways to self-harm or attempt suicide (see Table 3.15 in Results section). Additionally, we derived a total score to reflect level of harmful information seeking on social media, which was used for correlational analyses for Aims 2 and 3.

For the K cohort, Wave 8 also included items about engagement in protective behaviours on social media. Again, we provide descriptive statistics for each item (see Table 3.17) and include a total score for computing correlation analyses for Aims 2 and 3. Waves 9C1, 9C2, and 10 asked about activities on social media, in addition to frequency of use. In Waves 9C1 and 9C2, these items enquire about problematic behaviours, such as spending a lot of time thinking about social media or planning to use it, feeling the need to continually use more social media, and using social media to forget their personal problems. In Wave 10, assessment of these problematic behaviours is augmented with a number of (potentially) positive online behaviours, such as using social media to share interests and hobbies, and using social media to connect to peers who have similar experiences. We provide descriptive statistics at an item level for these social media activity items, as well as using a total score for correlational analyses. In the case of Wave 10, which has a balance of positive and negative items, we calculated separate total scores for the positive and negative items in case these have different relationships to mental health. Finally, unlike the other waves, Wave 10 also asked a series of questions about negative experiences on social

media. Items were descriptively reported separately, and a total score was used for correlational analyses.

Table 3.5. *Computer use measures across cohorts and waves of data collection.*

Timepoint	B cohort	K cohort
Wave 1		1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not use the computer, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged.
Wave 2		1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not use the computer, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged.
Wave 2.5	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	1-5 response scale for frequency of computer use for DVDs/CDs (1 item), school (1 item), and games (1 items). 1 = never, 2 = less than once per week, 3 = 1-2 times per week, 4 = 3-4 times per week, 5 = daily. DVDs/CDs and games items added and averaged for typical use frequency estimate. School item not used.
Wave 3	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	Total minutes per week. Divided by 7 and converted into hours for daily estimate.
Wave 3.5	Total weekday minutes (1 item) and total weekend minutes (1 item). Added, divided by 7, and converted into hours for daily estimate.	Total weekday minutes (1 item) and total weekend minutes (1 item). Added, divided by 7, and converted into hours for daily estimate.
Wave 4	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	Total minutes per week. Divided by 7 and converted into hours for daily estimate.
Wave 5		15 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking).

		1 -5 response scale, 1 = almost every day, 2 = once or twice per week, 3 = a few times per month, 4 = once per month or less, 5 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.
Wave 6		9 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking). 1 -5 response scale, 1 = almost every day, 2 = once or twice per week, 3 = a few times per month, 4 = once per month or less, 5 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.
Wave 7	9 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking). 1 -5 response scale, 1 = almost every day, 2 = once or twice per week, 3 = a few times per month, 4 = once per month or less, 5 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.	9 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking). 1 -5 response scale, 1 = almost every day, 2 = once or twice per week, 3 = a few times per month, 4 = once per month or less, 5 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.
Wave 8	7 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking). 1 -6 response scale, 1 = everyday, 2 = almost every day, 3 = once or twice per week, 4 = a few times per month, 5 = once per month or less, 6 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.	4 items asking about frequency of computer use for different tasks (e.g., internet, gaming, social networking). 1 -6 response scale, 1 = everyday, 2 = almost every day, 3 = once or twice per week, 4 = a few times per month, 5 = once per month or less, 6 = never. Items reverse coded so higher scores indicate greater use, and averaged for typical use frequency estimate.

Table 3.6. *Gaming use measures across cohorts and waves of data collection.*

Timepoint	B cohort	K cohort
Wave 2		1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.
Wave 2.5	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	
Wave 3	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	Total minutes per week. Divided by 7 and converted into hours for daily estimate.
Wave 3.5	Total weekday minutes (1 item) and total weekend minutes (1 item). Added, divided by 7, and converted into hours for daily estimate.	Total weekday minutes (1 item) and total weekend minutes (1 item). Added, divided by 7, and converted into hours for daily estimate.
Wave 4	Total minutes per week. Divided by 7 and converted into hours for daily estimate.	Total minutes per week. Divided by 7 and converted into hours for daily estimate.
Wave 5	Total hours per week. Divided by 7 for daily estimate.	Total minutes per week. Divided by 7 and converted into hours for daily estimate.
Wave 6	Total hours per week. Divided by 7 for daily estimate.	0-3 response scale for days of game play during week. 0 = not in the past week, 1 = 1-2 days, 2 = 3-5 days, 3 = 6-7 days.
Wave 7	Total hours per week. Divided by 7 for daily estimate.	Total hours per week. Divided by 7 for daily estimate.
Wave 8	Total hours per week. Divided by 7 for daily estimate.	1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.

Wave 10	1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.	1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.

Table 3.7. *TV use measures across cohorts and waves of data collection.*

Timepoint	B cohort	K cohort
Wave 1		1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not watch TV, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.
Wave 2	1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.	1-5 response scale for hours per day for weekdays (1 item) and weekend days (1 item). 1 = does not play, 2 = less than one hour, 3 = 1 up to 3 hours, 4 = 3 up to 5 hours, 5 = 5 or more hours. Items added and averaged for typical use frequency estimate.
Wave 2.5	Total minutes per week for TV (1 item) and DVDs (1 item). Added, converted to hours, and divided by 7 for daily estimate.	
Wave 3	Total minutes per week. Converted to hours and divided by 7 for daily estimate.	Total minutes per week. Converted to hours and divided by 7 for daily estimate.
Wave 3.5	Total minutes per week for TV (1 item for weekdays and 1 for weekend days) and DVDs (1 item for weekdays and 1 for weekend days). Added, converted to hours and divided by 7 for daily estimate.	Total minutes per week for TV (1 item for weekdays and 1 for weekend days) and DVDs (1 item for weekdays and 1 for weekend days). Added, converted to hours and divided by 7 for daily estimate.
Wave 4	Total minutes per week.	Total minutes per week.

	Converted to hours and divided by 7 for daily estimate.	Converted to hours and divided by 7 for daily estimate.
Wave 5	Total minutes per week. Converted to hours and divided by 7 for daily estimate.	Total minutes per week. Converted to hours and divided by 7 for daily estimate.
Wave 6	Total minutes per week. Converted to hours and divided by 7 for daily estimate.	
Wave 7	Total minutes per week. Converted to hours and divided by 7 for daily estimate.	Total minutes per week. Converted to hours and divided by 7 for daily estimate.
Wave 8	Total minutes per week. Converted to hours and divided by 7 for daily estimate.	

Table 3.8. *Social media use measures across cohorts and waves of data collection.*

Timepoint	B cohort	K cohort
Wave 7		1-5 response scale for proportion of time spent using social media on weekdays (1 item) and weekend days (1 item). 1 = none, 2 = less than half, 3 = about half, 4 = more than half, 5 = all. Items added and averaged for typical use frequency estimate.
Wave 8	<u>Frequency of use</u> 1-8 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never. Scores were reverse coded for typical use frequency estimate. <u>Information seeking</u> 8 yes/no items asking about harmful content seen (4 items) or shared (4 items) online. Items were added.	<u>Frequency of use</u> 1-8 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never. Scores were reverse coded for typical use frequency estimate. <u>Information seeking</u> 10 yes/no items asking about harmful content seen (5 items) or shared (5 items) online. Items were added. <u>Protective behaviours</u>

		6 yes/no items asking about engagement in protective behaviours on social media. Items were added.
Wave 9C1	Frequency of use 1-9 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never, 9 = I don't have an account. Response options 8 and 9 were collapsed, and scores were then reverse coded for typical engagement frequency estimate. Activities on social media 6 items on 1-5 response scale asking about level of engagement in problematic behaviours on social media. 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for typical engagement frequency estimate.	Frequency of use 1-9 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never, 9 = I don't have an account. Response options 8 and 9 were collapsed, and scores were then reverse coded for typical engagement frequency estimate. Activities on social media 6 items on 1-5 response scale asking about level of engagement in problematic behaviours on social media. 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for typical engagement frequency estimate.
Wave 9C2	Frequency of use 1-9 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never, 9 = I don't have an account. Response options 8 and 9 were collapsed, and scores were then reverse coded for typical engagement frequency estimate. Activities on social media 6 items on 1-5 response scale asking about level of engagement in problematic behaviours on social media.	Frequency of use 1-9 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never, 9 = I don't have an account. Response options 8 and 9 were collapsed, and scores were then reverse coded for typical engagement frequency estimate. Activities on social media 6 items on 1-5 response scale asking about level of engagement in problematic behaviours on social media.

	1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for typical engagement frequency estimate.	1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for typical engagement frequency estimate.
Wave 10	<u>Frequency of use</u> 1-8 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never. Scores were reverse coded for typical engagement frequency estimate. <u>Activities on social media</u> 12 items on 1-5 response scale asking about level of engagement in problematic (6 items) and more positive (6 items) behaviours on social media. 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for positive and negative engagement separately, and a balance score was also created with positive experience score minus negative experience score. <u>Negative experiences online</u> 18 yes/no items asking about various negative experiences on social media. Items were summed for total negative experiences estimate.	<u>Frequency of use</u> 1-8 response scale asking about frequency of sharing/posting on social media. 1 = hourly or more often, 2 = several times per day, 3 = everyday, 4 = almost everyday, 5 = once or twice per week, 6 = a few times per month, 7 = once per month or less, 8 = never. Scores were reverse coded for typical engagement frequency estimate. <u>Activities on social media</u> 12 items on 1-5 response scale asking about level of engagement in problematic (6 items) and more positive (6 items) behaviours on social media. 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Items were averaged for positive and negative engagement separately, and a balance score was also created with positive experience score minus negative experience score. <u>Negative experiences online</u> 18 yes/no items asking about various negative experiences on social media. Items were summed for total negative experiences estimate.

3.2.3 Data Analysis Plan

All data pre-processing and analyses were conducted in R. Multiple imputation was used to handle missing data with chained equations. Fifty imputations were obtained separately for B and K cohorts, and results for descriptive and correlational analyses were pooled for each cohort separately, based on Rubin's (1988) rules.

Descriptives statistics were used to address Aim 1 regarding exploration of digital technology use patterns. Time use of digital technologies (computers, gaming, social media, and TV) were reported as percentages per response category, broken down according to cohort and wave. While some variability in percentages of the samples who engaged regularly in digital technology use was expected from wave

to wave (especially anticipating age-related increases in use from childhood to adolescence to young adulthood), observed variability was marked for the gaming variable. In this case, we also provide unimputed results as a sensitivity analysis to assess whether this fluctuation in percentages coincides with the amount of missing data which needed to be imputed.

As subsequent aims involve evaluation of association between digital technology use and mental health, we also provide descriptive statistics for mental health outcome variables by wave and cohort. We apply common thresholds to identify those who may be at risk of a mental health condition. For the K10, we apply cutoffs derived by the Victorian Population Health Survey (Department of Human Services Victoria, 2001), with scores below 20 suggesting the respondent is psychologically well, 20-24 suggesting mild level of psychological distress, 25-29 suggesting moderate distress, and scores of 30 and above suggesting severe level of psychological distress. For the K6, we applied cutoffs recommended by Prochaska et al. (2012), in which scores of 0-7 suggest low psychological distress, 8-12 moderate distress, and 13 and above suggest severe psychological distress.

We applied the four-band cutoffs recommended by the New South Wales Department of Communities and Justice (2024) for the SDQ. For the emotional problems subscale, scores of 0-3 are considered close to average, scores of 4 are slightly raised, 5-6 is high, and 7-10 is very high. For the conduct problems subscales, 0-2 are close to average, 3 is slightly raised, 4-5 is high, and 6-10 is very high. For hyperactivity, scores of 0-5 are close to average, 6-7 is slightly raised, 8 is high, and 9-10 is very high. For peer problems, 0-2 is close to average, 3 is slightly raised, 4 is high, and 5-10 is very high. For prosocial behaviour, scores of 0-5 indicate very high risk, scores of 6 are slightly lowered (high risk), scores of 7 may be considered slightly raised, and scores of 8-10 are in the normal range.

Regression analyses were conducted to evaluate Aim 2 (digital technology use predicting mental health increases) and Aim 3 (mental health predicting increases in digital technology use). To be included as an outcome variable, the construct needed to be measured in consecutive waves of data (typically a 2-year time interval) enabling changes in the outcome to be modelled (i.e., dependent variable [DV] at time t regressed onto DV at time t – 1). Predictors were assessed at time t – 1, enabling evaluation of prospective effects on the dependent variables. Several additional covariates were included (and are detailed in Table 3.4).

The K6, K10, SDQ subscales, and quality of life measure were included as potential mental health or mental health-related variables, dependent on availability at specific waves, while computer, TV/DVD, gaming, and social media use were included as digital technology time use measures. Additional measures of social media activity at Waves 8-10 were also included as another way to model social media use as an outcome variable. The remaining social media variables described in the Methods section (see Table 3.8) were permitted as predictors, but not included as outcomes.

In a few instances, the time t mental health variables differed from the time t – 1 mental health variables (e.g., SDQ variables used at one wave and K10 used at the next). Though not an ideal direct control, we include these analyses for an estimate of prospective effects, though note within relevant tables when the t – 1 variable differs from the t version of the dependent variable. For digital technology use, we only report analyses with the same variable (i.e., gaming at time t regressed onto gaming at time t – 1, rather than accepting another digital technology variable as a substitute at time t – 1).

In waves where there were multiple dependent variables for mental health or digital technology, each was used in turn as a dependent variable, controlling for t – 1 versions of the other dependent variables. That is, if a wave included the five SDQ subscales, when the time t version of one subscale was the dependent variable in a model, t – 1 versions of all five SDQ subscales were included for adjustment in the model, and not just the t – 1 version of the particular SDQ subscale being used as the dependent variable.

This strategy resulted in a large number of separate regressions to test the overarching hypotheses about effects of digital technology use on mental health (Aim 2) and mental health on digital technology use (Aim 3). No adjustment for Type I error inflation is used, and instead results were evaluated wholistically to determine strength of evidence for these hypotheses across all of these models (i.e., using a consistency approach for result interpretation).

Results

3.2.4 Aim 1: Descriptive evaluation of digital technology use over waves and cohorts

Tables 9-13 provide a breakdown of engagement with various forms of digital technology. As shown in Table 3.9, there is a monotonic increase with age in the proportion of the K cohort who use their computer for more than 1 hour per day, ranging from 7% at 4 years of age to 34% by age 10. The B cohort also shows an increase with age, though age 5 has the largest proportion of the sample reporting 1 hour or more of computer use per day. This discrepancy in proportions for the B cohort should be interpreted with caution as at age 5, the computer use measure is asked differently to the other three waves of for this cohort.

Table 3.9 presents computer use in hours per day. Other waves explore use across the period of a week, and these data are summarised here instead of in table form. For the B cohort, at Wave 7 (aged 12-13 years), 10% of the sample reported never using computers, and 5% reported using at least once or twice per week. At Wave 8 (aged 14-15 years), 1% of the sample reported never using computers, and only 8% reported use of at least once or twice per week. In addition, for the K cohort at Wave 2.5 (aged 7-8 years), 23% never use and 33% reported using a computer at least once or twice per week. At Wave 5 (aged 12-13 years), 0% never use, and 98% use at least once or twice per week. At Wave 6 (aged 14-15), 3% never use while 76% use a computer at least once or twice per week. At Wave 7 (aged 16-17), 1% never use and 85% use at least once or twice per week. For Wave 8 (aged 18-19), 63% never use and only 8% use at least once or twice per week. This difference in frequency of use may in part be a function of how use was measured across waves (see Table 3.5).

The results presented in Table 3.10 show that the proportion of participants in the B cohort who engage in gaming for at least one hour per day peaks in the age range of 10-14 years. In the K-cohort, the age range of 9-16 years is where there is a peak in game use. However, we note that the proportion of the sample reporting 5+ hours of use per day is markedly higher at ages 12 and 16. Table 3.11 shows proportions derived from unimputed data, which show a similar pattern, suggesting the fluctuations in proportions for the K-cohort are unlikely to be the result of imputation of missing data. We note too that across more waves, participants are providing free response estimates of minutes of use across the week. The age 6 and age 23 data collection waves instead ask for response along pre-defined response categories (see Table 3.6), and provide lower use percentages.

Table 3.12 provides a breakdown of TV use across cohorts and waves. The majority of participants for both cohorts report watching 1 or more hours of TV per day. Frequency of TV use was relatively consistent across ages.

As shown in Table 3.13, daily use estimates for social media range from 14-26% for the B cohort and 11-23% for the K cohort. Table 14 provides a breakdown of activities related to social media use. A small proportion (8-19%) of the overall sample report negative experiences 'often' or 'very often', such as spending a lot of time thinking about social media or planning to use it, using social media to forget their problems, and experiencing negative impacts on work/study from use.

These negative experiences (items 1-6) have weak positive correlations with frequency of reported use; correlations ranged from +.03 to +.28. Similarly, correlations were small yet positive when the total number of experiences was correlated with frequency of reported social media use; correlations ranged from +.14 to +.25 for the B cohort and +.23 to .25 for the K cohort. Stronger effects were observed, however, for the prospective relationship between number of negative activities reported and mental health risk at subsequent timepoints. For the B cohort, each additional negative activity reported (starting from zero) increased likelihood of at least moderate depression by 1.7 to 1.8 times. Concurrent associations at Wave 10 provide a higher estimate (2.1 times increase in likelihood of mild depression), though some caution is needed in interpretation given cross-sectional nature of that estimate. Note: this could not be estimated for the K cohort, for whom these variables were not available to calculate these prospective estimates.

In addition to these negative experiences, a number of participants also reported social media activities that may be characterised as more positive (see Table 3.14). For instance, 28-31% reported using social media to share their interests and hobbies, and 13-15% recognised that social media allows them to show their creative content. A number of respondents also identified social media as a means to connect with peers with similar experiences, and that social media use may help them feel less alone with their negative emotional experiences. Correlations between these positive uses of social media and frequency of use were small, ranging from +.07 to +.21.

Tables 3.15 and3.16 provide breakdown of engagement with these social media activities by sex at birth. A clear pattern emerges, with girls consistently more likely than boys to engage in these activities often or very often.

In terms of content that participants are exposed to on social media, pornographic content was most common for the K cohort (note, this was assessed at age 18), and content about ways to be thin was also common for both cohorts (Table 3.17). When broken down by sex at birth (Table 3.18), girls generally reported more exposure to the various types of content on social media, with the exception of pornographic material, where boys reported far greater rates of exposure (61% vs 22%).

Almost one in five participants reported seeing inappropriate content and received unwelcome contact from strangers (Table 3.19). Approximately 10% of the sample reported that they have had lies or rumours spread about them, were called names, felt left out by others, or received repeated unwanted messages (Table 3.19). The total number of these negative experiences encountered online was weakly though positively associated with frequency of social media use for both the B cohort (r = .11) and the K cohort (r = .21). For every negative experience, the likelihood of at least mild depression increased 1.3 times.

Table 3.20 provides breakdown of experiences by sex at birth. While rates of reporting of these experiences were comparable in most instances, in some cases these rates were higher for girls. This included for experiences of being left out, receipt of unwanted messages, seeing inappropriate content, and being contacted by strangers.

Many K cohort participants reported untagging themselves from posts and deleting posts about themselves to protect themselves online (Table 3.21). However, 40% engaged in none of these protective behaviours, and most who did only engaged in one of these protective behaviours. Individuals who engaged with social media more frequently were more likely to report engagement in each of these protective behaviours, though these correlations were small (*r*s ranged from .07 to .18). Correlations were also small and positive for total number of protective behaviours engaged in with: (1) frequency of social media use (r = .18), and (2) level of exposure to negative content online (r = .33).

Mental health descriptives are presented in Tables 22 and 23. For the B cohort, there were high rates of mild to severe psychological distress at ages 16 to 19. This pattern was also observed at ages 18-21 for the K cohort. Across the 5 dimensions of the SDQ, the proportion of the B cohort sample with raised to very high scores was highest for problems on the prosocial dimension (across most waves), followed by the conduct dimension (especially for earlier waves; see Table 3.18). A similar pattern was observed for the K cohort (see Table 3.23).

Finally, as an exploratory analysis, we explored whether frequency of engagement in digital technology use may reduce level of engagement in other activities (a notion of time displacement). For the B cohort, weak negative associations were found between digital technology use and out-of-home activities (r_{Mean} = -.07, range = -0.15 to + 0.09), physical activity (r_{Mean} = -.06, range = -0.15 to + 0.01), homework (r_{Mean} = -.05, range = -0.20 to + 0.05), and unstructured activity (r_{Mean} = -.05, range = -0.12 to -0.02). There was also a small positive association between different forms of digital technology used (r_{Mean} = .05, range = -0.21 to +0.22).

For the K cohort, weak negative associations were also found between digital technology use and out-of-home activities (r_{Mean} = -.05, range = -0.16 to + 0.05), physical activity (r_{Mean} = -.04, range = -0.16 to + 0.02), homework (r_{Mean} = -.03, range = -0.13 to + 0.07), and structured activity (r_{Mean} = -.04, range = -0.19 to +0.05). There was also a small positive association between different forms of digital technology used (r_{Mean} = .09, range = -0.06 to +0.26). The consistent pattern of correlations in both cohorts provides limited support for the notion that digital technology use displaces time that would be available for other tasks and activities.

Table 3.9. *Response category percentages for computer use (hours per day) by wave and cohort.*

		Age of participants						
Cohort	**Response category; hours per day**	**3**	**4**	**5**	**6**	**8**	**9**	**10**
B	0	60%	45%	9%	26%			
	<1	38%	46%	39%	62%			
	1-3	2%	8%	43%	11%			
	3-5	0%	1%	6%	1%			
	5+	0%	0%	3%	0%			
K	0		50%		56%	22%	2%	12%
	<1		43%		33%	60%	80%	54%
	1-3		7%		11%	17%	17%	32%
	3-5		0%		0%	1%	1%	2%
	5+		0%		0%	0%	0%	0%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 3 actually spans 3-4 year olds. B = infant cohort, K = kinder cohort. Blank cells reflect that data on these measures were not collected at those ages.

Table 3.10. *Response category percentages for electronic game use (hours per day) by wave and cohort.*

		Age of participants												
Cohort	**Response category; hours per day**	**3**	**4**	**5**	**6**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**19**	**23**
B	0	83%	71%	15%	33%	14%		7%	15%	26%			40%	
	<1	16%	22%	60%	54%	57%		46%	36%	20%			8%	
	1-3	1%	7%	22%	12%	27%		42%	40%	37%			22%	
	3-5	0%	0%	2%	1%	2%		4%	7%	12%			15%	
	5+	0%	0%	1%	0%	0%		1%	2%	5%			15%	
K	0				78%	33%	5%	24%	15%		25%	33%		44%
	<1				15%	51%	6%	2%	1%		1%	6%		10%
	1-3				7%	15%	37%	28%	14%		10%	23%		21%
	3-5				0%	1%	25%	20%	18%		12%	15%		15%
	5+				0%	0%	27%	26%	52%		52%	23%		10%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 3 actually spans 3-4 year olds. B = infant cohort, K = kinder cohort.

Table 3.11. *Response category percentages for electronic game use (hours per day) by wave and cohort (UNIMPUTED SAMPLE).*

		Age of participants											
Cohort	**Response category; hours per day**	**3**	**4**	**5**	**6**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**19**	**23**
K	0				66%	34%	5%	24%	15%		22%	32%		45%
	<1				26%	2%	5%	2%	1%		1%	11%		10%
	1-3				7%	25%	35%	28%	15%		9%	23%		21%
	3-5				0%	18%	24%	20%	18%		12%	17%		14%
	5+				0%	21%	26%	25%	51%		55%	17%		9%
Percent missing data					4%	7%	60%	11%	16%		49%	43%		56%

Notes. Percentages appear with rounding and may not sum exactly to 100%.

Table 3.12. *Response category percentages for TV use (hours per day) by wave and cohort.*

		Age of participants										
Cohort	**Response category; hours per day**	**2**	**3**	**4**	**5**	**6**	**8**	**9**	**10**	**12**	**14**	**16**
B	0	6%	6%	1%	1%	1%	0%		0%	2%	5%	
	<1	20%	43%	14%	38%	17%	16%		13%	13%	16%	
	1-3	60%	45%	66%	54%	70%	68%		67%	67%	57%	
	3-5	12%	5%	15%	6%	11%	14%		16%	14%	16%	
	5+	2%	1%	4%	1%	2%	3%		4%	4%	6%	
K	0			3%		6%	1%	1%	1%	0%		5%
	<1			25%		16%	14%	27%	11%	11%		15%
	1-3			60%		67%	69%	62%	69%	67%		55%
	3-5			10%		10%	14%	9%	17%	18%		19%
	5+			2%		1%	2%	1%	2%	4%		7%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 3 actually spans 3-4 year olds. B = infant cohort, K = kinder cohort.

Table 3.13. *Response category percentages for social media use by wave and cohort.*

		Age of participants							
Cohort	**Category**	**14**	**16**	**17**	**18**	**19**	**20**	**21**	**23**
B	Never	9%	12%	13%		15%			
	Once per month or less	25%	41%	41%		41%			
	A few times per month	17%	15%	16%		14%			
	Once or twice per week	13%	9%	10%		9%			
	Almost every day	10%	6%	5%		4%			
	Every day	10%	4%	3%		5%			
	Several times per day	10%	6%	6%		8%			
	Hourly or more often	6%	5%	5%		5%			
K	Never				9%		12%	13%	17%
	Once per month or less				25%		33%	37%	41%
	A few times per month				21%		23%	19%	16%
	Once or twice per week				15%		13%	14%	8%
	Almost every day				7%		5%	5%	4%
	Every day				7%		4%	3%	3%
	Several times per day				9%		6%	5%	8%
	Hourly or more often				7%		4%	3%	3%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 3 actually spans 3-4 year olds. B = infant cohort, K = kinder cohort.

Table 3.14. *Proportion of cohorts who engage in various social media activities 'often' or 'very often'.*

	B cohort			K cohort		
Item	**Wave 9C1**	**Wave 9C2**	**Wave 10**	**Wave 9C1**	**Wave 9C2**	**Wave 10**
1. I spend a lot of time thinking about social media or planning to use it	19%	19%	16%	16%	18%	17%
2. I feel I need to continually use more social media	12%	13%	11%	12%	13%	13%
3. I use social media to forget my personal problems	17%	17%	14%	14%	15%	15%
4. I have tried to stop using social media without succeeding	9%	9%	9%	11%	9%	9%
5. I become anxious or agitated if I am prohibited from using social media.	9%	8%	5%	7%	8%	4%
6. I use social media so much that my use has a negative impact on my work / study	13%	15%	9%	12%	11%	8%
7. I use social media to share my interests and hobbies with other people online			31%			28%
8. I use social media to share my own creative content			15%			13%
9. I use social media to access mental health information or support services			5%			7%
10. Social media provides me with relief from feeling stressed, worried and/or down			20%			21%
11. Social media makes me feel less alone in my experience of feeling stressed, worried and/or feeling down			20%			19%
12. Social media connects me to peers that have similar experiences to me			38%			35%

Notes. Items 1-6 are intended as negative experiences, but items 7-12 are potentially positive. Original response options for each item were 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Proportions in table represent proportion of sample who selected 'often' or 'very often'.

Table 3.15. *Proportion of B cohort who engage in various social media activities 'often' or 'very often' by sex at birth.*

	Boys			Girls		
Item	**Wave 9C1**	**Wave 9C2**	**Wave 10**	**Wave 9C1**	**Wave 9C2**	**Wave 10**
1. I spend a lot of time thinking about social media or planning to use it	14%	13%	11%	24%	26%	21%
2. I feel I need to continually use more social media	9%	9%	8%	14%	17%	14%
3. I use social media to forget my personal problems	12%	10%	9%	22%	24%	20%
4. I have tried to stop using social media without succeeding	6%	5%	7%	12%	14%	11%
5. I become anxious or agitated if I am prohibited from using social media.	6%	5%	3%	12%	12%	7%
6. I use social media so much that my use has a negative impact on my work / study	9%	10%	7%	17%	20%	12%
7. I use social media to share my interests and hobbies with other people online			28%			34%
8. I use social media to share my own creative content			11%			19%
9. I use social media to access mental health information or support services			3%			7%
10. Social media provides me with relief from feeling stressed, worried and/or down			13%			27%
11. Social media makes me feel less alone in my experience of feeling stressed, worried and/or feeling down			12%			27%
12. Social media connects me to peers that have similar experiences to me			32%			44%

Notes. Items 1-6 are intended as negative experiences, but items 7-12 are potentially positive. Original response options for each item were 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Proportions in table represent proportion of sample who selected 'often' or 'very often'.

Table 3.16. *Proportion of K cohort who engage in various social media activities 'often' or 'very often' by sex at birth.*

	Boys			Girls		
Item	**Wave 9C1**	**Wave 9C2**	**Wave 10**	**Wave 9C1**	**Wave 9C2**	**Wave 10**
1. I spend a lot of time thinking about social media or planning to use it	12%	12%	12%	20%	25%	22%
2. I feel I need to continually use more social media	10%	9%	10%	15%	17%	16%
3. I use social media to forget my personal problems	10%	10%	9%	18%	21%	21%
4. I have tried to stop using social media without succeeding	8%	6%	7%	13%	13%	12%
5. I become anxious or agitated if I am prohibited from using social media.	5%	5%	3%	8%	10%	6%
6. I use social media so much that my use has a negative impact on my work / study	9%	9%	6%	15%	14%	9%
7. I use social media to share my interests and hobbies with other people online			24%			32%
8. I use social media to share my own creative content			11%			16%
9. I use social media to access mental health information or support services			4%			10%
10. Social media provides me with relief from feeling stressed, worried and/or down			14%			27%
11. Social media makes me feel less alone in my experience of feeling stressed, worried and/or feeling down			12%			25%
12. Social media connects me to peers that have similar experiences to me			29%			41%

Notes. Items 1-6 are intended as negative experiences, but items 7-12 are potentially positive. Original response options for each item were 1 = very rarely, 2 = rarely, 3 = sometimes, 4 = often, 5 = very often. Proportions in table represent proportion of sample who selected 'often' or 'very often'.

Table 3.17. *Exposure to negative content via information seeking, content viewing, or posting behaviours of B and K cohorts, aged 14 and 18, respectively (Wave 8).*

Item	B cohort	K cohort
Ways to be very thin (S/V)	32%	24%
Ways to be very thin (P/S/D)	16%	5%
Ways to access illicit substances (S/V)	5%	7%
Ways to access illicit substances (P/S/D)	3%	2%
Pornography (S/V)		42%
Pornography (P/S/D)		2%
Ways of physically harming or hurting yourself (S/V)	5%	5%
Ways of physically harming or hurting yourself (P/S/D)	1%	1%
Ways of dying by suicide / taking your own life (S/V)	6%	6%
Ways of dying by suicide / taking your own life (P/S/D)	*1%*	*0%*

Notes. S/V = searched for or viewed information or images. P/S/D = posted, shared, or distributed information or images. Question stem for these items was 'For the topic below, please indicate which of the online activities you have engaged in'.

Table 3.18. *Exposure to negative content via information seeking, content viewing, or posting behaviours of B and K cohorts, aged 14 and 18, respectively (Wave 8) reported separately by sex at birth.*

	B cohort		K cohort	
Item	**Boy**	**Girl**	**Boy**	**Girl**
Ways to be very thin (S/V)	25%	39%	14%	34%
Ways to be very thin (P/S/D)	15%	18%	4%	6%
Ways to access illicit substances (S/V)	5%	5%	7%	6%
Ways to access illicit substances (P/S/D)	2%	3%	2%	2%
Pornography (S/V)			61%	22%
Pornography (P/S/D)			2%	1%
Ways of physically harming or hurting yourself (S/V)	3%	7%	3%	7%
Ways of physically harming or hurting yourself (P/S/D)	1%	2%	1%	1%
Ways of dying by suicide / taking your own life (S/V)	4%	8%	4%	7%
Ways of dying by suicide / taking your own life (P/S/D)	*1%*	*1%*	*0%*	*0%*

Notes. S/V = searched for or viewed information or images. P/S/D = posted, shared, or distributed information or images. Question stem for these items was 'For the topic below, please indicate which of the online activities you have engaged in'.

Table 3.19. *Negative online experiences of B and K cohorts, aged 19 and 23, respectively (Wave 10).*

Item	B cohort	K cohort
Had lies or rumours spread about me	13%	9%
Had personal contact details made public on a social media service or other online platform without my consent	2%	2%
Had intimate images or videos of me posted online without my consent	1%	2%
Was ridiculed, insulted or humiliated because of my physical appearance, religion, gender, race, disability, sexual orientation or political beliefs	6%	5%
Had fake sexually explicit images or photos posted online	1%	1%
Was called names by others	10%	7%
Was left out by others	13%	9%
Was threatened online or other people online were encouraged to harm me	3%	3%
Had someone pretend to be me online	3%	3%
Had my accounts (e.g. social media, bank or email) accessed by someone else without me agreeing	5%	5%
Received repeated unwanted online messages from someone	10%	8%
Saw inappropriate content (e.g. sexual or violent content)	21%	16%
Was contacted by strangers	23%	20%
Was stalked online	4%	3%
Had my personal information used in a way I did not like	1%	3%
Had felt pressured to share sexual or intimate images	3%	3%
Was included in online conversations where inappropriate comments have made me feel uncomfortable	4%	4%
Other	2%	1%

Notes. Question stem for these items was 'Which of the following, if any, have you experienced online in the last 12 months?'.

Table 3.20. *Negative online experiences of B and K cohorts, aged 19 and 23, respectively (Wave 10) broken down by sex at birth.*

	B cohort		K cohort	
Item	**Boys**	**Girls**	**Boys**	**Girls**
Had lies or rumours spread about me	12%	14%	8%	9%
Had personal contact details made public on a social media service or other online platform without my consent	2%	2%	2%	2%
Had intimate images or videos of me posted online without my consent	1%	1%	1%	2%
Was ridiculed, insulted or humiliated because of my physical appearance, religion, gender, race, disability, sexual orientation or political beliefs	5%	7%	4%	5%
Had fake sexually explicit images or photos posted online	0%	1%	1%	1%
Was called names by others	10%	10%	8%	7%
Was left out by others	10%	15%	8%	11%
Was threatened online or other people online were encouraged to harm me	4%	3%	4%	3%
Had someone pretend to be me online	2%	3%	2%	4%
Had my accounts (e.g. social media, bank or email) accessed by someone else without me agreeing	5%	6%	4%	6%
Received repeated unwanted online messages from someone	7%	14%	6%	11%
Saw inappropriate content (e.g. sexual or violent content)	18%	25%	14%	18%
Was contacted by strangers	14%	31%	13%	27%
Was stalked online	3%	5%	3%	4%
Had my personal information used in a way I did not like	1%	1%	2%	3%
Had felt pressured to share sexual or intimate images	2%	5%	2%	4%
Was included in online conversations where inappropriate comments have made me feel uncomfortable	3%	6%	3%	4%

Notes. Question stem for these items was 'Which of the following, if any, have you experienced online in the last 12 months?'

Table 3.21. *Protective behaviours for one's social network profile, K cohort aged 18 (Wave 8).*

Item	
Un-tagged self from post	45%
Deleted posts about myself	39%
Reported posts about myself or request that administrators take them down	10%
Request that someone else take them down	14%
Stopped using my social networking account(s)	20%
Deleted my social networking account(s)	13%

Notes. Question stem for these items was 'For the topic below, please indicate which of the online activities you have engaged in'.

Table 3.22. *Response category percentages for mental health variables by wave for B cohort.*

	Age of participants								
Variable	**4**	**6**	**8**	**10**	**12**	**16**	**17**		**19**
Prosocial									
Raised	16%	12%	11%	9%	11%				
High	13%	8%	7%	6%	7%				
Very High	13%	8%	7%	7%	10%				
Hyper									
Raised	10%	11%	11%	10%	10%				
High	3%	3%	4%	4%	3%				
Very High	2%	4%	5%	4%	4%				
Emotion									
Raised	6%	8%	8%	8%	9%				
High	4%	6%	7%	8%	8%				
Very High	1%	2%	3%	4%	5%				
Peer									
Raised	10%	10%	10%	10%	10%				
High	6%	6%	6%	6%	6%				
Very High	5%	5%	7%	8%	8%				
Conduct									
Raised	17%	12%	10%	8%	7%				
High	17%	8%	7%	6%	5%				
Very High	5%	2%	2%	2%	3%				
K6 / K10									
Mild						19%	19%		
Moderate						13%	16%		25%
Severe						23%	26%		16%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 0 is actually participants from birth to 1 year old, and age 2 actually spans 2-3 year olds. Note that K6 was used for Wave 10 scores whereas K10 was used for Waves 9C1 and 9C2. SDQ Is separated into subscales for: (1) emotional symptoms, (2) conduct problems, (3) hyperactivity/inattention, (4) peer problems, and (5) prosocial behaviour.

Table 3.23. *Response category percentages for mental health variables by wave for K cohort.*

	Age of participants									
Variable	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**21**
Prosocial										
Raised	16%	12%	13%	10%	10%	12%	12%			
High	12%	9%	9%	7%	8%	9%	9%			
Very High	12%	9%	9%	7%	9%	13%	11%			
Hyper										
Raised	13%	10%	10%	10%	9%	8%	7%			
High	3%	3%	3%	3%	2%	2%	1%			
Very High	3%	3%	4%	4%	3%	3%	2%			
Emotion										
Raised	7%	7%	7%	8%	8%	7%	7%			
High	6%	6%	6%	8%	8%	8%	10%			
Very High	1%	2%	2%	4%	4%	4%	7%			
Peer										
Raised	13%	11%	11%	9%	10%	11%	10%			
High	7%	6%	7%	6%	6%	7%	7%			
Very High	5%	6%	6%	8%	7%	9%	8%			
Conduct										
Raised	16%	10%	9%	10%	7%	7%	6%			
High	20%	8%	8%	7%	6%	5%	5%			
Very High	8%	2%	2%	2%	2%	3%	3%			
K-10										
Mild								16%	19%	19%
Moderate								10%	13%	12%
Severe								16%	19%	20%

Notes. Age at each wave ranges by ~12 months, and age value given is lower limit of this range. For instance, age 3 actually spans 3-4 year olds. K = kinder cohort. SDQ Is separated into subscales for: (1) emotional symptoms, (2) conduct problems, (3) hyperactivity/inattention, (4) peer problems, and (5) prosocial behaviour.

3.3 Aim #2 – Digital technology use prospectively predicting mental health

In this study, we tested prospective associations between digital technology use variables and mental health outcomes. For both the B and K cohorts, a minority of the tested prospective associations were found to be significant ($p < .05$, two-tailed). For the B cohort, 5 of 81 tested associations were significant (6%). For the K cohort, 10 of 100 tested associations were significant (10%). In general, for these significant associations, the pattern was for digital technology use to be associated with worsening psychological outcomes.

3.3.1 B cohort

Table 3.24. *Digital technology use predicting mental health (Waves 8 to 10).*

Outcome	Predictor	B [95% CIs]	p value
W10 K10	W9C2 social media negative experiences	0.21 [-0.11, 0.53]	.202
	W9C2 social media use	0.17 [0.04, 0.29]	**.010**
W9C2 K10	W9C1 social media negative experiences	-0.14 [-0.56, 0.27]	.490
	W9C1 social media use	0.05 [-0.10, 0.20]	.498
W9C1 K10	W8 social media use	0.15 [0.00, 0.30]	.056
	W8 social media information seeking	0.37 [0.00, 0.74]	.052
W8 SDQ conduct	Gaming	0.00 [-0.05, 0.04]	.901
	TV use	-0.03 [-0.08, 0.03]	.303
	Computer use	0.01 [-0.05, 0.07]	.763
W8 SDQ emotion	Gaming	0.04 [-0.03, 0.11]	.276
	TV use	0.00 [-0.08, 0.08]	.981
	Computer use	0.01 [-0.07, 0.10]	.780
W8 SDQ hyper	Gaming	0.05 [-0.02, 0.12]	.161
	TV use	-0.02 [-0.10, 0.05]	.553
	Computer use	0.02 [-0.06, 0.10]	.603
W8 SDQ peer	Gaming	0.04 [0.10, -0.02]	.204
	TV use	0.02 [-0.05, 0.08]	.612
	Computer use	0.18 [0.10, 0.26]	**<.001**
W8 SDQ prosocial	Gaming	-0.05 [-0.12, 0.02]	.185
	TV use	0.03 [-0.04, 0.10]	.414
	Computer use	0.04 [-0.03, 0.12]	.233
W8 Quality of life	Gaming	-0.01 [-0.02, 0.00]	.053
	TV use	0.00 [-0.01, 0.01]	.515
	Computer use	0.01 [0.00, 0.02]	.063

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

Table 3.25. *Digital technology use predicting mental health (Waves 6 to 7).*

Outcome	Predictor	B [95% CIs]	p value
W7 SDQ conduct	Gaming	0.01 [-0.04, 0.07]	.690
	TV use	0.02 [-0.04, 0.08]	.469
W7 SDQ emotion	Gaming	0.05 [-0.03, 0.13]	.191
	TV use	0.00 [-0.09, 0.08]	.913
W7 SDQ hyper	Gaming	-0.04 [-0.12, 0.04]	.319

	TV use	-0.03 [-0.11, 0.05]	.475
W7 SDQ peer	Gaming	0.01 [-0.05, 0.08]	.660
	TV use	0.05 [-0.02, 0.12]	.169
W7 SDQ prosocial	Gaming	-0.10 [-0.17, -0.03]	**.003**
	TV use	-0.03 [-0.10, 0.03]	.338
W7 Quality of life	Gaming	-0.01 [-0.02, 0.00]	**.049**
	TV use	0.00 [-0.01, 0.01]	.880
W6 SDQ conduct	Gaming	0.02 [-0.03, 0.07]	.444
	TV use	-0.01 [-0.07, 0.04]	.640
W6 SDQ emotion	Gaming	0.01 [-0.06, 0.09]	.696
	TV use	0.04 [-0.05, 0.12]	.424
W6 SDQ hyper	Gaming	0.04 [-0.03, 0.12]	.287
	TV use	-0.01 [-0.09, 0.07]	.784
W6 SDQ peer	Gaming	0.01 [-0.05, 0.07]	.754
	TV use	0.05 [-0.02, 0.12]	.192
W6 SDQ prosocial	Gaming	-0.01 [-0.07, 0.05]	.776
	TV use	0.04 [[-0.03, 0.11]	.310

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

Table 3.26. *Digital technology use predicting mental health (Waves 4 to 5).*

Outcome	Predictor	B [95% CIs]	p value
W5 SDQ conduct	Gaming	0.00 [-0.06, 0.07]	.937
	TV use	-0.03 [-0.10, 0.03]	.329
	Computer use	-0.01 [-0.09, 0.08]	.872
W5 SDQ emotion	Gaming	-0.01 [-0.10, 0.07]	.718
	TV use	0.05 [-0.04, 0.14]	.252
	Computer use	-0.02 [-0.12, 0.09]	.734
W5 SDQ hyper	Gaming	0.11 [0.02, 0.20]	**.022**
	TV use	-0.08 [-0.18, 0.01]	.092
	Computer use	-0.01 [-0.13, 0.12]	.910
W5 SDQ peer	Gaming	0.02 [-0.05, 0.10]	.561
	TV use	-0.01 [-0.09, 0.07]	.819
	Computer use	-0.07 [-0.16, 0.03]	.158
W5 SDQ prosocial	Gaming	0.00 [-0.07, 0.07]	.993
	TV use	0.01 [-0.07, 0.09]	.755
	Computer use	0.07 [-0.03, 0.17]	.190
W4 SDQ conduct	Gaming	0.00 [-0.11, 0.11]	.994
	TV use	0.01 [-0.10, 0.11]	.924
	DVD use	0.01 [-0.01, 0.02]	.524
	Computer use	0.04 [-0.05, 0.12]	.420
W4 SDQ emotion	Gaming	0.04 [-0.09, 0.17]	.534
	TV use	0.04 [-0.08, 0.16]	.486
	DVD use	0.01 [-0.01, 0.03]	.402
	Computer use	0.02 [-0.09, 0.14]	.663

Outcome	Predictor	B [95% CIs]	p value
W4 SDQ hyper	Gaming	0.01 [-0.14, 0.17]	.884
	TV use	0.02 [-0.12, 0.17]	.739
	DVD use	0.01 [-0.02, 0.04]	.595
	Computer use	-0.03 [-0.15, 0.10]	.678
W4 SDQ peer	Gaming	0.04 [-0.06, 0.15]	.419
	TV use	-0.02 [-0.13, 0.09]	.694
	DVD use	0.02 [0.00, 0.04]	.054
	Computer use	0.01 [-0.08, 0.09]	.887
W4 SDQ prosocial	Gaming	-0.05 [-0.19, 0.10]	.511
	TV use	0.06 [-0.06, 0.19]	.293
	DVD use	-0.02 [-0.05, 0.00]	.067
	Computer use	-0.01 [-0.11, 0.10]	.887

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

3.3.2 K cohort

Table 3.27. *Digital technology use predicting mental health (Waves 7 to 9C2).*

Outcome	Predictor	B [95% CIs]	p value
W9C2 K10	Social media negative experiences	0.20 [-0.29, 0.70]	.412
	Social media use	0.22 [0.05, 0.39]	**.011**
W9C1 K10	Social media use	0.10 [-0.14, 0.33]	.405
	Social media information seeking	0.41 [-0.07, 0.88]	.092
	Social media protective behaviours	0.22 [-0.10, -0.01]	.179
	Gaming	0.23 [-0.11, 0.57]	.186
	Computer use	0.39 [-0.30, 1.07]	.263
W8 Quality of life	Gaming	0.00 [-0.01, 0.01]	.692
	TV use	-0.01 [-0.02, 0.01]	.387
	Computer use	-0.02 [-0.04, -0.01]	**.009**
	Social media use	0.00 [-0.01, 0.01]	.534
W8 K10	Gaming	0.16 [-0.24, 0.56]	.437
	TV use	0.17 [-0.23, 0.56]	.407
	Computer use	0.89 [0.26, 1.52]	**.006**
	Social media use	0.52 [0.14, 0.90]	**.008**
W7 Quality of life	Gaming	0.00 [-0.01, 0.02]	.912
	Computer use	-0.02 [-0.03, -0.01]	**<.001**
W7 SDQ conduct	Gaming	0.04 [-0.05, 0.12]	.380
	Computer use	0.00 [-0.07, 0.07]	.986
W7 SDQ emotion	Gaming	-0.05 [-0.18, -0.09]	.498
	Computer use	0.01 [-0.09, 0.11]	.826
W7 SDQ hyper	Gaming	-0.03 [-0.14, 0.09]	.636

Outcome	Predictor	B [95% CIs]	p value
	Computer use	-0.02 [-0.10, 0.06]	.658
W7 SDQ peer	Gaming	0.09 [-0.02, 0.19]	.100
	Computer use	-0.04 [-0.12, 0.04]	.301
W7 SDQ prosocial	Gaming	-0.02 [-0.13, 0.09]	.764
	Computer use	0.00 [-0.08, 0.08]	.939

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

Table 3.28. *Digital technology use predicting mental health (Waves 5 to 6).*

Outcome	Predictor	B [95% CIs]	p value
W6 Quality of life	Gaming	-0.01 [-0.02, 0.00]	.135
	TV use	-0.01 [-0.02, 0.00]	.157
	Computer use	0.04 [0.03, 0.06]	**<.001**
W6 SDQ conduct	Gaming	0.03 [-0.02, 0.08]	.220
	TV use	0.02 [-0.05, 0.09]	.565
	Computer use	-0.02 [-0.09, 0.05]	.656
W6 SDQ emotion	Gaming	0.03 [-0.04, 0.11]	.352
	TV use	0.04 [-0.04, 0.13]	.339
	Computer use	-0.05 [-0.14, 0.05]	.311
W6 SDQ hyper	Gaming	0.00 [-0.07, 0.07]	.942
	TV use	-0.02 [-0.10, 0.07]	.729
	Computer use	0.02 [-0.07, 0.12]	.653
W6 SDQ peer	Gaming	0.06 [0.00, 0.12]	**.040**
	TV use	0.03 [-0.04, 0.11]	.390
	Computer use	0.14 [0.05, 0.22]	**.001**
W6 SDQ prosocial	Gaming	-0.05 [-0.12, 0.03]	.213
	TV use	-0.01 [-0.10, 0.07]	.775
	Computer use	-0.03 [-0.12, 0.06]	.501
W5 SDQ conduct	Gaming	0.03 [-0.02, 0.08]	.193
	TV use	0.03 [-0.04, 0.11]	.382
	Computer use	0.00 [-0.07, 0.06]	.929
W5 SDQ emotion	Gaming	-0.01 [-0.08, 0.06]	.779
	TV use	-0.05 [-0.15, 0.06]	.366
	Computer use	-0.03 [-0.11, 0.06]	.534
W5 SDQ hyper	Gaming	0.02 [-0.05, 0.09]	.588
	TV use	0.02 [-0.09, 0.13]	.730
	Computer use	0.03 [-0.06, 0.12]	.518
W5 SDQ peer	Gaming	0.05 [-0.01, 0.11]	.129
	TV use	-0.02 [-0.11, 0.07]	.673
	Computer use	0.03 [-0.05, 0.10]	.488
W5 SDQ prosocial	Gaming	0.00 [-0.06, 0.06]	.955
	TV use	0.05 [-0.05, 0.15]	.322
	Computer use	-0.04 [-0.13, 0.04]	.293

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

Table 3.29. *Digital technology use predicting mental health (Waves 3 to 4).*

Outcome	Predictor	B [95% CIs]	p value
W4 SDQ conduct	Gaming	0.10 [-0.01, 0.20]	.071
	TV use	0.06 [-0.02, 0.15]	.140
	Computer use	-0.03 [-0.10, 0.04]	.465
W4 SDQ emotion	Gaming	0.02 [-0.07, 0.10]	.786
	TV use	0.03 [-0.09, 0.15]	.657
	Computer use	0.03 [-0.07, 0.12]	.565
W4 SDQ hyper	Gaming	0.13 [-0.02, 0.28]	.099
	TV use	0.05 [-0.07, 0.17]	.447
	Computer use	-0.01 [-0.11, 0.09]	.843
W4 SDQ peer	Gaming	0.04 [-0.08, 0.16]	.514
	TV use	0.11 [0.02, 0.21]	**.022**
	Computer use	0.06 [-0.03, 0.15]	.194
W4 SDQ prosocial	Gaming	-0.10 [-0.22, 0.02]	.112
	TV use	0.05 [-0.06, 0.15]	.377
	Computer use	0.01 [-0.07, 0.10]	.735
W3 SDQ conduct	Gaming	0.03 [-0.03, 0.09]	.356
	TV use	0.02 [-0.04, 0.08]	.515
	Computer use	-0.03 [-0.09, 0.03]	.266
W3 SDQ emotion	Gaming	0.00 [-0.07, 0.08]	.916
	TV use	-0.05 [-0.13, 0.02]	.145
	Computer use	0.00 [-0.07, 0.08]	.916
W3 SDQ hyper	Gaming	0.05 [-0.04, 0.14]	.284
	TV use	0.01 [-0.08, 0.09]	.834
	Computer use	-0.05 [-0.14, 0.04]	.259
W3 SDQ peer	Gaming	-0.06 [-0.14, 0.01]	.094
	TV use	-0.02 [-0.09, 0.05]	.643
	Computer use	0.04 [-0.03, 0.10]	.272
W3 SDQ prosocial	Gaming	-0.02 [-0.10, 0.05]	.563
	TV use	0.01 [-0.06, 0.08]	.838
	Computer use	-0.01 [-0.07, 0.06]	.877

Notes. W = wave, SDQ = strengths and difficulties questionnaire. K10 = Kessler.

Table 3.30. *Digital technology use predicting mental health (Wave 2).*

Outcome	Predictor	B [95% CIs]	p value
W2 SDQ conduct	Computer use	-0.01 [-0.07, 0.05]	.711
	TV use	0.00 [-0.06, 0.05]	.874
W2 SDQ emotion	Computer use	-0.01 [-0.08, 0.07]	.846
	TV use	0.03 [-0.04, 0.10]	.427
W2 SDQ hyper	Computer use	0.05 [-0.03, 0.14]	.244
	TV use	-0.03 [-0.11, 0.06]	.495
W2 SDQ peer	Computer use	0.08 [0.02, 0.15]	**.014**

Outcome	Predictor	B [95% CIs]	p value
W2 SDQ prosocial	Computer use	-0.02 [-0.09, 0.05]	.609
	TV use	0.05 [-0.02, 0.12]	.161

3.4 Aim #3 – Mental health prospectively predicting digital technology use

For this aim, we tested prospective associations between digital technology use variables and mental health outcomes. Compared to findings for Aim 3, there were a larger proportion of significant effects of mental health predicting engagement in digital technology use, though these still accounted for a minority of tested associations. For the B cohort, 15 of 95 tested associations were significant (16%). For the K cohort, 29 of 118 tested associations was significant (25%). In general, for these significant associations, the pattern was for higher psychological distress to predict increased digital technology use.

3.4.1 B cohort

Table 3.31. *Mental health predicting digital technology use (Waves 8 to 10).*

Outcome	Predictor	B [95% CIs]	p value
W10 social media use	Mental health (K10)	0.01 [0.00, 0.01]	.165
W10 social media negative experiences	Mental health (K10)	0.01 [0, 0.01]	**.025**
W10 social media positive experiences	Mental health (K10)	0.01 [0, 0.01]	**<.001**
W10 gaming use	Mental health (K10)	0.01 [0.01, 0.02]	**<.001**
W9C2 social media use	Mental health (K10)	0.00 [-0.01, 0.01]	.635
W9C2 social media negative experiences	Mental health (K10)	0.00 [0.00, 0.01]	.186
W9C1 social media negative experiences	SDQ conduct	0.03 [0.00, 0.06]	**.045**
	SDQ emotion	0.04 [0.01, 0.06]	**.002**
	SDQ hyper	-0.01 [-0.03, 0.01]	.559
	SDQ peer	-0.03 [-0.05, -0.01]	**.016**
	SDQ prosocial	-0.01 [-0.02, 0.01]	.597

	Quality of life	-0.63 [-0.86, -0.40]	**<.001**
W8 computer use	SDQ conduct	0.00 [-0.02, 0.02]	.995
	SDQ emotion	0.00 [-0.01, 0.01]	.705
	SDQ hyper	0.00 [0.00, 0.01]	.307
	SDQ peer	0.01 [0.00, 0.03]	.079
	SDQ prosocial	0.01 [-0.01, 0.01]	.912
	Quality of life	0.01 [-0.10, 0.11]	.912
W8 gaming use	SDQ conduct	0.01 [-0.02, 0.04]	.532
	SDQ emotion	0.01 [0.00, 0.03]	.150
	SDQ hyper	0.01 [0.00, 0.03]	.151
	SDQ peer	0.02 [0.00, 0.04]	.112
	SDQ prosocial	-0.01 [-0.03, 0.02]	.603
	Quality of life	-0.06 [-0.23, 0.12]	.514
W8 social media use	SDQ conduct	0.09 [0.03, 0.15]	**.006**
	SDQ emotion	-0.01 [-0.05, 0.03]	.609
	SDQ hyper	0.03 [0.00, 0.07]	.076
	SDQ peer	-0.04 [-0.09, 0.01]	.119
	SDQ prosocial	0.02 [-0.03, 0.06]	.476
	Quality of life	-0.57 [-0.96, -0.18]	**.004**

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

Table 3.32. *Mental health predicting digital technology use (Waves 6 to 8).*

Outcome	Predictor	B [95% CIs]	p value
W8 social media information seeking	SDQ conduct	0.03 [0.00, 0.06]	**.035**
	SDQ emotion	0.01 [-0.01, 0.01]	.197
	SDQ hyper	0.00 [-0.02, 0.02]	.775
	SDQ peer	0.00 [-0.03, 0.02]	.958
	SDQ prosocial	-0.01 [-0.03, 0.02]	.492
	Quality of life	-0.69 [-0.91, -0.47]	**<.001**
W8 TV use	SDQ conduct	0.04 [0.01, 0.06]	**.002**
	SDQ emotion	0.00 [-0.02, 0.02]	.954
	SDQ hyper	0.00 [-0.01, 0.01]	.865
	SDQ peer	-0.01 [-0.03, 0.01]	.584
	SDQ prosocial	0.00 [-0.02, 0.02]	.772
	Quality of life	-0.04 [-0.19, 0.11]	.560
W7 computer use	SDQ conduct	0.01 [-0.01, 0.03]	.303

	SDQ emotion	0.00 [-0.02, 0.01]	.474
	SDQ hyper	0.01 [0.00, 0.02]	.267
	SDQ peer	0.04 [0.03, 0.06]	**<.001**
	SDQ prosocial	-0.01 [-0.02, 0.01]	.250
	Quality of life	-0.01 [-0.13, 0.11]	.883
W7 gaming use	SDQ conduct	0.02 [0.00, 0.05]	.106
	SDQ emotion	0.00 [-0.02, 0.01]	.910
	SDQ hyper	0.01 [0.00, 0.03]	.108
	SDQ peer	0.02 [0.00, 0.04]	.084
	SDQ prosocial	-0.02 [-0.04, 0.00]	.070
	Quality of life	-0.07 [-0.22, 0.09]	.420
W7 TV use	SDQ conduct	0.03 [0.01, 0.05]	**.010**
	SDQ emotion	-0.01 [-0.02, 0.01]	.377
	SDQ hyper	0.01 [0.00, 0.02]	.087
	SDQ peer	0.00 [-0.02, 0.02]	.884
	SDQ prosocial	0.00 [-0.02, 0.01]	.507
	Quality of life	0.00 [-0.13, 0.12]	.952
W6 gaming use	SDQ conduct	-0.01 [-0.02, 0.01]	.465
	SDQ emotion	-0.01 [-0.02, 0.01]	.413
	SDQ hyper	0.01 [0.00, 0.02]	.053
	SDQ peer	0.01 [-0.01, 0.02]	.270
	SDQ prosocial	-0.01 [-0.02, 0.01]	.339
W6 TV use	SDQ conduct	0.02 [0.00, 0.04]	**.029**
	SDQ emotion	0.00 [-0.01, 0.01]	.844
	SDQ hyper	0.00 [-0.01, 0.01]	.622
	SDQ peer	0.01 [-0.01, 0.02]	.272
	SDQ prosocial	0.01 [-0.01, 0.02]	.245

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

Table 3.33. *Mental health predicting digital technology use (Waves 4 to 5).*

Outcome	Predictor	B [95% CIs]	p value
W5 gaming use	SDQ conduct	0.00 [-0.02, 0.02]	.831
	SDQ emotion	0.00 [-0.01, 0.01]	.954
	SDQ hyper	0.00 [-0.01, 0.01]	.811
	SDQ peer	0.00 [-0.02, 0.01]	.608
	SDQ prosocial	-0.02 [-0.03, 0.01]	**.005**
W5 TV use	SDQ conduct	0.00 [-0.01, 0.02]	.775
	SDQ emotion	0.00 [-0.01, 0.02]	.608

Outcome	Predictor	B [95% CIs]	p value
	SDQ hyper	0.00 [-0.01, 0.01]	.468
	SDQ peer	0.00 [-0.02, 0.01]	.602
	SDQ prosocial	0.00 [-0.02, 0.01]	.456
W4 computer use	SDQ conduct	0.01 [-0.02, 0.03]	.596
	SDQ emotion	0.00 [-0.03, 0.03]	.855
	SDQ hyper	0.00 [-0.02. 0.02]	.956
	SDQ peer	0.01 [-0.02, 0.04]	.446
	SDQ prosocial	-0.01 [-0.04, 0.02]	.442
W4 gaming use	SDQ conduct	0.00 [-0.02, 0.02]	.696
	SDQ emotion	-0.01 [-0.03, 0.01]	.365
	SDQ hyper	0.01 [-0.01, 0.03]	.439
	SDQ peer	0.00 [-0.02, 0.02]	.959
	SDQ prosocial	0.00 [-0.02, 0.02]	.715
W4 TV use	SDQ conduct	0.00 [-0.01, 0.02]	.537
	SDQ emotion	-0.01 [-0.02, 0.01]	.278
	SDQ hyper	0.00 [-0.01, 0.02]	.548
	SDQ peer	0.00 [-0.02, 0.02]	.859
	SDQ prosocial	0.00 [-0.01, 0.01]	.992

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

3.4.2 K cohort

Table 3.34. *Mental health predicting digital technology use (Waves 8 to 9C2.)*

Outcome	Predictor	B [95% CIs]	p value
W9C2 social media use	Mental health (K10)	0.02 [0.01, 0.03]	**.001**
W9C2 social media negative experiences	Mental health (K10)	0.01 [0.00, 0.01]	**.011**
W9C1 social media use	Mental health (K10)	0.02 [0.00, 0.04]	**.026**
	Quality of life	0.32 [-0.16, 0.80]	.185
W9C1 social media negative experiences	Mental health (K10)	0.01 [0.00, 0.02]	**.003**
	Quality of life	-0.16 [-0.44, 0.13]	.279

Outcome	Predictor	B [95% CIs]	p value
W8 computer use	SDQ conduct	0.05 [0.02, 0.08]	**.002**
	SDQ emotion	-0.01 [-0.03, 0.01]	.312
	SDQ hyper	0.03 [0.01, 0.05]	**.002**
	SDQ peer	0.01 [-0.01, 0.03]	.386
	SDQ prosocial	0.01 [-0.01, 0.03]	.406
	Quality of life	-0.36 [-0.54, -0.18]	**<.001**
W8 gaming use	SDQ conduct	-0.01 [-0.05, 0.03]	.651
	SDQ emotion	0.00 [-0.03, 0.03]	.891
	SDQ hyper	0.04 [0.01, 0.06]	**.008**
	SDQ peer	0.02 [-0.02, 0.05]	.317
	SDQ prosocial	0.00 [-0.03, 0.03]	.828
	Quality of life	-0.09 [-0.34, 0.16]	.474
W8 social media use	SDQ conduct	0.10 [0.01, 0.19]	**.027**
	SDQ emotion	0.00 [-0.06, 0.05]	.849
	SDQ hyper	0.14 [0.09, 0.19]	**<.001**
	SDQ peer	0.00 [-0.06, 0.05]	.941
	SDQ prosocial	0.03 [-0.02, 0.08]	.295
	Quality of life	-0.58 [-1.01, -0.15]	**.008**

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

Table 3.35. *Mental health predicting digital technology use (Waves 6 to 7).*

Outcome	Predictor	B [95% CIs]	p value
W7 computer use	SDQ conduct	0.01 [-0.01, 0.01]	.216
	SDQ emotion	0.00 [-0.01, 0.01]	.780
	SDQ hyper	0.00 [-0.01, 0.01]	.676
	SDQ peer	-0.02 [-0.03, -0.01]	**<.001**
	SDQ prosocial	0.00 [-0.01, 0.01]	.989
	Quality of life	-0.07 [-0.15, 0.02]	.121
W7 gaming use	SDQ conduct	0.00 [-0.03, 0.03]	.928
	SDQ emotion	0.02 [0.00, 0.04]	.108
	SDQ hyper	0.01 [-0.01, 0.02]	.339
	SDQ peer	0.02 [0.00, 0.05]	**.032**
	SDQ prosocial	0.00 [-0.02, 0.02]	.838
	Quality of life	-0.10 [-0.25, 0.06]	.240
W7 social media use	SDQ conduct	0.05 [0.02, 0.08]	**.001**
	SDQ emotion	0.00 [-0.02, 0.02]	.774
	SDQ hyper	0.03 [0.01, 0.05]	**.001**

Outcome	Predictor	B [95% CIs]	p value
	SDQ peer	-0.04 [-0.07, -0.02]	**<.001**
	SDQ prosocial	0.00 [-0.02, 0.02]	.839
	Quality of life	-0.07 [-0.25, 0.10]	.421
W7 TV use	SDQ conduct	0.02 [-0.01, 0.04]	.247
	SDQ emotion	0.02 [0.00, 0.04]	**.018**
	SDQ hyper	0.00 [-0.01, 0.02]	.668
	SDQ peer	0.02 [0.00, 0.03]	.112
	SDQ prosocial	0.00 [-0.01, 0.02]	.759
	Quality of life	-0.20 [-0.35, -0.05]	**.011**
W6 computer use	SDQ conduct	-0.01 [-0.03, 0.01]	.181
	SDQ emotion	0.00 [-0.01, 0.01]	.837
	SDQ hyper	0.00 [-0.02, 0.01]	.336
	SDQ peer	-0.02 [-0.03, 0.00]	**.025**
	SDQ prosocial	0.01 [-0.01, 0.02]	.320
W6 gaming use	SDQ conduct	0.00 [-0.01, 0.02]	.891
	SDQ emotion	0.00 [-0.01, 0.01]	.830
	SDQ hyper	0.00 [-0.01, 0.01]	.591
	SDQ peer	0.01 [0.00, 0.03]	**.027**
	SDQ prosocial	-0.01 [-0.02, 0.00]	.261

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

Table 3.36. *Mental health predicting digital technology use (Waves 4 to 5).*

Outcome	Predictor	B [95% CIs]	p value
W5 computer use	SDQ conduct	-0.01 [-0.03, 0.01]	.444
	SDQ emotion	0.00 [-0.01, 0.02]	.697
	SDQ hyper	0.00 [-0.01, 0.01]	.776
	SDQ peer	0.03 [0.02, 0.05]	**<.001**
	SDQ prosocial	-0.01 [-0.03, 0.00]	.163
W5 gaming use	SDQ conduct	0.00 [-0.02. 0.03]	.877
	SDQ emotion	0.02 [0.00, 0.04]	**.035**
	SDQ hyper	-0.01 [-0.02, 0.01]	.462
	SDQ peer	0.00 [-0.02, 0.03]	.645
	SDQ prosocial	-0.02 [-0.03, 0.00]	.121
W5 TV use	SDQ conduct	0.02 [0.00, 0.04]	.086
	SDQ emotion	0.01 [0.00, 0.02]	.163
	SDQ hyper	0.00 [-0.01, 0.02]	.843
	SDQ peer	0.00 [-0.01, 0.02]	.685

Outcome	Predictor	B [95% CIs]	p value
	SDQ prosocial	0.01 [-0.01, 0.02]	.266
W4 computer use	SDQ conduct	0.01 [-0.01, 0.04]	.291
	SDQ emotion	-0.01 [-0.02, 0.01]	.546
	SDQ hyper	-0.01 [-0.02, 0.01]	.411
	SDQ peer	0.00 [-0.02, 0.02]	.673
	SDQ prosocial	0.00 [-0.01, 0.02]	.652
W4 gaming use	SDQ conduct	0.00 [-0.03, 0.03]	.999
	SDQ emotion	-0.02 [-0.04, 0.01]	.185
	SDQ hyper	0.01 [-0.01, 0.03]	.176
	SDQ peer	0.05 [0.02, 0.07]	**.001**
	SDQ prosocial	0.00 [-0.02 0.02]	.991
W4 TV use	SDQ conduct	0.02 [0.00, 0.04]	**.017**
	SDQ emotion	-0.01 [-0.02, 0.01]	.226
	SDQ hyper	0.00 [-0.01, 0.01]	.836
	SDQ peer	0.01 [-0.01, 0.03]	.239
	SDQ prosocial	0.00 [-0.01, 0.02]	.608

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

Table 3.37. *Mental health predicting digital technology use (Waves 2 to 3).*

Outcome	Predictor	B [95% CIs]	p value
W3 computer use	SDQ conduct	-0.01 [-0.02, 0.01]	.304
	SDQ emotion	0.00 [-0.01, 0.02]	.474
	SDQ hyper	0.00 [-0.01, 0.01]	.713
	SDQ peer	0.00 [-0.01, 0.02]	.613
	SDQ prosocial	-0.01 [-0.02, 0.01]	.266
W3 gaming use	SDQ conduct	0.01 [-0.01, 0.02]	.283
	SDQ emotion	0.00 [-0.01, 0.01]	.730
	SDQ hyper	0.00 [-0.01, 0.00]	.259
	SDQ peer	0.02 [0.01, 0.03]	**.005**
	SDQ prosocial	0.00 [-0.02, 0.01]	.412
W3 TV use	SDQ conduct	0.01 [0.00, 0.02]	.201
	SDQ emotion	0.00 [-0.01, 0.02]	.473
	SDQ hyper	0.01 [0.00, 0.02]	**.049**
	SDQ peer	0.00 [-0.01, 0.01]	.994
	SDQ prosocial	0.00 [-0.01, 0.01]	.505
W2 computer use	SDQ conduct	0.01 [0.00, 0.02]	.128

	SDQ emotion	0.00 [-0.02, 0.01]	.518
	SDQ hyper	0.00 [-0.01, 0.01]	.534
	SDQ peer	0.00 [-0.01, 0.02]	.828
	SDQ prosocial	0.00 [-0.02, 0.01]	.521
W2 gaming use	SDQ conduct	0.02 [0.00, 0.03]	**.005**
	SDQ emotion	-0.01 [-0.02, 0.00]	.096
	SDQ hyper	-0.01 [-0.02, 0.00]	.125
	SDQ peer	-0.01 [-0.02, 0.00]	.148
	SDQ prosocial	-0.01 [-0.02, 0.01]	.321
W2 TV use	SDQ conduct	0.01 [0.00, 0.02]	**.030**
	SDQ emotion	-0.02 [-0.03, 0.00]	**.009**
	SDQ hyper	0.01 [0.00, 0.02]	**.024**
	SDQ peer	0.00 [-0.01, 0.02]	.612
	SDQ prosocial	0.00 [-0.01, 0.01]	.892

Notes. W = wave, SDQ = strengths and difficulties questionnaire.

3.3 Discussion/Conclusion

This chapter explored frequency of engagement with a number of forms of digital technology, and associations of this use with mental health and mental health-related variables in a large prospective cohort study, the Longitudinal Study of Australian Children (LSAC). Frequency of engagement differed with age and was also dependent on the type of digital technology measured. In general, TV was most commonly used, followed by gaming and social media. We note some sizable fluctuations across waves in estimates for engagement with these technologies, especially in the case of gaming use. Though this did not appear to be a function of amount of missing data across waves, it is possible that differences in the way the items were worded and reliance on self- or parent-report contributed noise to their measurement. We thus recommend some caution in interpreting effects involving frequency of use.

In the case of social media, the LSAC dataset enabled evaluation beyond frequency of use. Specifically, LSAC included measurement of content viewed and shared, as well as engagement in positive and negative social media activities, and efforts to protect oneself while on social media. One in five respondents reported engaging in at least one potentially harmful social media behaviour, and up to 40% did not engage in protective behaviours while online. In general, exposure to harmful content and negative experiences online were more common among girls than boys.

Positive correlations were observed between frequency of social media use, extent of exposure to negative content, engagement in potentially harmful social media behaviours, and efforts to protect oneself while online, though these effects tended to be small. Amount of time online may thus not be the decisive factor in determining *whether* someone experiences harm from social media use, though time spent online may increase the *frequency* of such experiences.

Across the observation period (age 0-19 years for the B cohort and 4-23 years for the K cohort), a number of prospective associations were observed in which: (1) digital technology use was predictive of increasing mental health symptom severity and (2) increased digital technology use was predicted by elevated mental health symptom severity. However, these significant effects were a minority of all tested

effects, and there was no clear pattern for the sample overall in terms of developmental window for greatest risk, nor risk clearly associated with one digital technology platform/type more so than another.

It is worth placing these findings within the context of study limitations and strengths. Analyses in the present chapter were limited to overall examination of two cohorts (infant and child), which provided opportunity to explore replication of pattern of findings. This approach, however, is insensitive to the potential for some subgroups within the sample to be more or less vulnerable to the effects of social media on mental health, a possibility captured in analyses of the CATS data (see technical chapters 3.1 and 3.2). LSAC also does not provide for examination of the types of social media platforms that participants are using, which may be another source of variance in whether and how social media impacts mental health. This possibility is taken up in analysis of the RAW data (see technical chapter 3.3).

LSAC repeatedly measures a population-representative sample of Australians as they transition from childhood to adolescence and young adulthood, providing insights into mental health and digital technology use across key developmental milestones. However, this sample was not recruited specifically for this purpose, and thus differences in digital technology use reported here from what has been seen in prior studies may be partially attributed to differences in recruitment strategy and stated purpose of the study for which participants agreed to participate. The broad range of constructs captured in LSAC provides a rich picture of development from childhood to adulthood, yet also places limits on the depth of inquiry for any particular aspect of development. We thus look to other chapters in this report for consistency and complementarity of findings across different study designs to provide this more complete picture of impacts of social media on mental health and mental health on social media (see Implications and Recommendations sections [Chapters 7 and 8] of the main report).

In summary, LSAC data provide some evidence of engagement in digital technology use, both in terms of amount of use and types of use. Weak positive associations were observed for frequency of use and engagement in both harmful and protective online behaviours, suggesting that time use may not be the decisive factor in terms of impacts of social media use. Within this context, the failure to find a strong and consistent signal for mental health impacts from social media use may be partially attributed to reliance on operationalisation in terms of amount of use rather than types of social media use, a concern raised previously in the literature (e.g., Jarman et al., 2022). The occurrence of both positive and negative social media activities as seen in LSAC may also produce countervailing influences on social media users, obscuring the true effects of social media on mental health (Jarman et al., 2026). We thus do not view the LSAC results as definitive, and instead encourage consideration of these findings jointly with other findings in the broader literature, including from studies of different designs (Lawlor et al., 2016).

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Chapter 4.

Nationally Representative Survey

Chapter 4: Nationally Representative Cross-sectional Survey

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4.1 Background

Building on the consultation with experts and stakeholders described in Chapter 1, and the review of empirical literature [to be] presented in Chapter 2, the present chapter focuses on how those priorities were translated into new data collection. The earlier components of the project provided data on the digital technologies most commonly used by children and young people, as well as the mental-health outcomes most frequently reported, and the mechanisms thought to underpin these relationships. This chapter will build on these earlier components and 1) outline how these sources of data informed the design and implementation of purpose-built surveys and interviews for young people aged 5-25, and 2) collect and analyse cross-sectional data from 5-12-, 13-17-, and 18-25-year-olds to examine use of digital technologies and the relationship of this use to positive and mental health indicators.

Much of the existing research in this area has focused narrowly on social media, treating screen time or overall time spent online as the primary variable of interest. This approach, whilst informative, does not capture the full complexity of how children and young people engage with digital technology in their everyday lives. The present study takes a broader and more nuanced view, examining a range of digital technologies and the specific patterns of use associated with them, including how young people use technology, why they use it, and what they derive from it, in order to better understand the associations between digital technology use and mental-health outcomes

The study reported on in this chapter used a multi-phase design to develop and implement a purpose-built survey on digital technology use and mental-health outcomes among children and young people. In Phase 1, survey questions developed by the research team were reviewed and refined. A sub-set of participants from the Chapter 1 consultation process provided feedback on the clarity, structure, age appropriateness, and relevance of these questions to current digital technology use and mechanisms linking digital technology use to mental health outcomes. Phase 2 involved administering the finalised survey to multiple samples of children and young people and collecting and analysing these data. During Phase 2, a proportion of parents or guardians of children aged 5–12 years indicated their willingness for their child to participate in additional interviews. Phase 3 comprised supplementary qualitative interviews with children aged 5–12 years whose parents or guardians provided consent following completion of the parent-report survey.

4.2 Methods

This chapter used a two-phase design to develop and implement a purpose-built survey on digital technology use and mental-health outcomes among children and young people. In Phase 1, survey questions developed by the research team were reviewed and refined. A sub-set of participants from the Chapter 1 co-design process provided feedback on the clarity, structure, age appropriateness, and relevance of these questions to current digital technology use. Phase 2 involved administering the finalised survey to multiple samples of children and young people, alongside supplementary qualitative interviews with a sub-sample of children aged 5–12 years. Phase 3 involved supplementary qualitative interviews with children aged 5–12 years, conducted

with children whose parents or guardians indicated their willingness for their child to participate following completion of the parent-report survey.

4.2.1 Phase 1: Consultation and survey development

4.2.1.1 Participants

Eight participants were included in Phase 1. Participants were drawn from those who had taken part in the Chapter 1 co-design process. This included two participants from each age group (parents of children aged 5–12 years, adolescents aged 13–17 years, and young people aged 18–25 years), with one neurodivergent participant included in the 13–17 age group and one in the 18–25 age group. Of the eight participants, seven identified as female and one identified as male.

4.2.1.2 Materials

Phase 1 consultation focused on researcher-developed survey items assessing demographic information, digital technology use, engagement, and hypothesised mechanisms. Participants were asked to provide feedback on the inclusiveness of demographic questions and response options; the clarity of questions about device and platform use; and items assessing engagement with social media (e.g., "How often do you tap 'like' or use reactions on posts or videos?"). Feedback was also sought on items assessing hypothesised mechanisms of use (e.g., "Social media offers me an escape from my everyday life"). To support review of the screen time items, participants were provided with brief written instructions and device-specific screenshots illustrating how to access screen time information on iOS and Android devices and were asked to comment on the clarity of these materials.

4.2.1.3 Procedure

Participants who had taken part in the Chapter 1 co-design activities were invited via email to participate in Phase 1. Those who expressed their interest in participating were asked to indicate their availability, after which participants were purposively selected to maximise diversity across age groups, gender and location. Selected participants were emailed a participant information statement and consent form. Upon provision of informed consent, participants were invited to schedule a one-on-one online session with a member of the research team via Zoom.

Each session took approximately 30 minutes. Prior to the session, participants were provided with a Word document containing the full draft survey. The draft survey included both researcher-developed items, for which feedback was sought, and validated mental-health outcome measures, which were included to provide context and flow but were not the focus of feedback.

At the start of each session, the researcher introduced the study and outlined the purpose of the survey. Sessions then followed a think-aloud approach. Participants were asked to share their screen while navigating the draft survey and to verbalise their thoughts, reactions, and any points of confusion or difficulty as they progressed through the questions. Participants were informed that they were not required to provide genuine responses to survey items. If a participant paused for approximately 15 seconds, the researcher prompted them to continue verbalising their thoughts. During the session, researchers followed a semi-structured facilitation protocol. When participants raised questions or expressed uncertainty, researchers

first asked participants to explain how they had interpreted the item. Where interpretations aligned with the intended meaning, participants were encouraged to suggest ways the wording could be improved for clarity. Where interpretations differed, researchers clarified the intended meaning and invited suggestions for revising the item to better capture the construct.

All sessions were video recorded. Verbal feedback was collated and de-identified prior to review. Participants received a $20 gift card as a token of appreciation for their time.

4.2.1.4. Data analysis

All verbal feedback from think-aloud sessions was transcribed, and written comments were collated. Feedback was reviewed systematically by lead researchers to identify issues related to clarity, wording, interpretation, age appropriateness, and usability of researcher-developed survey items. Recurring concerns were prioritised for revision, and proposed changes were discussed until consensus was reached before implementation. Validated mental-health measures were reviewed only to ensure survey flow and completeness and were not modified. A record of changes made between draft and final survey versions was maintained to document the refinement process.

4.2.2 Phase 2: Survey Data Collection

4.2.2.1 Participants

A total of 1,670 participants completed the survey, comprising 660 parents reporting on children aged 5-12 years, 453 adolescents aged 13–17 years, and 557 young adults aged 18–25 years. Data collection started and finished in November 2025 (during the school term for child and adolescent participants).

Participants were recruited through a combination of probability-based national sampling conducted by the Social Research Centre (SRC) and targeted recruitment undertaken by the La Trobe University research team via university and partner platforms, third-party recruitment services (e.g., Prolific), and professional networks associated with the research centre. Detailed demographic characteristics for each participant group are presented in Table 4.1.

Across both recruitment pathways, eligibility criteria included residence in Australia and age eligibility (young people aged 13–25 years, or parents/guardians of children aged 5–12 years). All potential participants were provided with a Participant Information Statement and completed informed consent prior to participation, in accordance with the ethical requirements of La Trobe University and the Social Research Centre.

Table 4.1. *Demographic characteristics by cohort of survey participants.*

Characteristics	5–12 years[a]	13-17 years	18–25 years
Mean Age, (SD)	44.9 (8.9)[b]	15.3 (1.3)	22.1 (2.2)
Child Age	8.7 (2.2)[c]		
Gender, n (%)			
Female/Girl	310 (47.0%)	220 (48.9%)	302 (54.2%)
Male/Boy	337 (51.1%)	194 (43.1%)	181 (32.5%)
Non-binary	2 (0.3%)	11 (2.4%)	28 (5.0%)
Trans-man	–	7 (1.6%)	20 (3.6%)
Trans-woman	–	6 (1.3%)	10 (1.8%)
Others	–	2 (0.4%)	5 (0.9%)
NA[d]	–	10 (2.2%)	11 (2.0%)
Sexuality[e], n (%)	–		
Asexual	–	13 (2.9%)	32 (5.7%)
Bisexual	–	32 (7.1%)	75 (13.5%)
Gay	–	4 (0.9%)	13 (2.3%)
Lesbian	–	9 (2.0%)	30 (5.4%)
Pansexual	–	7 (1.6%)	22 (3.9%)
Queer	–	6 (1.3%)	37 (6.6%)
Straight	–	284 (63.1%)	318 (57.1%)
Other	–	1 (0.2%)	3 (0.5%)
NA[d]	–	94 (20.9%)	27 (4.8%)
Neurodivergent, n (%)			
Yes	170 (25.8%)	74 (16.4%)	174 (31.2%)
Autism	110	55	113
ADHD	131	49	111
Dyslexia	20	7	14
Dyscalculia	12	7	7
Developmental Coordination Disorder (DCD)	10	5	6
No	420 (63.6%)	289 (64.2%)	278 (49.9%)
Unsure	34 (5.2%)	3 (0.7%)	16 (2.9%)
NA[d]	36 (5.5%)	84 (18.7%)	89 (16.0%)
Cultural background, n (%)			
Aboriginal	22 (3.3%)	18 (4.0%)	8 (1.4%)
Aboriginal and Torres Strait Islander	0	0	1 (0.2%)
Torres Strait Islander but not Aboriginal origin	1 (0.2%)	0	0
Australian (non-Aboriginal, non-Torres Strait Islander)	468 (70.9%)	319 (70.9%)	308 (55.3%)

Characteristics	5–12 years[a]	13-17 years	18–25 years
Caribbean Islander	1 (0.2%)	0	1 (0.2%)
Central American	0	1 (0.2%)	2 (0.4%)
New Zealand (non-Māori)	8 (1.2%)	4 (0.9%)	9 (1.6%)
New Zealand (Māori)	5 (0.8%)	3 (0.7%)	3 (0.5%)
North African/Middle Eastern	13 (2.0%)	10 (2.2%)	18 (3.2%)
North American	7 (1.1%)	1 (0.2%)	1 (0.2%)
North-East Asian	10 (1.5%)	11 (2.4%)	43 (7.7%)
North-West European	25 (3.8%)	25 (5.6%)	48 (8.6%)
Micronesian	1 (0.2%)	0	0
Polynesian	0	2 (0.4%)	1 (0.2%)
South American	3 (0.5%)	5 (1.1%)	3 (0.5%)
South-East Asian	52 (7.9%)	39 (8.7%)	95 (17.1%)
Southern/Central Asian	16 (2.4%)	12 (2.7%)	24 (4.3%)
Southern/Eastern European	22 (3.3%)	18 (4%)	38 (6.8%)
Sub-Saharan African	7 (1.1%)	2 (0.4%)	3 (0.5%)
State or territory of residence, n (%)			
New South Wales	167 (25.3%)	109 (24.2%)	185 (33.2%)
Victoria	238 (36.1%)	170 (37.8%)	182 (32.7%)
Queensland	113 (17.1%)	77 (171%)	74 (13.3%)
South Australia	40 (6.1%)	27 (6.0%)	34 (6.1%)
Western Australia	59 (8.9%)	34 (7.6%)	36 (6.5%)
Tasmania	16 (2.4%)	13 (2.9%)	12 (2.2%)
Australian Capital Territory	16 (2.4%)	5 (1.1%)	18 (3.2%)
Northern Territory	4 (0.6%)	4 (0.9%)	3 (0.5%)
NA[d]	7 (1.1%)	11 (2.4%)	13 (2.3%)

Note. [a] parent-report; [b] age of the parent completing this questionnaire, [c] child's age (as reported by the parent) that the parent based their responses on, [d] participant did not select any options; [e] parents were not asked to report the sexuality of their child

4.2.2.2 Measures

The survey comprised demographic items, measures of digital device and platform use, screen time and app usage, digital engagement behaviours, and validated mental health and wellbeing measures. For children aged 5–12 years (parent-carer report), all items were completed by a parent or carer with reference to one specific child. Where a parent had more than one child within this age range, they selected one child to report on. Full versions of the national survey across for 18-25 years old are presented in Appendix A.

The survey was designed to be age-appropriate across all cohorts. For participants aged 13–17 and parents/carers of children aged 5–12, the survey was designed to be completed within 8–13 minutes. For participants aged 18–25, the survey was estimated to take approximately 20 minutes to complete. Unless otherwise specified, all measures described below were administered to all participants within the relevant age group, using age-appropriate items. Where measures were age-specific or conditionally administered, this is noted accordingly.

Demographics

Participants provided self-reported demographic information, including age, sex assigned at birth, gender identity, sexual orientation, country of birth, cultural background, and neurodivergent status, with formal diagnoses reported where applicable. Throughout this report, participants who self-identified as not being neurodivergent, or unsure about their neurodivergent status will be referred to as non-neurodivergent. Participants who self-identified as being neurodivergent or looking into concerns or seeking a diagnosis will be referred to as neurodivergent. For the parent-reported 5–12-year-old cohort, demographic information was collected for both the parent and the child.

In this study, gender diversity was defined as participants who, in response to the item "What is your gender?", selected Trans man, Trans woman, or Non-binary. LGBTQA+ identity was defined as participants who were gender diverse and/or who, in response to the item "What is your sexuality or sexual orientation?", selected Asexual, Bisexual, Gay, Lesbian, Pansexual, Queer, or Something else.

Digital devices, platforms, and screen time

Participants were asked to report the digital devices and platforms they or their child used regularly (for parent 5-12). Screen time was assessed by asking participants to open the screen-time feature on their own phone, or their child's phone, and enter the information shown into the survey. This included overall screen time as well as the five most-used apps. Participants reported the total hours and minutes spent on each of these apps over the previous seven days. Parents in the 5–12 cohort completed these items with reference to their child's technology use. Participants were also given the option to upload screenshots of their device's screen-time summary if they wished.

Digital engagement behaviours

Participants were asked about how they typically engaged with digital technologies, including social media, gaming, and other online platforms. This included reporting how often they viewed, posted, or shared content; messaged or chatted with others; liked or reacted to content; commented; and used beauty filters or special effects. Participants also indicated whether the content they saw was mainly from people they followed, such as friends or favourite creators, or recommended by the platform. Responses were recorded on a 7-point scale ranging (1 = *never/none of the time/none of the content,* 7 = a*ll of the time*).

Participants were then asked to estimate the amount of time they usually spent on different types of platforms, including social media, gaming, long-form video, and AI-based platforms, using a 9-point scale ranging (1 = *half an hour,* 8 = *about eight hours more per day*). For the parent

of 5–12 and young people aged 18-25, time spent on each platform was reported separately for weekdays and weekends, whereas participants in the 13-17 cohort reported average time spent across a typical week. Participants who reported playing games completed additional items about how they typically played, including whether they played alone, with friends, with others online, or for educational purposes.

4.2.2.3 Positive Mental Health Outcomes

Wellbeing

Overall wellbeing was measured using the Short Warwick–Edinburgh Mental Well-being Scale (SWEMWBS; Stewart-Brown et al., 2009), a seven-item scale assessing positive feelings and functioning over the past two weeks (e.g., "I've been feeling optimistic about the future"). Items were rated on a 5-point scale ranging from 1 (*none of the time*) to 5 (*all of the time*), yielding total scores between 7 and 35, with higher scores indicating greater positive mental wellbeing.

Identity Affirmation

Positive feelings toward one's identity were assessed using the Identity Affirmation subscale of the Lesbian, Gay, and Bisexual Identity Scale (LGBIS; Mohr & Kendra, 2011). This three-item subscale captures the extent to which participants feel proud of and comfortable with their sexual or gender identity (e.g., "I feel proud of my sexual orientation"). Items were rated on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*), yielding total scores between 3 and 18, with higher scores indicating greater identity affirmation. This measure was administered only to participants aged 13–17 and 18–25 who identified as LGBTQA+.

Body Esteem

Body esteem was assessed using three items from the Appearance subscale of the Body Esteem Scale for Adolescents and Adults (Mendelson et al., 2001), which measures satisfaction with one's physical appearance. Items included: "I like what I see when I look in the mirror," "I'm pretty happy about the way I look," and "I like what I look like in pictures." Higher scores indicated more positive body esteem. The first item ("I like what I see when I look in the mirror") was omitted from the 13–17-year-old survey.

Self-Concept Clarity

Self-concept clarity was assessed using a single item adapted from the Self-Concept Clarity Scale (Campbell et al., 1996; Schwartz et al., 2011). Participants responded to the statement *"In general, I have a clear sense of who I am and what I am*" on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating greater clarity and stability in participants' sense of self. This item was only administered among young children aged 5-12 and adolescents aged 13-17.

4.2.2.4 Negative Mental Health Outcomes

Loneliness

Loneliness was measured using the UCLA 3-Item Loneliness Scale (Hughes et al., 2004), which assesses how often participants feel isolated or left out (e.g., "*How often do you feel left out?*").

Items were rated on a 3-point scale ranging from 1 (*hardly ever*) to 3 (*often*), with higher scores reflecting greater loneliness.

Depressive Symptoms

Depressive symptoms were assessed using age-appropriate versions of the Patient Health Questionnaire (PHQ). Participants aged 18–25 completed the PHQ-9 (Kroenke et al., 2001), which assesses the frequency of nine depressive symptoms over the past two weeks on a 4-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Total scores range from 0 to 27, with established cut-points of 5, 10, 15, and 20 indicating mild, moderate, moderately severe, and severe depression, respectively.

Participants aged 13–17 completed a shortened adolescent version based on the Patient Health Questionnaire–Adolescent (PHQ-A; Johnson et al., 2002), comprising three items identified as most informative for adolescent populations: low mood or irritability, reduced interest or pleasure in activities, and sleep difficulties (Items 1, 2, and 6; Perlis et al., 2025). Items were rated on the same 4-point scale as the PHQ-9, with higher scores indicating greater depressive symptomatology.

For the parent-reported 5–12 cohort, a modified version of the PHQ-9 was used in which items relating to suicide and self-harm were excluded. An additional item assessing hopelessness, adapted from the General Hopelessness Scale (Drinkwater et al., 2023), was included in their place. Parents responded to the statement "*My child is hopeful about the future*" on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*); this item was reverse scored so that higher scores reflected greater hopelessness.

Generalised Anxiety

General anxiety was measured using the Generalised Anxiety Disorder–2 (GAD-2; Kroenke et al., 2007), a two-item measure assessing the frequency of feeling nervous, anxious, or on edge, and being unable to stop or control worrying. Items were rated on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day), yielding total scores between 0 and 6, with scores of 3 or higher commonly used to indicate clinically significant anxiety symptoms.

Social Anxiety

Social anxiety was assessed using the Mini–Social Phobia Inventory (Mini-SPIN; Connor et al., 2001). For participants aged 13–17, a shortened two-item version was administered, comprising the items "*Fear of embarrassment causes me to avoid doing things or speaking to people*" and *"I avoid activities in which I am the centre of attention,*" rated on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). For participants aged 18–25, the full three-item Mini-SPIN was used, with a total score of 6 or greater applied as the established clinical cut-off for screening for social anxiety disorder.

Eating Disorder Risk and Symptomatology

Eating disorder risk and symptomatology were assessed using the InsideOut Institute Screener (IOI-S; Bryant et al., 2021, 2023). The IOI-S is designed to identify both high-risk cases and early-stage eating disorder symptomatology across a broad range of psychopathology, including an individual's relationship with food (e.g., *"How is your relationship with food? For example: is food*

and eating worry free, or is it full of worry and stress"), the extent to which body shape and weight determines self-worth, preoccupation with food or body weight, food-related anxiety, loss of control overeating, and compensatory behaviours. Items were rated on a 6-point Likert scale ranging from 1 (*never*) to 5 (*all of the time*), yielding total scores between 6 and 30, with higher scores indicating greater risk. IOI-S total scores are interpreted as follows: ≤12 = low risk; 13–15 = moderate risk (monitor); 16–18 = high risk (monitor and engage in psychoeducation with a healthcare professional); and ≥19 = likely sub-threshold or threshold eating disorder (refer to specialist services).

Body Dissatisfaction

Body dissatisfaction was assessed using overevaluation and preoccupation items from the Eating Disorder Examination Questionnaire–Short (EDE-QS; Gideon et al., 2016), a 12-item measure assessing eating disorder symptoms over the preceding seven days (e.g., "*How dissatisfied have you been with your weight or shape?*") This measure was not administered to participants aged 13–17, in order to keep survey completion time within the target range of 8–13 minutes.

Aggression and Anger

Aggression and anger were assessed within the parent-reported 5–12 cohort using a parent-report measure adapted from the Patient-Reported Outcomes Measurement Information System (PROMIS; Irwin et al., 2012; Pilkonis et al., 2011), validated for children aged 1–17 years (Kaman et al., 2022). Parents rated their child's irritable and angry mood over the past seven days (e.g., "My child felt mad") across six items, using a 5-point scale ranging from 0 (*never*) to 4 (*almost always*), yielding total scores between 0 and 24, with higher scores indicating greater levels of aggression and anger.

Mechanisms

Items assessing potential mechanisms of digital technology use were developed by the research team in consultation with young people, and were further informed by consultations with experts and stakeholders as described in Chapter 1. Mechanism items were only presented to participants who endorsed using the relevant digital technology (i.e., social media, gaming, generative AI, and AI companions). Responses were recorded on a 5-point scale ranging from 1 (*not at all*) to 5 (*very much so*), with higher scores indicating greater endorsement of the mechanism.

Mechanisms were assessed across all three age groups for social media, gaming, and AI companions. Generative AI mechanisms were not administered to participants aged 13–17, in order to keep the survey within the target completion time of 8–13 minutes for that cohort. Across all digital technologies, both positive mechanisms (e.g., identity exploration, freedom, acceptance, and self-expression) and negative mechanisms (e.g., bullying and social comparison) were assessed using a consistent set of items, with some adaptation across digital technology types and age groups where appropriate. For example, items relating to feeling pressured to present oneself in a sexualised way were not administered to the parent-reported 5–12 cohort. Further details regarding the specific mechanism items administered across age groups and digital technology types are provided in Appendix A.

Procedure

Participants were invited to share their experiences of digital technology use and its perceived impact on mental health and wellbeing by completing an online survey via QuestionPro. Young people aged 13–25 years completed a self-report survey, while parents or guardians completed a parent-report survey on behalf of children aged 5–12 years.

The survey was standardised across participant groups, with a core set of questions administered to all participants. The version completed by adolescents aged 13–17 years served as the base survey, with slightly expanded versions administered to parents of children aged 5–12 years and to young people aged 18–25 years to capture age-specific experiences. For example, the item "I feel pressured to present myself in a sexualised way on social media" was administered to participants aged 18–25 only. Question wording was adapted as needed to reflect self- versus parent-report contexts (e.g., "What do you use...?" versus "What does your child use...?"), and additional items were included for participants who identified as LGBTQA+ where relevant. Survey completion time varied by group, with the adolescent (13–17 years) survey taking approximately 8–13 minutes to complete, and the parent-report (5–12 years) and young adult (18–25 years) surveys taking approximately 20 minutes.

At the conclusion of the parent-report survey, parents of children aged 5–12 years were given the option to nominate their child to participate in an individual structured interview. These interviews were conducted with the parent present and mirrored the topics covered in the parent-report survey, using age-appropriate language and response options to enable direct input from children regarding their digital technology experiences.

4.2.3 Phase 3 Structured interviews of children aged 5-12

4.2.3.1 Participants

Of the 660 parents of children aged 5–12 years, 143 expressed interest and provided consent for their child to take part in a follow-up interview, and 42 children (17 females and 25 males) subsequently completed an interview with a member of the research team. The mean age of participating children was 8.8 years (SD = 2.01).

4.2.3.2 Method

Most of the measures included in the interview were the same as those used in the parent-report. However, to keep the interview to approximately 20 minutes and reduce the child's mental load, some items were omitted. For the full interview protocol, please refer to Appendix B.

Digital devices and platforms

Within the interview, children were first asked to indicate whether they regularly use the following types of digital technology: smartphone, mobile phone, tablet, laptop/computer, gaming console, and television. Once they indicated which devices they use, they were asked to rank up to six of these in order of preference, to index their relative importance. After asking about devices, we then asked about the platforms they use regularly, including social media, long-form video platforms, messaging apps, gaming platforms, AI companion tools, AI

generative tools, forums, and chat platforms. For each digital technology and platform type, children indicated whether they use it regularly (0 = does not use regularly, 1 = uses regularly).

Digital technology behaviours

Children were then asked how much time they spend engaging in specific online behaviours, such as using social media to look at other people's content, sharing and posting content, messaging or chatting, creating and posting videos, liking or reacting to content, writing comments, using beauty filters, and using special effects. Responses were recorded on a 4-point scale from 0 (never) to 3 (a lot), with an additional option to select "not sure". Depending on which types of digital technology they reported using, children were also asked about the duration of their engagement with long-form videos, AI chatbots, generative AI, gaming, and participation in online groups and communities.

Mechanisms

Mechanism items were only presented to children aged 5-12 who indicated that they used those technologies (i.e., social media, gaming, AI companions). To keep the measures simple and developmentally appropriate for children aged 5–12, responses were recorded on a 3-point scale ranging from 1 (not at all) to 3 (very true), with higher scores indicating greater endorsement of the mechanism. There was also an option 0 (unsure/don't know).

Mental Health Outcomes

For children aged 5–12 years, the interview-based mental health measures closely mirrored those used in the parent-report survey for this age group, but were adapted for child self-report, simpler wording, and oral administration. Below we describe the measures and highlight the main differences from the parent-report version.

Wellbeing was assessed using the Personal Wellbeing Index – School Children (PWI-SC; Cummins & Lau, 2005), as in the parent survey. Items were read aloud and clarified as needed to ensure comprehension, but the content and scaling remained consistent with the parent-report measure. For example, children were asked, "Overall, how happy are you with your life as a whole?" and responded using a 5-point scale from 1 ("Not at all happy") to 5 ("Very, very happy").

Negative mental health outcomes covered loneliness, depression, generalised anxiety, social anxiety, and aggression. Loneliness items were adapted from the UCLA Loneliness Scale, but reworded into brief, concrete questions and contextualised to be more relevant and understandable for younger children. For example, children were asked, "Do you ever feel left out of things with your friends or family?" and "Do you ever feel like you're all alone/by yourself, even when you are around your friends or family?"

Depressive symptoms were measured using the same core constructs as in the parent survey: the two items from the Patient Health Questionnaire (PHQ-2) and one item from the General Hopelessness Scale (reverse coded). In the interview, items were presented in child-friendly language and followed a two-step format. Children were first asked whether they had "had little interest or fun in doing things" and whether they had "felt sad/down, depressed". For each endorsed symptom, they were then asked, "If yes, how often have you felt like that?", to capture

frequency. This structure parallels the parent-report content but is tailored to an interviewer-led format.

Generalised anxiety was assessed using the Generalized Anxiety Disorder 2-item scale (GAD-2; Kroenke et al., 2007), and social anxiety using the Mini-SPIN (Connor et al., 2001), consistent with the parent-report survey.

Aggression was measured using a brief subset of items from the PROMIS anger/aggression item bank (Irwin et al., 2012; Pilkonis et al., 2011; Kaman et al., 2022). In contrast to the parent-report survey, which used a fuller set of items, only three PROMIS items were included in the child interview to minimise burden and maintain an interview length of approximately 20 minutes, while still capturing core aspects of aggressive behaviour.

Eating-disordered risk and body esteem were assessed using the same measures as in the parent-report survey, namely the Screener for Eating Disorders (Bryant et al., 202) and items from the Appearance subscale of the Body Esteem Scale for Adolescents and Adults (Mendelson et al., 2001), respectively.

Procedure

Once parents had consented to the expression of interest, they were given a link to book their child in for an interview with a member of the research team. Given the age of the children, parents were required to be present at the start of the interview (and to remain in the background throughout) as they might help to explain items in a way that was easier for the child to understand. However, if a parent began to answer a question instead of the child, the researcher prompted the child to respond and gently reminded the parent to allow the child to answer.

At the start of the interview, the researcher introduced themselves, sought assent from the child again, and informed the child that they could take a break whenever they needed. To aid understanding, the research team shared their screen and used visual prompts, including simple pictures of different technologies. Children were first asked, “Do you know what these are?” and then, “Which ones do you use?” and “Which ones are your favourite?”. For example, an iPhone was used to represent a smartphone and a flip phone to represent a mobile phone. In addition to giving verbal responses, children could point to the picture corresponding to their answer (for example, pointing to the laptop/computer image to indicate it was their favourite device), use a thumbs up or thumbs down to indicate agreement or yes/no or regular/non-regular use, or, if they preferred, state a number from 1 to 3 to indicate how much they agreed.

4.2.3.3 Data analysis

Data analyses for both survey and interview responses were conducted using R (version 4.5.2) Prior to analysis, data were screened for completeness, plausibility, and out-of-range values, which were treated as missing. Scale-based measures were scored in accordance with published guidelines. Analyses were conducted separately for each age cohort.
Descriptive statistics (means, standard deviations, medians, ranges, and frequencies) were calculated to summarise participant characteristics, patterns of digital technology use, and mental-health and wellbeing outcomes. For multiple-select items (e.g., devices or platforms

used), percentages represent the proportion of respondents within each age group and do not sum to 100%. Distributions of Likert-type items were examined to assess variability and identify skewness and potential outliers.

4.3.1 Correlations and subgroup analysis

Associations between digital-technology variables (e.g., time spent) and mental-health outcomes were examined using Spearman's correlation coefficients. Spearman correlations were selected because some variables were measured using ordinal Likert-type scales and because this non-parametric approach is less sensitive to outliers and departures from normality than Pearson correlations.

To examine whether associations differed across demographic groups (e.g., gender-grouped, sexuality-grouped, and neurodivergence-grouped categories), moderation analyses were conducted using linear regression models that included interaction terms between digital-technology variables and grouping variables. Significant interactions were probed using simple slopes. Results are presented in summary tables displaying the direction and significance of associations within each subgroup, alongside the unstandardised regression coefficient. For ease of interpretation, only subgroup findings where the pairwise comparison between groups was statistically significant are reported. This means that even where associations were examined within a subgroup, they are only presented and discussed when the difference between subgroups (e.g., between females and males, or between LGBTQA+ and non-LGBTQA+ participants) was statistically significant, indicating that the association meaningfully differed as a function of group membership. Model assumptions were assessed through inspection of residuals.

4.3.2 Decision tree analysis

Decision tree models were constructed to investigate how social media, gaming, and AI generative technology mechanisms interact with and statistically predict mental health outcomes. Decision tree analysis is a machine-learning technique that recursively partitions individuals into subgroups based on predictor variable scores, enabling the exploration of complex, non-linear interactions among a large number of variables in an exploratory manner (Breiman, 2017; Yong et al., 2020). Trees were generated using the *rpart* (Therneau et al., 2015) and caret (Kuhn, 2011) packages in R, producing a hierarchical tree structure in which each path from the root node to a terminal node represents a unique combination of predictors associated with a predicted mean outcome value for that subgroup.

Analyses were conducted separately by age cohort and technology type to maintain sufficient sample sizes and reduce the risk of overfitting. For the 18–25 cohort, separate decision tree models were fitted for social media, gaming, and AI generative mechanisms, each restricted to users of the relevant technology. For the 13–17 cohort, models were fitted for social media and gaming mechanisms among users, and for the 5–12 cohort, decision trees were fitted for gaming mechanisms among gamers only. In all cases, only participants who reported using the relevant technology were included, as mechanism questions were only administered to users. Non-users were excluded by design, as their missing data on mechanism variables reflected non-participation rather than data quality issues. Decision trees were estimated for all tested

outcomes except LGBTQA+ identity affirmation, which was only administered to LGBTQA+ participants and therefore had an insufficient sample size to support a valid tree.

To mitigate overfitting, data were split into training (70%) and test (30%) sets, with models built on the training data and cross-validated on the test data. The minimum terminal node size (*minbucket*) was evaluated across seven values (10–70), with the optimal value selected based on the highest average R^2 across all outcomes on the test data. Trees were grown using a complexity parameter and subsequently pruned to the value minimising cross-validated error, reducing model complexity and improving interpretability and generalisability (Bramer, 2007). Variable importance scores were extracted from each pruned tree to rank mechanisms by their overall predictive contribution to each outcome. These importance scores reflect the total reduction in prediction error attributable to each mechanism across all splits in the tree (including surrogate splits), whereas the tree diagrams show the main primary splits and cut-offs that define the subgroups.

All statistical tests were two-tailed, with an alpha level of .05. Where appropriate, effect sizes were reported. Tables and figures were generated using R packages for data management, visualisation.

4.3 Results

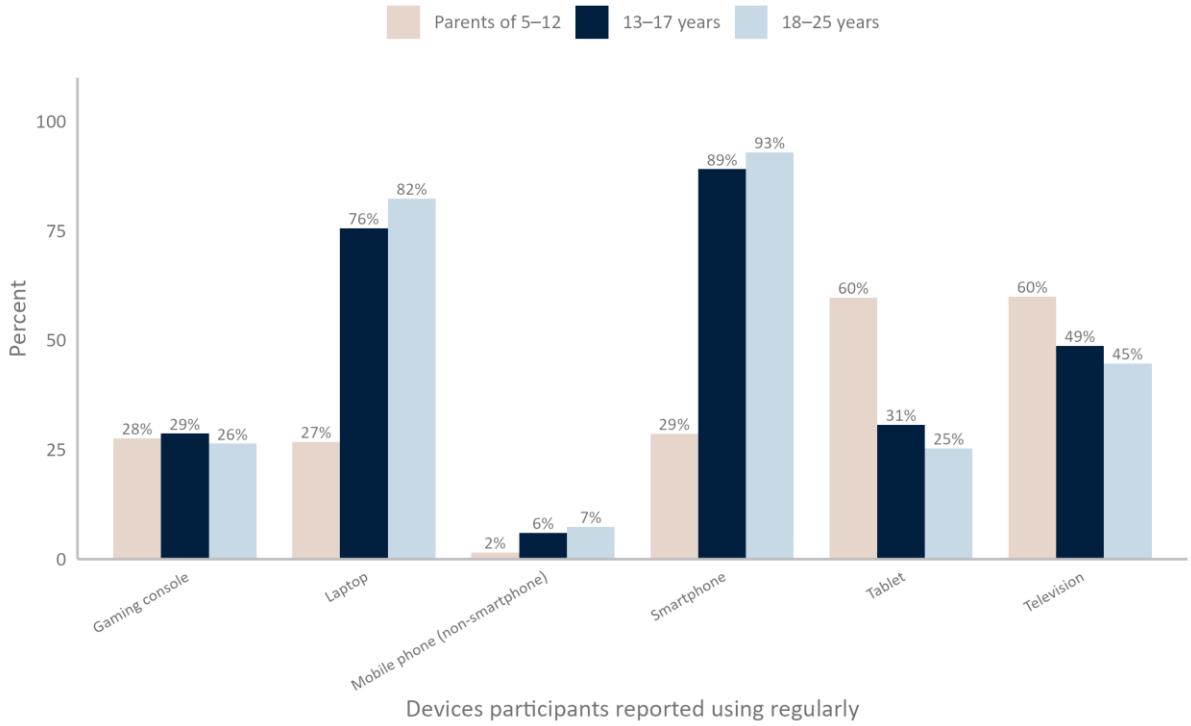
4.3.1 Digital Technology Use

This section provides a description of the frequency and extent of use of digital technology devices and platforms, time spent using screens and different platforms, and behaviours engaged with while using digital technologies among children, adolescents, and young adults. Throughout this section of the report, description of digital technology use is presented first for children aged 5–12 years (combining interview and parent-report data), followed by description for adolescents aged 13–17 years, and then for young adults aged 18–25 years. For children aged 5-12, data will be presented from parent-report on their digital technology use, and where available, also from child self-report from interviews. Throughout the report, data will be specified as interview-reported when presented, otherwise, data on the child cohort is assumed to be parent-reported.

4.3.1.1 Commonly used devices across age groups

Figure 4.1 summarises the devices and platforms reported to be used regularly by children, adolescents, and young adults from survey responses.

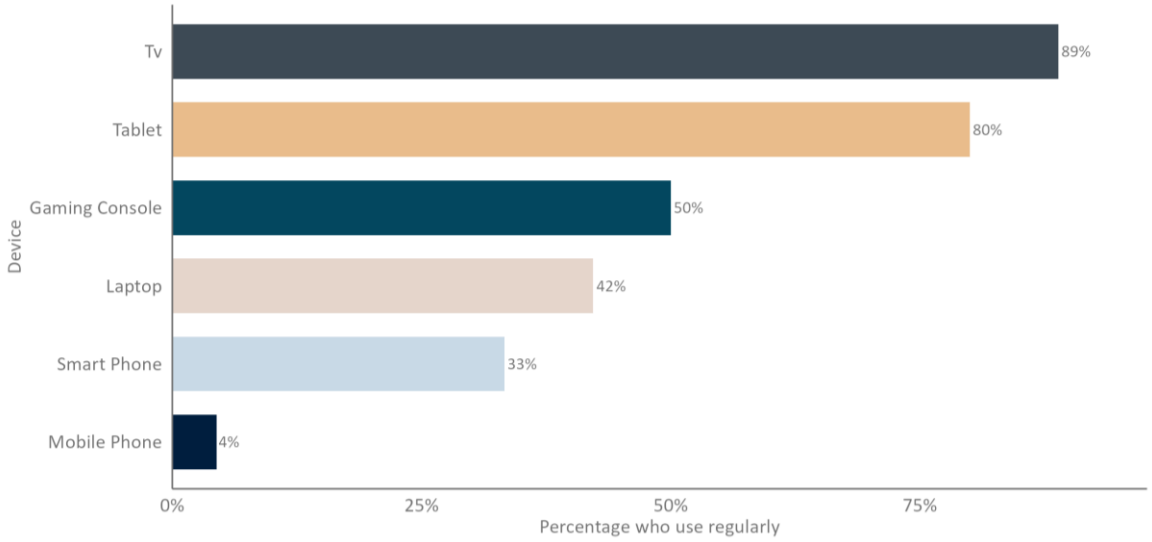
Figure 4.1. *Commonly used devices reported across age groups.*



Note. Television use includes both broadcast and streaming.

For children aged 5–12 years, parent-reported data indicate a distinct pattern of device use, with tablets and televisions being the most commonly used devices. This is consistent with the findings from the 5–12-year-old children's interviews (shown in Figure 4.2). Smartphones and laptops were reported as less frequently used among this age group than among older groups, though regular usage was still indicated for approximately one-quarter to one-third of 5–12-year-old participants.

Figure 4.2. *Commonly used devices reported among children 5-12 in child interview*



Among adolescents, smartphones were the most commonly used device, followed by laptops and televisions, with tablets and gaming consoles reported by smaller proportions of participants. A similar pattern was observed for young adults, for whom smartphones were also the most commonly used device, followed by laptops and televisions, with tablets and gaming consoles used less frequently. Gaming consoles were used at similar levels across all age groups and were typically the fourth or fifth most commonly used device out of the six assessed. In contrast, non-smartphone mobile phones were rarely used by participants from any age group.

4.3.1.2 Daily screen time

Daily screen time was high across all age groups as shown in Table 4.2, with participants spending 5-6 hours on their handheld device on average per day. Screen time increased modestly with age, from childhood through young adulthood. The proportion of participants spending at least 8 hours per day on screens also showed a slight age-related increase, ranging from about 17% to 19%

Table 4.2 *Daily screen time (hours per day) and proportion of participants spending ≥ 8 hours/day by age group*

Age group	Mean (SD)	Min – Max	Proportion with ≥ 8 hours/day of screen time
5–12	5.3 (4.8)	0.1 – 22.9	17.1%
13–17	5.9 (3.6)	1– 22.7	18.3%
18–25	6.2 (3.3)	0.1 – 23	19.0%

4.3.1.3 Commonly used platforms across age groups

The most commonly used platforms and apps were assessed using two complementary approaches: 1) participants reported their top five most-used apps based on their phone usage data, and 2) participants selected from a predefined list the platforms and apps they used most frequently.

Most commonly used apps according to device-use data

Table 4.3 presents the most commonly used apps across cohorts, according to phone usage data, with the top five most used apps included here. For children, a distinct profile was evident, with YouTube and Roblox most frequently reported, followed by website browsers (Safari and Google Chrome), TikTok, and child-specific messaging platforms such as Messenger Kids.

Among adolescents, the top apps were predominantly social media and messaging platforms, with Instagram, Snapchat, TikTok, and YouTube most frequently reported. Young adults showed a similar pattern to adolescents, with Instagram the most highly used app, followed by website browsers (Safari and Google Chrome), TikTok, and YouTube, with messaging apps such as Messages and Messenger the fifth most used app for this group.

Table 4.3. *Top five apps based on screen time data recorded on phones or tablets.*

Age group	Rank	App	Weekly use (Mean, Min–Max hours)	% of spending > 35 hours per week	n
5-12					
	1	YouTube	6.1 (0.1– 46.2)	2.6%	104
	2	Roblox	4.5 (0.1 – 25.1)	0%	71
	3	Website browsers [a]	1.9 (0.1 – 17.3)	0%	34
	4	TikTok	7.2 (0.2– 34.7)	0%	27
	5	Messenger Kids	1.9 (0.2– 15.5)	0%	24
13-17					
	1	Instagram	5.3 (0.2– 61)	1.1%	184
	2	Snapchat	5.1 (0.1–30)	0%	170
	3	TikTok	7.6 (0.2– 40)	0.6%	166
	4	YouTube	6.3 (0.3–77.9)	1.3%	155
	5	Website browsers [a]	2.6 (0.2–34.2)	0%	113
18-25					
	1	Instagram	6.0 (0.1– 40.9)	0.3%	334
	2	Website browsers [a]	4.6 (0.2 – 52)	0.4%	254
	3	TikTok	8.4 (0.1 – 73.2)	1.4%	219
	4	YouTube	7.6 (0.1 – 51.6)	2.6%	189
	5	Messaging apps [b]	2.8 (0.2 –71)	0.6%	158

Note. [a] Website browsers reported are Google Chrome and Safari; [b] For adults 18-25, messaging apps include Message (*n* =86) and Facebook Messenger (*n*=72)

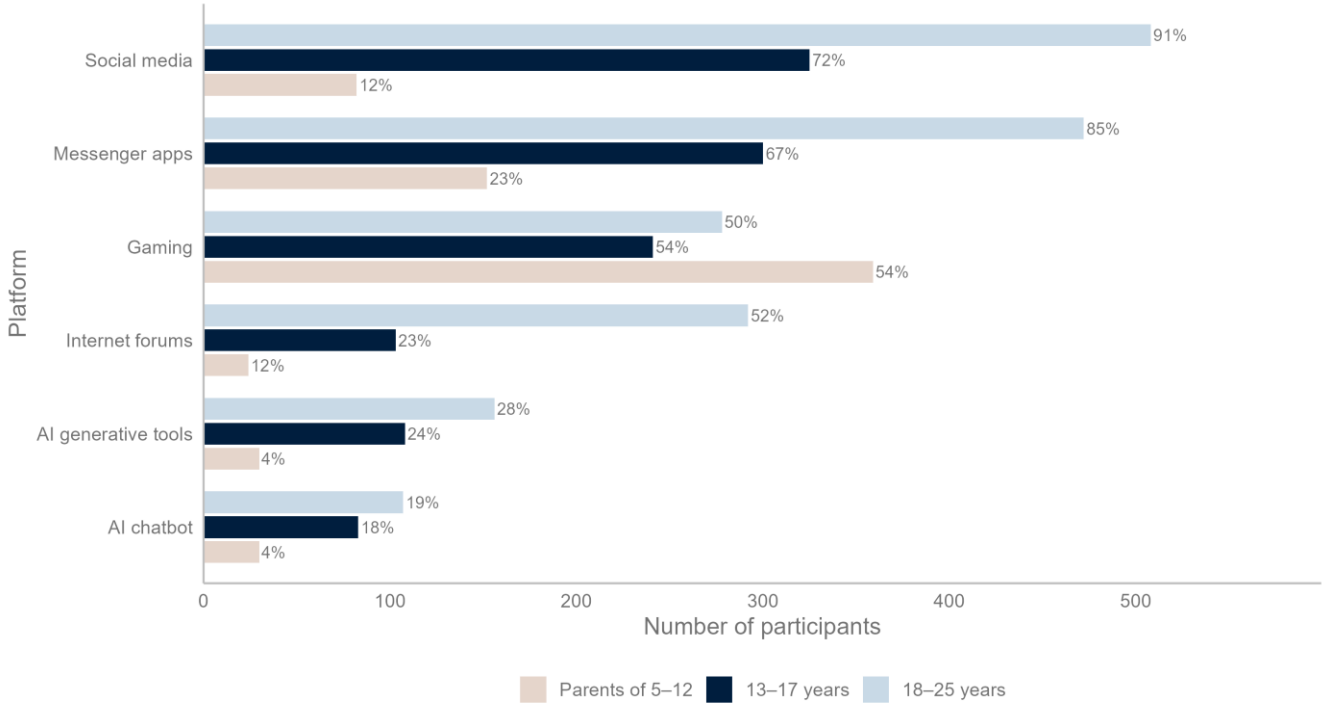
4.3.1.2 Most-used platforms selected from predefined options

As shown in Figure 4.3, use of different platforms (selected from a predefined list) varied across age groups. For children, gaming was the most frequently reported platform, with social media and messaging apps ranked second and third, respectively, from parent-report. This pattern is consistent with the responses from the child interviews (Figure 4.4), in which gaming was reported as the second most popular activity (after watching long-form videos), followed in

popularity by messaging apps. In both data sources, generative AI chatbots were the least commonly reported platform used by children.

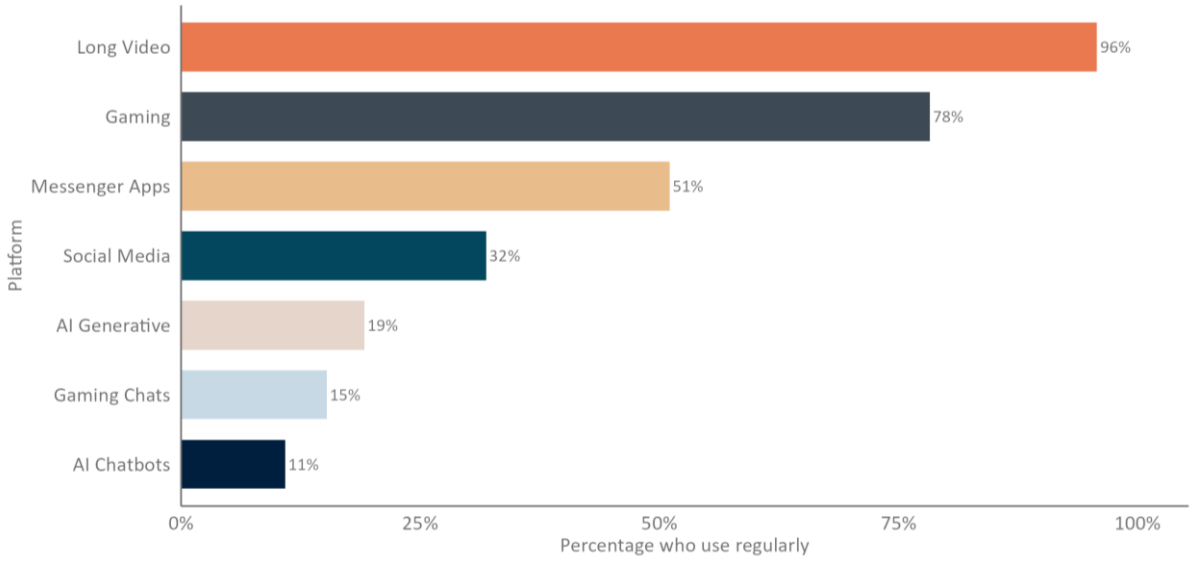
Among adolescents, various social media apps were the most frequently reported platforms, followed by messaging apps, with gaming also commonly reported. Similarly, , social media were the most frequently reported platforms among young adults, with messaging apps the second most frequently used app, and gaming also widely used. Internet forums were reported to be used regularly only in this age group and were less commonly used among the younger age groups. Across all age groups, reported use of AI technologies was relatively sparse, with generative AI tools more commonly used than AI chatbots.

Figure 4.3. *Most used digital technology platforms selected from predefined options.*



Note. Participants could select multiple digital technology platforms

Figure 4.4 *Percentage of children reporting regular use of each platform (children 5-12 interview data)*

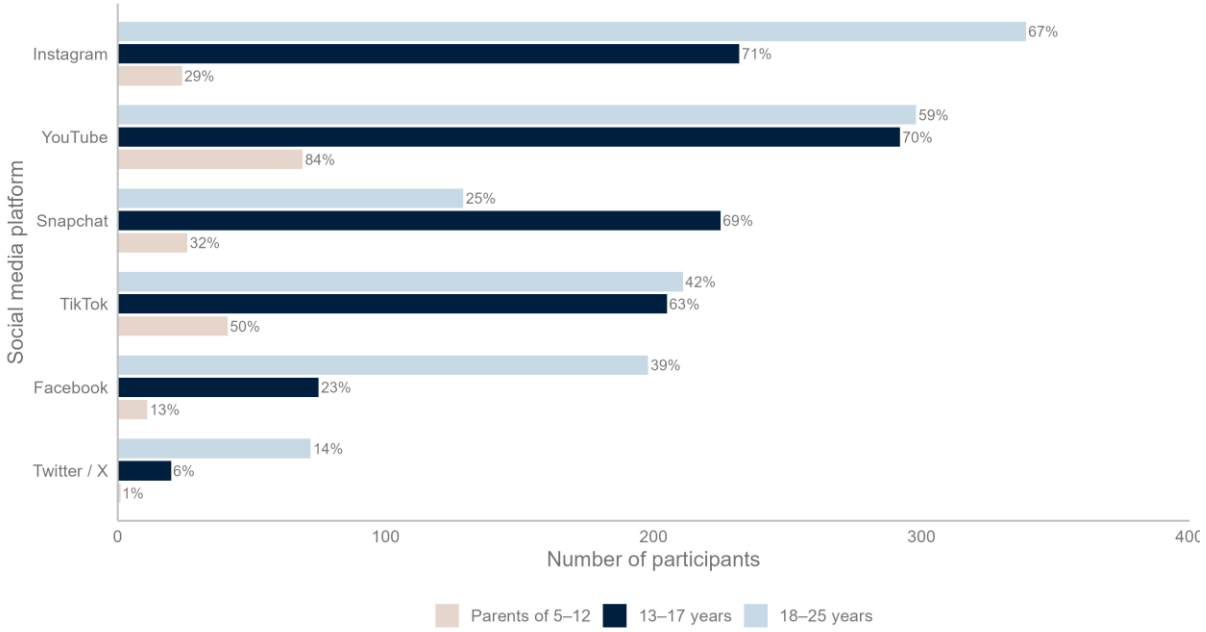


Note. Participants could select multiple social media platforms

Participants who indicated that they used social media were then asked to report, from a predefined list, which specific social media platforms they used (shown in Figure 4.5). Among children , parent-reported data indicated that YouTube and TikTok were most commonly used, while Instagram and Snapchat were less frequently reported, and Facebook and Twitter/X were least commonly used.

Among adolescents, Instagram and YouTube were the most commonly reported platforms, followed by TikTok and Snapchat, with Facebook and Twitter/X least commonly reported. A similar ordering was observed for young adults, for whom Instagram and YouTube were most commonly used, followed by TikTok and Snapchat, and Facebook and Twitter/X least frequently reported.

Figure 4.5. *Most used social media platforms selected from predefined options*



4.3.2 Social media engagement behaviour across age groups

This section of the chapter presents findings on how young people engaged with social media and the sources from which content was encountered.

4.3.2.1 Frequency of posting, sharing, and viewing content on social media across age groups

Across all age groups, most survey participants reported rarely or never posting or sharing content on social media (see Figure 4.6). Viewing content was reported much more frequently, with the majority of participants indicating viewing content quite a bit or a lot of the time.

Figure 4.6. *Reported frequency of posting, sharing, and viewing social media content by age group.*

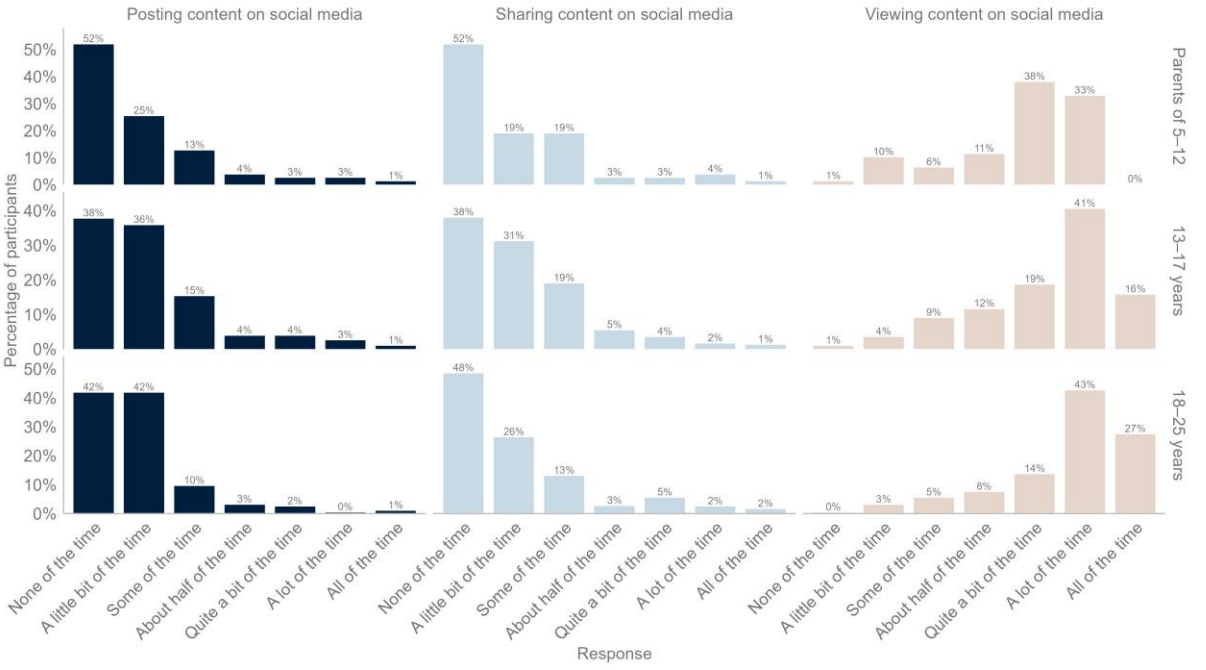
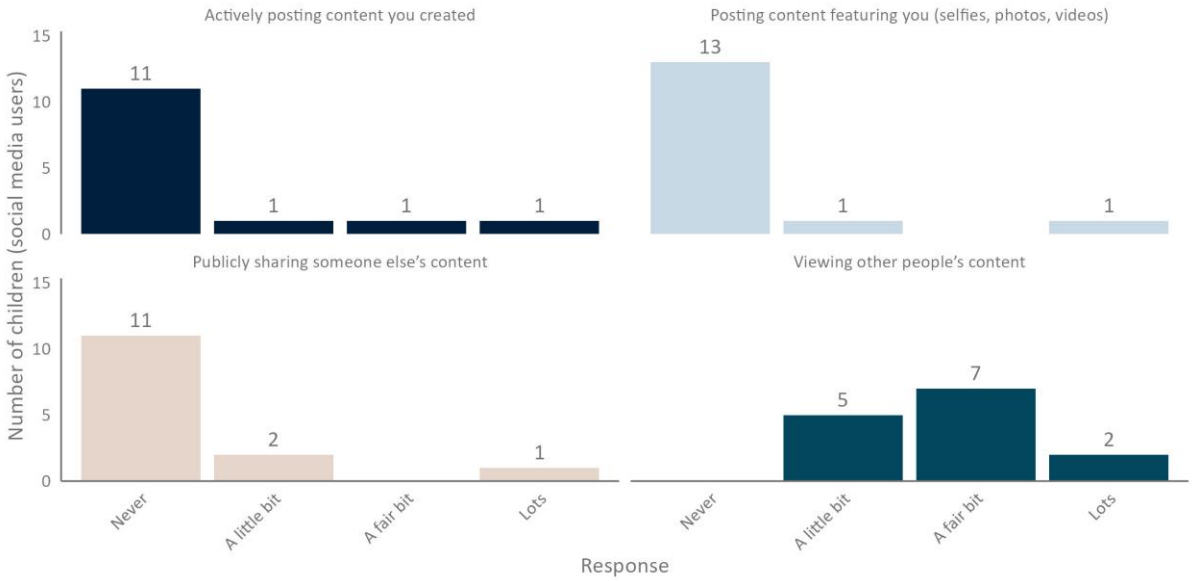


Figure 4.7 shows that among children in the interview who reported using social media, most did not post content they had created (including photos or videos) or share other people's content. Instead, the majority reported using social media primarily to view content created by others.

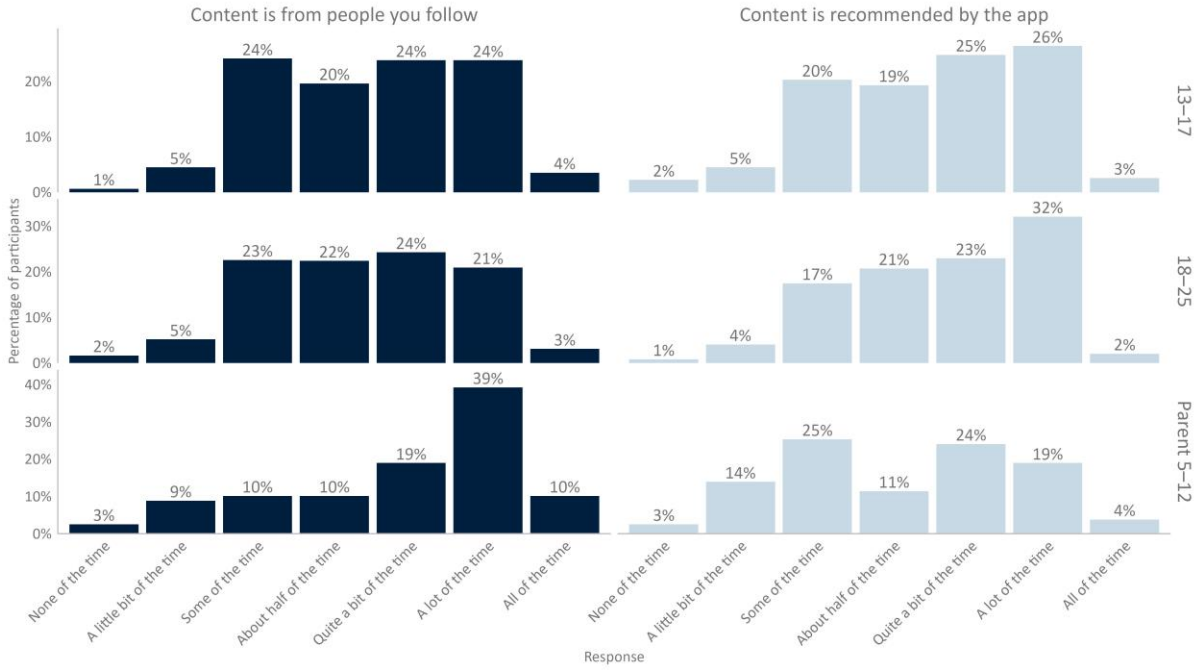
Figure 4. 7. *Social media activities among child users: Viewing, posting, and sharing (children 5-12 interview)*



4.3.2.2 Frequency of social media content delivery by different sources

Figure 4.8 shows the frequency with which participants viewed social media content from people they follow and from app-recommended sources across age groups. Among children, content was most frequently viewed from people they know, with relatively less exposure to app-recommended content. In contrast, among adolescents and young adults there was a slight tendency towards more frequent exposure to content recommended by the platform's recommender systems that was not apparent among children.

Figure 4.8. *Frequency of social media content from people followed and app-recommended sources, by age group.*



4.3.2.3 Social media interaction behaviours

Figure 4.9 presents the frequency of different social media engagement behaviours (messaging/chatting, liking/reacting, and commenting) by age group. Among children aged 5–12 years, parent reports indicated that messaging and chatting were more common than liking, reacting, or commenting, although overall they engaged in these behaviours less frequently than older participants. Most children were reported to never or only rarely comment on posts, and liking or reacting was also relatively infrequent in this group (shown in Figure 4.10). This pattern was reflected in the child interviews (n = 13), where commenting and liking/reacting were generally described as activities done "never" or only "a little", while messaging and chatting showed more variation, with some children never using these functions and a smaller subgroup reporting that they messaged or chatted a fair bit or a lot.

Adolescents aged 13–17 years showed higher levels of activity across all behaviours. Messaging and chatting were very common and likes and reactions were used more often than commenting. Commenting was still relatively uncommon, with many adolescents reporting that they seldom comment on posts. A similar pattern was evident among young adults aged 18–25 years. Messaging and chatting were widely used and likes and reactions were more frequent than commenting. Although commenting remained the least common behaviour, young adults generally reported more frequent use of messaging, liking/reacting, and commenting than children.

Figure 4.9. *Frequency of messaging/chatting, commenting and likes/reactions on social media by age group.*

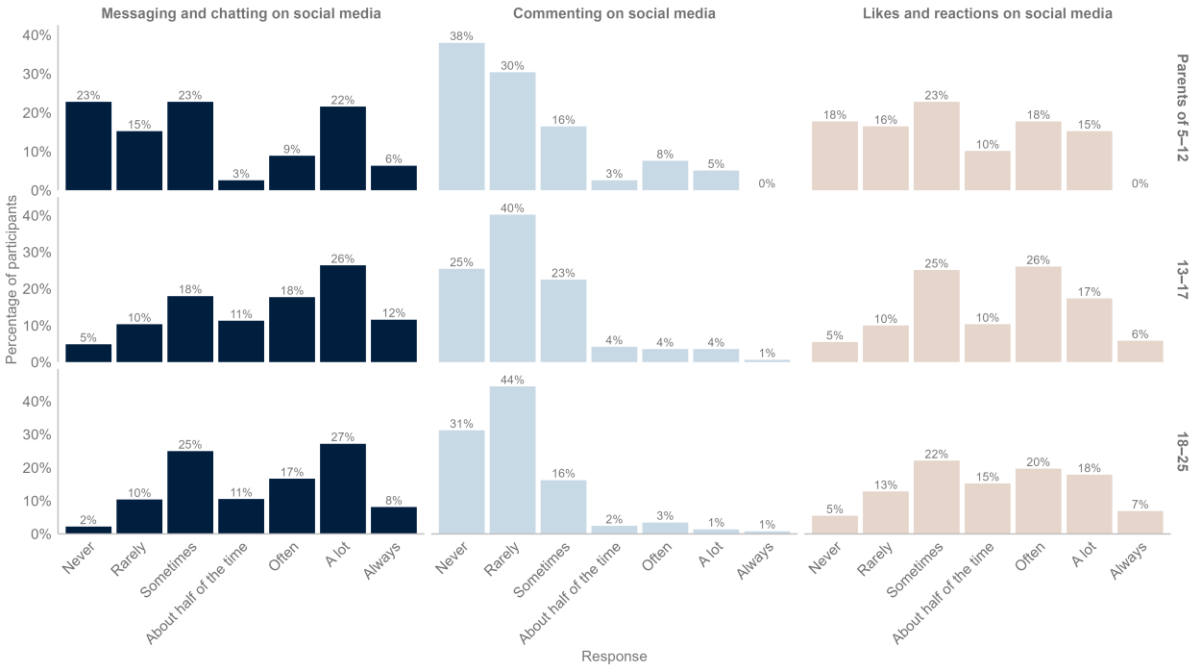
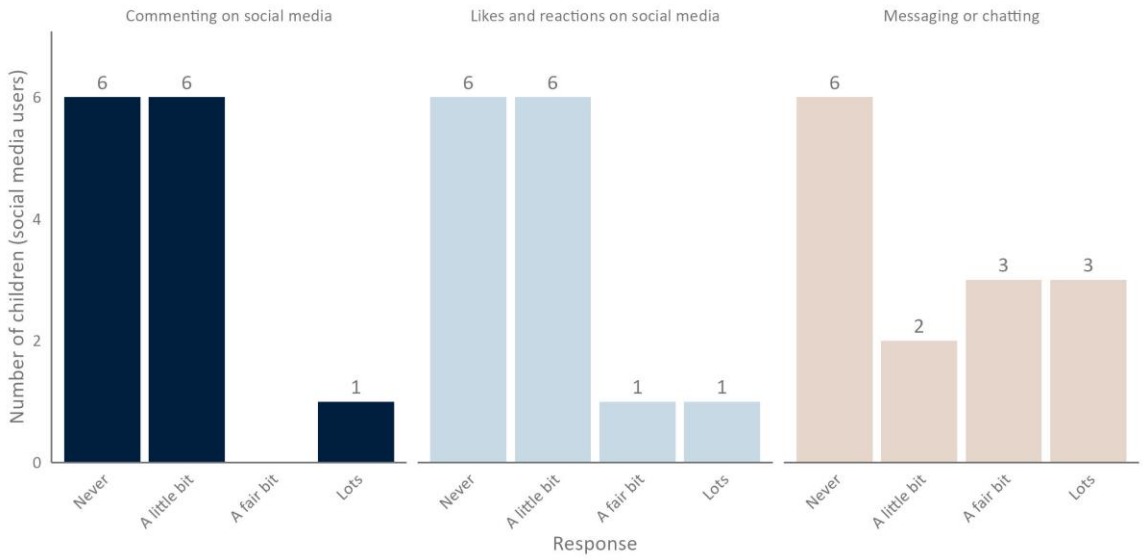


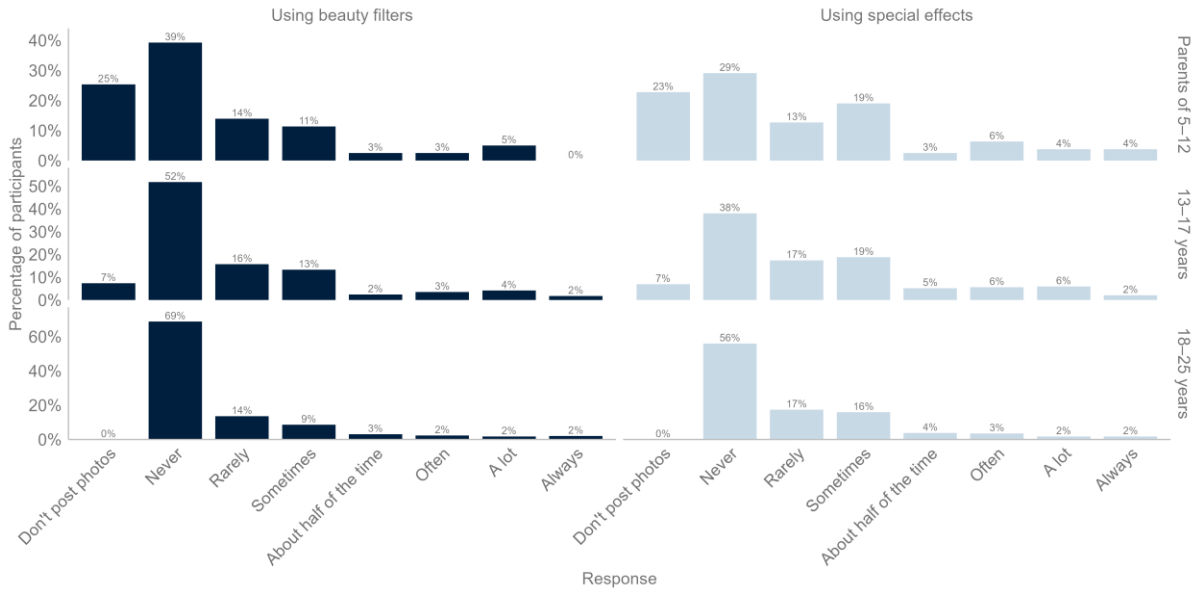
Figure 4.10. *Frequency of social media messaging, commenting, and reacting (5-12 interviews)*



4.3.2.3 Use of beauty filters and special effects on social media

Figure 4.11 shows that across all age groups, the use of beauty filters to enhance appearance and special effects for entertainment or fun on social media was reported to be used infrequently. Most children (parent-reported), adolescents, and young adults indicated that they never or rarely use beauty filters or special effects, or that the use of filters is not applicable for them as they do not post photos. This pattern was consistent in the child interviews, where only one participant reported using filters or effects "a fair bit".

Figure 4.11. *Frequency of using beauty filters and special effects on social media, by age group.*



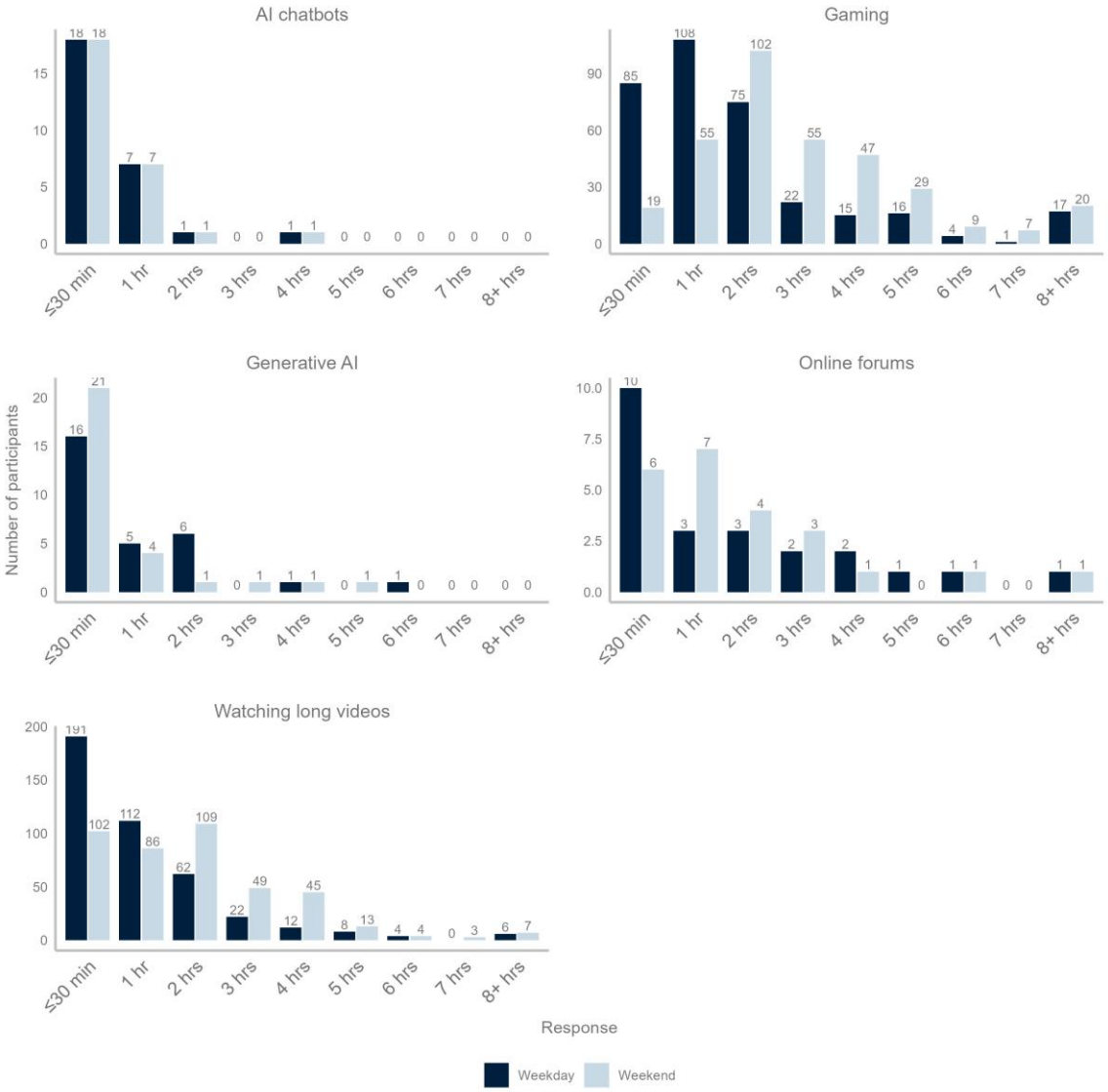
4.3.2.4 Time spent on different platforms across age groups

Time spent on different platforms is reported separately for each age cohort below. Adolescents were asked to report their average daily use across a typical week, whereas young adults and parents reporting on children aged 5–12 provided separate estimates for average daily typical weekday and weekend use.

4.3.2.5 Time spent on different platforms among children 5-12 (parent-reported)

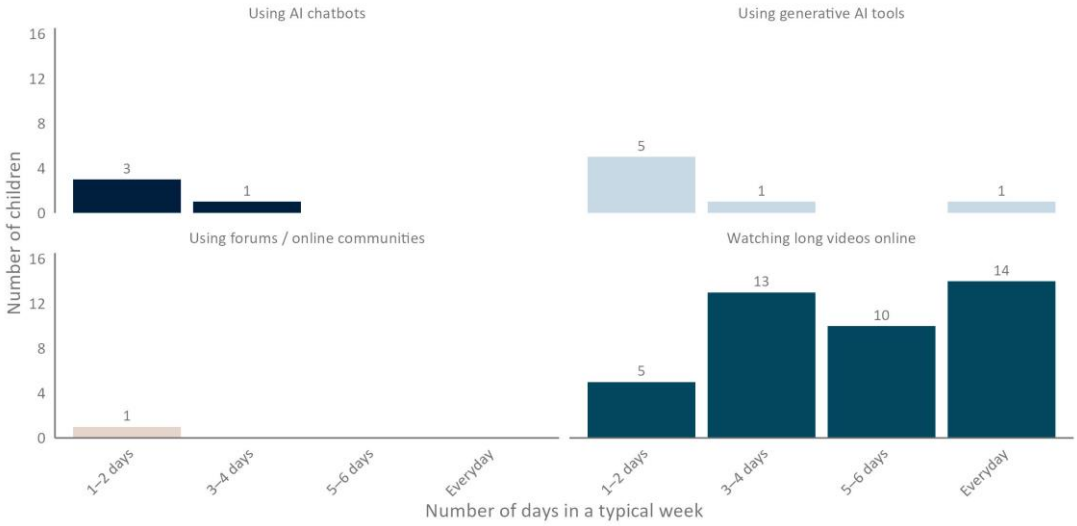
Figure 4.12 shows that the majority of children aged 5–12 (parent-reported) spent time watching long-form videos, with higher durations reported on weekends than on weekdays. Gaming was also common, particularly on weekends, with a greater proportion of children reported to spend one to three hours per day. In contrast, use of AI chatbots, generative AI, and online forums was minimal, with most children engaging in these activities less than 30 minutes per day on both weekdays and weekends and very few children reported to engage for extended periods. Among children aged 5–12, 7% were reported to spend at least five hours per day on at least one digital platform on weekdays, increasing to 12.1% on weekends. The proportion spending at least five hours on more than one platform was 2% on weekdays and 2.1% on weekends.

Figure 4.12. *Typical daily time spent across digital platforms among children aged 5-12 (parent-reported).*



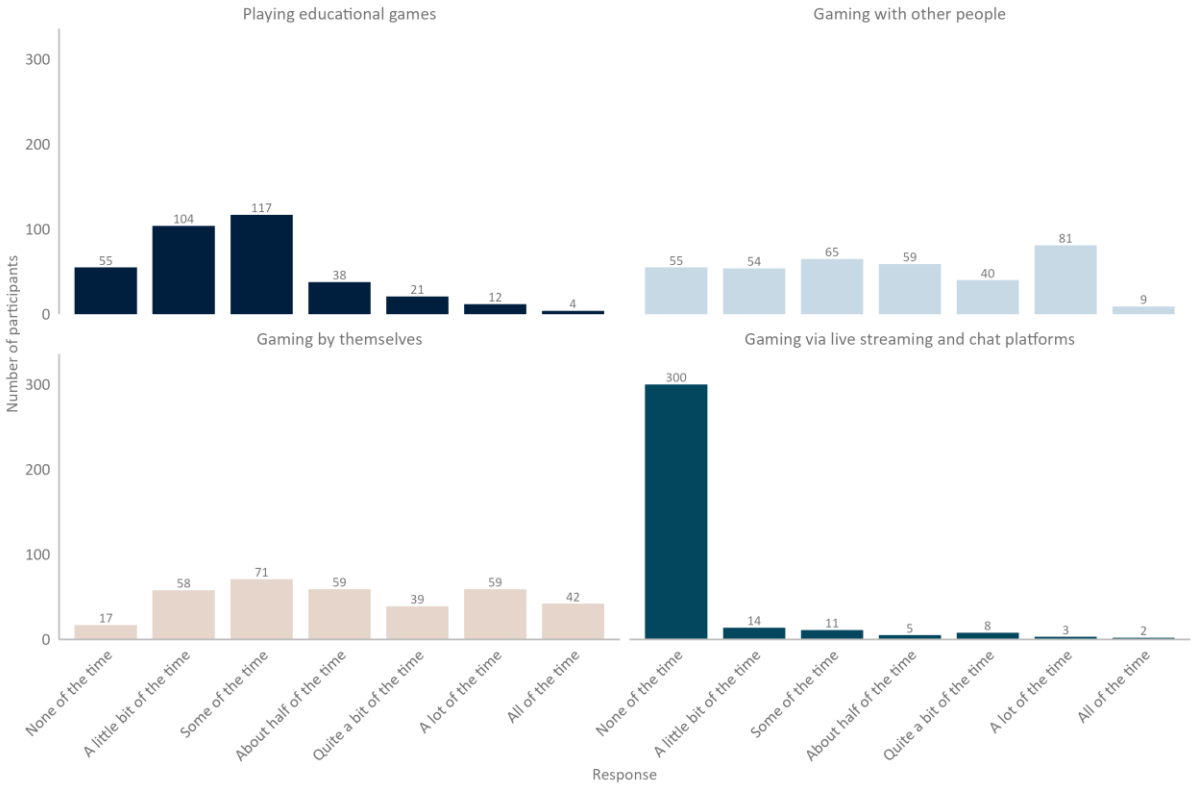
Among children in the interview sample who reported using each activity, there were marked differences in how frequently they engaged with them across a typical week (Figure 4.13). Watching long videos online was by far the most frequent activity: almost all children who selected this option reported doing so on most days, with many watching long videos every day. In contrast, only a small number of children reported using AI chatbots or generative AI tools at all, and among these users, engagement was generally low, typically limited to only a few days per week. Forums or online communities were used least of all, with just one child reporting use, confined to 1–2 days per week.

Figure 4.13. *Frequency of digital tech use per week among child users (interview data)*



Among those who reported playing games, Figure 4.14 presents the parent-report data and Figure 4.15 presents the corresponding child interview data. Across both sources, educational games emerged as a commonly used type of digital game for children aged 5–12 years. In the parent data, educational games were frequently endorsed, most often as something the child did "a little" or "some of the time". This aligns with the child interviews, where educational games played solo were the most commonly reported, with the largest group of children saying they played them on 1–2 days per week, and a smaller number reporting daily play.

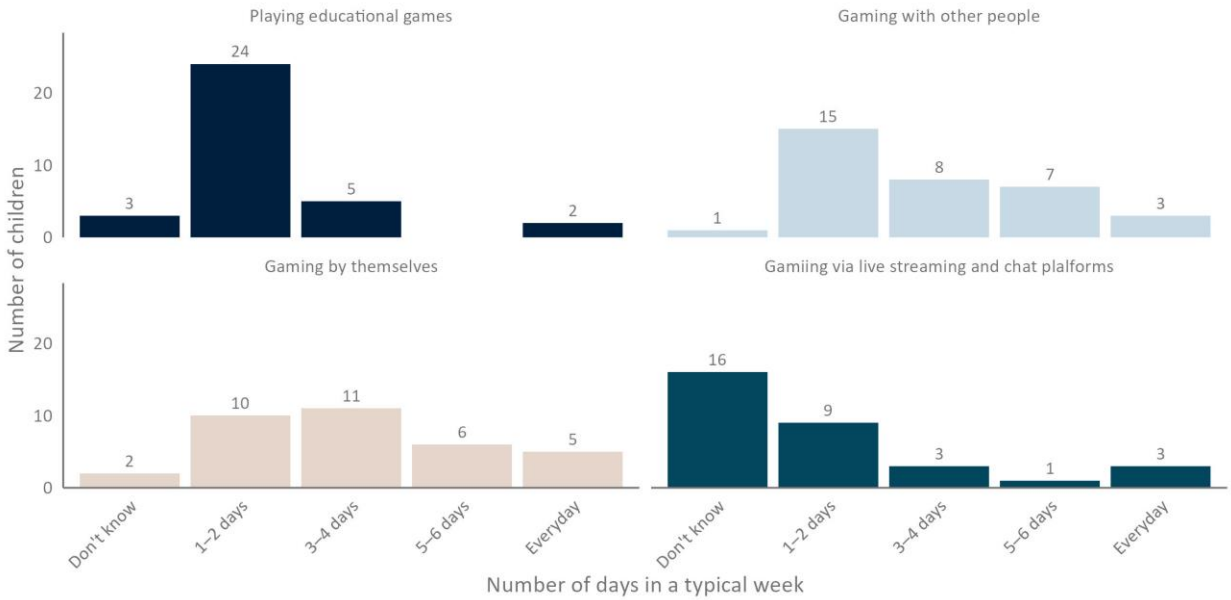
Figure 4.14. *Types of Gaming Activities Among Children Aged 5-12 (Parent-Reported).*



For non-educational gaming, a similar pattern emerged for playing by themselves and with others. In the parent reports, these activities were spread fairly evenly from "a little" to "a lot" of the time, suggesting a wide range of gaming intensity within the age group. The interview data showed a comparable spread across frequencies from 1–2 days to 3–4 days per week for both solo and multiplayer gaming, indicating that some children played only occasionally while others gamed more regularly.

By contrast, gaming via live streaming or watching game streams was uncommon. The majority of parents indicated that their child did not engage in this activity, and the child interviews similarly showed that only a small number of children reported watching or streaming games, typically on just 1–2 days per week. In addition, the majority of children in the interviews indicated that they did not know what "gaming via live streaming or watching game streams" meant.

Figure 4.15. *Types of Gaming Activities Among Children Aged 5-12 (Child-Interview).*



4.3.2.6 Time spent on different platforms among young people aged 13-17

Figure 4.16 shows that time spent on digital activities varied by activity type among adolescents. Gaming and watching long-form videos accounted for the greatest share of daily digital activity, with most participants reporting around two hours of gaming per day and up to one hour spent watching long videos. In contrast, time spent using AI tools (including chatbots and generative AI) and online forums was generally brief, with most adolescents reporting less than 30 minutes per day and very few indicating longer use. Overall, 10.4% of adolescents spent five or more hours per day on at least one platform, and 1.35% spent five or more hours on two or more platforms.

Figure 4.16. *Typical daily time spent on across digital platforms among adolescents aged 13–17.*

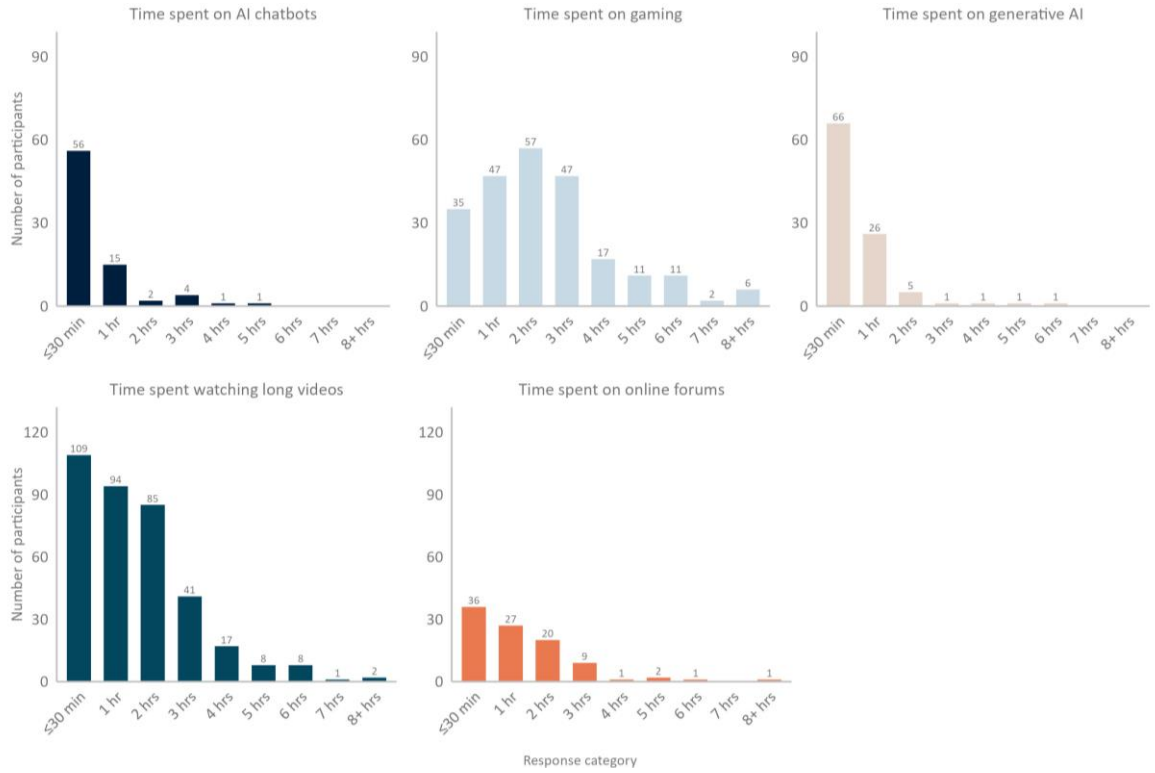
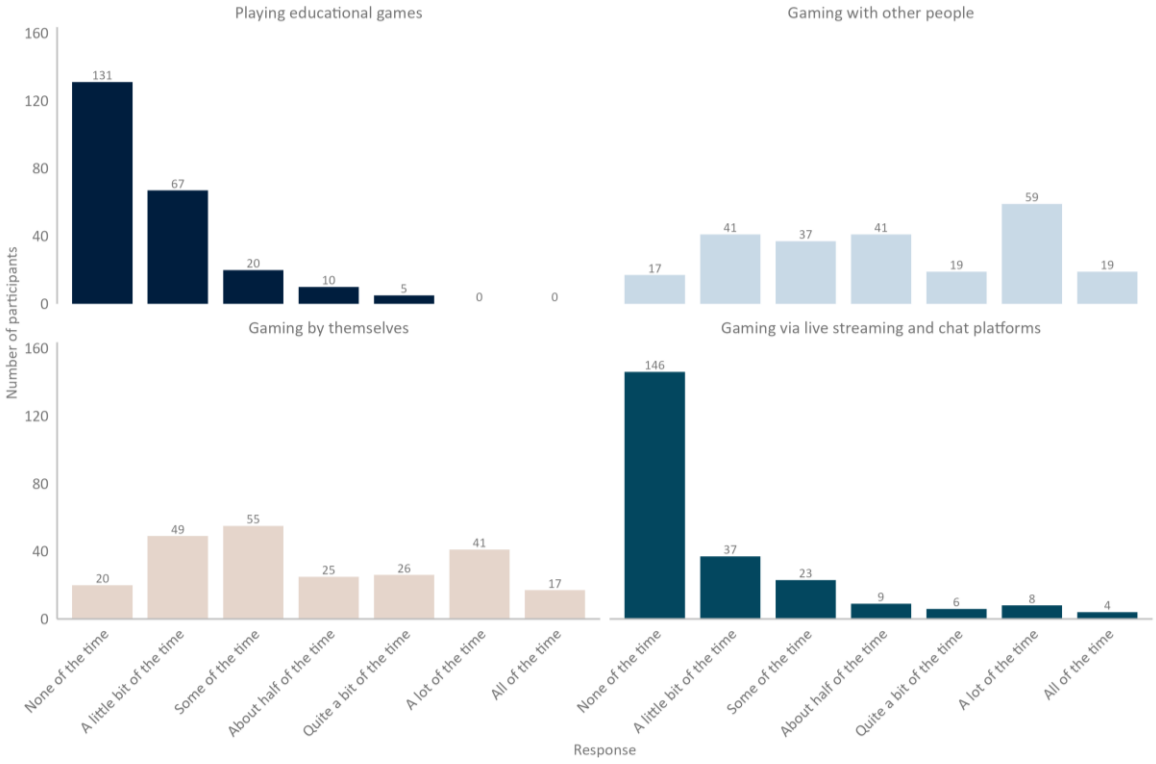


Figure 4.17 shows that among adolescents aged 13–17 who reported playing games, playing alone and playing with others were the most common activities, with many participants engaging in these some of the time to a lot of the time. In contrast, educational games and gaming via live-streaming and chat platforms were uncommon, with most participants reporting that they never engaged in these activities.

Figure 4.17. *Types of gaming activities among adolescents aged 13–17.*



4.3.2.7 Time spent on different platforms among young people aged 18-25

Figure 4.18 shows that for young adults, time spent on digital activities differed depending on the activity and the day(s) of the week. Gaming and watching long-form videos took up the most time, with many young adults spending two to four hours per day on these activities, especially on weekends. By comparison, time spent using AI chatbots and generative AI was generally short and fairly similarly distributed across weekdays and weekends, with most participants spending less than an hour per day. Time spent on online forums was also low overall, with only small increases on weekends and few young adults reporting longer periods of use.

Across all digital platforms, 25.9% of young adults reported spending at least five hours per day on at least one platform on weekdays, and 10.4% reported doing so on more than one platform. At weekends, 25.3% reported spending at least five hours on at least one platform, and 8.3% on more than one platform.

Figure 4.18. *Typical daily time spent on across digital platforms among adults aged 18–25.*

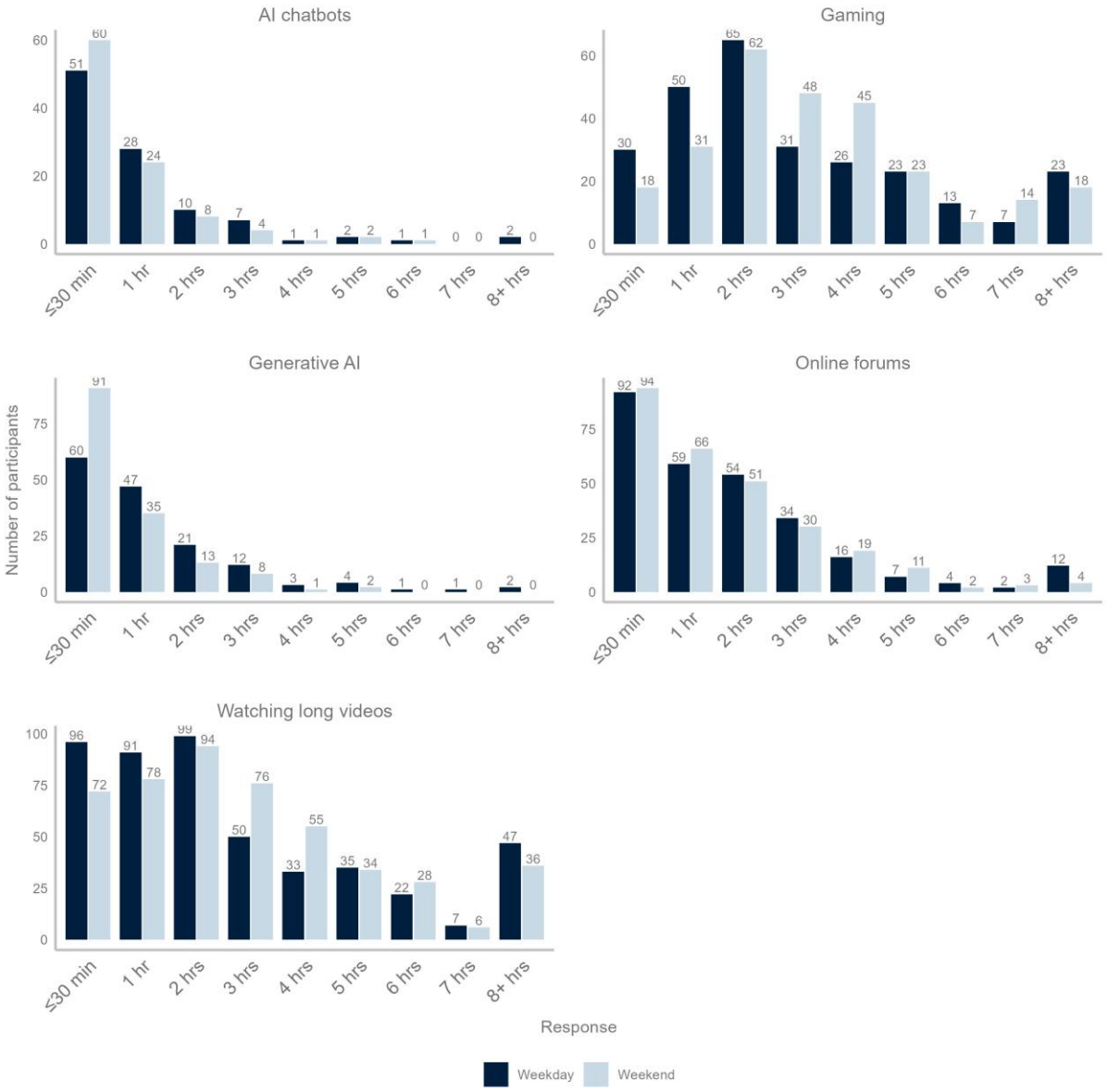
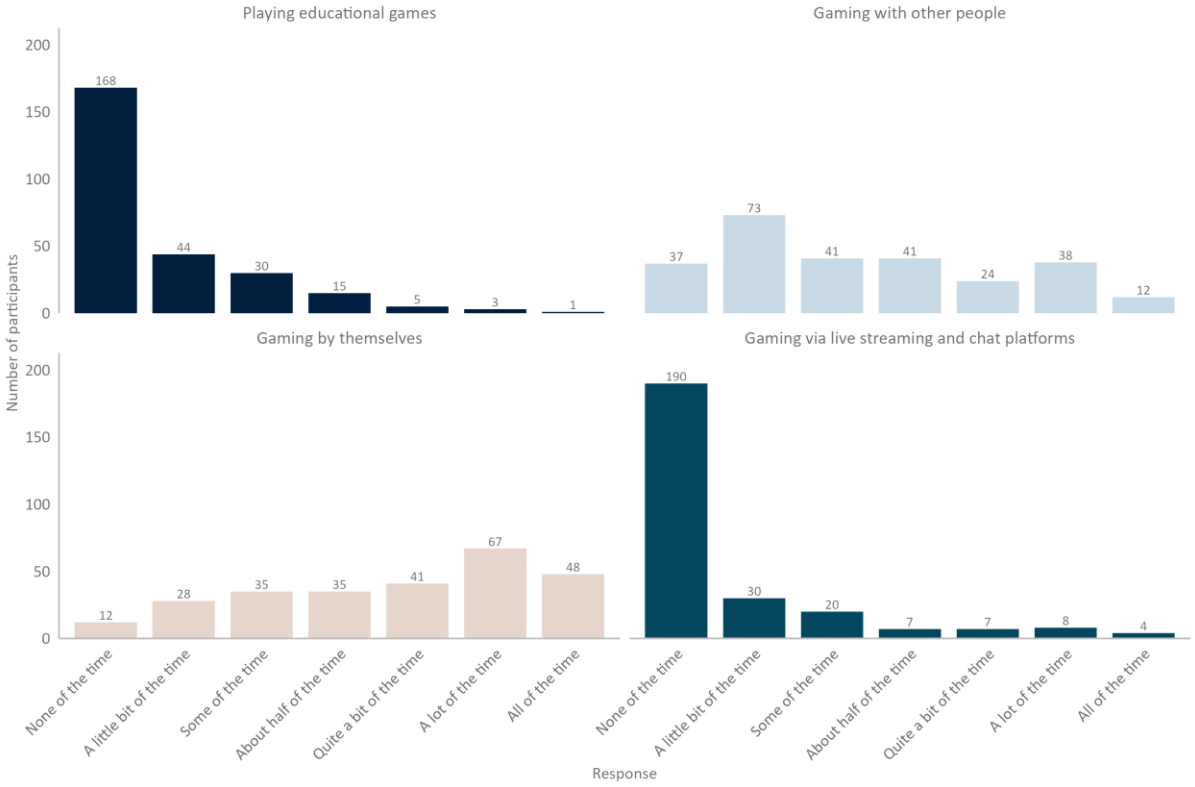


Figure 4.19 shows that among young adults who reported gaming, educational games were used infrequently, with most participants indicating that they never or rarely played these games. In contrast, gaming by oneself and gaming with other people were more common, with responses concentrated in the moderate to higher frequency categories, indicating that many participants engaged in these activities some of the time to a lot of the time. Gaming via live-streaming and chat platforms was uncommon, with most participants reporting spending none of their time in this activity. Notably, a small proportion of participants reported typically spending a great deal of time (≥8 hours) engaged with digital technology on a daily basis. This pattern was not observed for adolescents but was seen to a lesser extent among children, which may reflect that our assessment procedure asked separately about weekday and weekend days separately for children and adults.

Figure 4.19. *Types of gaming activities among young adults aged 18–25.*



4.3.3 Mechanisms

4.3.3.1 Social media mechanism

Across all age groups, participants reported a range of both positive and negative social media mechanisms as shown in Table 4.4. A consistent pattern emerged whereby adolescents aged 13–17 years and young adults aged 18–25 years reported higher endorsement of both positive and negative mechanisms compared with children aged 5–12 years (parent-reported).

The endorsement of positive mechanisms was generally higher among adolescents and young adults than children. Entertainment was the most highly endorsed positive mechanism across all three age groups. Endorsement of social connections, diverse content exposure, and freedom to express oneself was notably higher among adolescents and young adults compared with

children. Access to information, relaxation, and learning about what is popular were consistently endorsed across all age groups. In contrast, mental health support and posting to express oneself were among the least endorsed positive mechanisms across all groups.

Regarding negative mechanisms, the largest age-related differences were observed for seeing people attack others, exposure to extreme opinions, and loss of time scrolling, all of which were substantially higher among adolescents and young adults than children. Smaller but consistent increases across age groups were observed for seeing extreme trends, compulsive checking, worrying about being judged, comparing to others, and sleep interference. Showing one's best version on social media was notably higher among young adults than children. In contrast, bullying, feeling left out, unwanted sexual content, FOMO, and anxiety from not accessing social media were the least endorsed negative mechanisms and remained low across all age groups.

Table 4.4. *Descriptive statistics and endorsement rates for positive and negative social media mechanisms by age groups*

Social media mechanisms	**5–12** (*n* = 77-79)		**13–17** (*n* = 306)		**18–25** (*n* = 484)	
Positive mechanisms	**Mean (SD)**	**% ≥4**	**Mean (SD)**	**% ≥4**	**Mean (SD)**	**% ≥4**
Freedom to express oneself on social media	2.81 (1.36)	30.8	-	-	2.96 (1.16)	30.8
Acceptance of identity on social media	2.94 (1.25)	31.2	3.53 (1.05)	53.2	3.00 (1.07)	31.0
Using social media to access information	3.11 (1.23)	38.0	3.32 (1.20)	47.1	3.39 (1.10)	47.6
Using social media for relaxation	3.32 (1.20)	47.4	3.40 (1.10)	51.3	3.32 (1.11)	45.6
Using social media to escape from life	2.48 (1.42)	27.8	2.65 (1.17)	24.2	2.81 (1.22)	30.1
Exposure to diverse content on social media	3.32 (1.13)	40.5	3.58 (1.09)	56.5	3.77 (1.08)	61.4
Using social media for entertainment	4.08 (0.86)	75.9	3.93 (0.92)	72.5	3.79 (1.01)	64.5
Using social media for general learning	3.03 (1.20)	34.2	–	–	3.25 (1.10)	41.4
Using social media to learn about what is popular	3.52 (1.16)	51.9	3.30 (1.06)	45.4	3.45 (1.11)	53.8
Social connections on social media	2.82 (1.37)	32.9	3.55 (1.26)	55.9	3.59 (1.21)	56.9
Positive support on social media	2.74 (1.25)	29.5	3.22 (1.18)	44.4	3.04 (1.25)	38.8
Mental health support on social media	2.11 (1.25)	16.5	2.66 (1.23)	22.6	2.57 (1.23)	21.5
Posting to express oneself on social media	1.73 (1.12)	13.9	2.01 (1.18)	12.8	2.20 (1.30)	17.9

Social media mechanisms	**5–12** (*n* = 77-79)		**13–17** (*n* = 306)		**18–25** (*n* = 484)	
Negative mechanisms						
Anxiety from not accessing social media	2.08 (1.21)	13.9	1.84 (0.99)	7.8	1.75 (0.95)	5.4
Experiencing bullying on social media	1.48 (0.89)	6.3	1.60 (1.02)	8.2	1.51 (0.93)	4.9
Feeling left out on social media	1.70 (1.02)	7.6	1.72 (1.01)	7.2	1.82 (1.06)	8.7
Loss of time scrolling on social media	3.11 (1.32)	38.0	3.23 (1.24)	45.1	3.39 (1.23)	52.0
Social media being a distraction from other tasks	2.92 (1.31)	36.7	2.73 (1.22)	29.1	3.04 (1.24)	39.4
Social media interfering with sleep	2.01 (1.18)	12.7	2.31 (1.21)	21.2	2.55 (1.26)	22.8
Worrying about being judged on social media	1.92 (1.25)	14.1	2.42 (1.27)	23.2	2.68 (1.27)	26.7
FOMO from social media	2.10 (1.27)	17.7	2.38 (1.23)	20.6	2.38 (1.23)	19.8
Seeing people attack others on social media	2.55 (1.21)	23.1	3.29 (1.19)	47.4	3.82 (1.15)	65.8
Seeing extreme trends on social media	2.23 (1.14)	17.7	2.73 (1.17)	26.1	3.01 (1.31)	38.4
Perception of the perfect life on social media	2.72 (1.27)	25.3	2.50 (1.19)	20.7	2.64 (1.18)	23.5
Social media influencing self-image	2.34 (1.12)	15.2	2.43 (1.11)	17.6	2.46 (1.11)	18.6
Showing one's best version on social media	2.25 (1.43)	24.1	–	–	3.14 (1.29)	43.4
Trusting information from social media	2.76 (1.07)	25.6	2.31 (0.85)	6.9	2.27 (0.87)	6.0
Exposure to extreme opinions on social media	2.33 (1.17)	17.9	3.17 (1.14)	38.2	3.71 (1.11)	59.6
Compulsive checking of social media	2.20 (1.31)	20.3	2.72 (1.17)	26.5	2.80 (1.27)	30.9
Pressure to present oneself in a certain way on social media	1.82 (1.14)	10.1	–	–	2.35 (1.23)	20.0
Pressure to present oneself in a sexualised way on social media	–	–	–	–	1.39 (0.80)	2.9

Social media mechanisms	**5–12** (*n* = 77-79)		**13–17** (*n* = 306)		**18–25** (*n* = 484)	
Difficulty taking breaks from social media	2.59 (1.33)	26.6	–	–	2.78 (1.28)	30.6
Receiving unwanted sexual content on social media	1.37 (0.76)	3.8	1.68 (0.98)	7.5	1.60 (0.90)	5.0
Comparing to others on social media	1.95 (1.13)	11.4	2.38 (1.17)	19.0	2.67 (1.21)	26.0

Note.
% ≥4 indicates the percentage of participants who endorsed a score of 4 or above on a 1–5 point scale.
– indicates that the item was not administered to that age group.
n refers to the number of participants who completed each item; this varies across mechanisms as not all items were administered to all age groups.

As shown in Table4.5, children's responses highlighted social media as primarily an entertainment and discovery-focused activity. The most strongly endorsed mechanisms were using social media for entertainment and exposure to diverse content, with all children rating these as at least *a bit true* (100%), followed by acceptance of identity (2.40; 80%). Loss of time scrolling (2.08; 66.7%), using social media to escape from life (1.75; 66.7%), and seeing people attack others online (1.75; 66.7%) were also moderately endorsed. Social connections and social media being a distraction from other tasks were reported by around half of children (45.5% and 58.3% respectively). More negative experiences were considerably less common, with anxiety from not accessing social media (25.0%), social media influencing self-image (41.7%), and sleep disruption (16.7%) each rated as at least *a bit true* by only a minority. Notably, experiencing bullying on social media was not endorsed by any child (0.0%), and fear of missing out, compulsive checking, feeling left out, and comparing to others were all rarely reported (8.3–9.1%).

Table 4.5. *Descriptive statistics for social media mechanisms among children (n = 14)*

Mechanism (*n*= 13)	**Mean (SD)**	**% ≥ 2**
Anxiety from not accessing social media	1.25 (0.45)	25.0
Comparing to others on social media	1.09 (0.30)	9.1
Compulsive checking of social media	1.08 (0.29)	8.3
Social media being a distraction from other tasks	1.75 (0.75)	58.3
Exposure to diverse content on social media	2.64 (0.50)	100.0
Using social media to escape from life	1.75 (0.62)	66.7
Experiencing bullying on social media	1.00 (0.00)	0.0
Feeling left out on social media	1.08 (0.29)	8.3

Mechanism (*n*= 13)	Mean (SD)	% ≥ 2
FOMO from social media	1.08 (0.29)	8.3
Social connections on social media	1.82 (0.98)	45.5
Using social media for entertainment	2.67 (0.49)	100.0
Acceptance of identity on social media	2.40 (0.84)	80.0
Social media influencing self-image	1.42 (0.51)	41.7
Loss of time scrolling on social media	2.08 (0.90)	66.7
Seeing people attack others on social media	1.75 (0.62)	66.7
Social media interfering with sleep	1.25 (0.62)	16.7

4.3.3.2 Gaming mechanism

As shown in Table 4.6, across all age groups, gaming as a fun way to relax was consistently the highest-rated mechanism, with mean scores increasing from 3.7 among children to 4.2 among older age groups, and the proportion rating it ≥4 rising from 57.1 to 80.8.

Most benefit-oriented mechanisms increased with age. Using gaming for relaxation when feeling stressed rose from 3.0 to 3.9 (% ≥4: 34.9% to 68.3%) and using gaming to escape from life increased from 2.5 to 3.5 (% ≥4: 22.6% to 52.5%). Social and identity-related mechanisms, including feeling accepted, feeling socially connected, and sense of community belonging, followed the same pattern.

Conversely, problematic gaming behaviours were more prominent among younger children and declined with age. Difficulty taking breaks and feeling upset when unable to game were both most endorsed among 5–12-year-olds, declining steadily across older age groups

In contrast, exposure to negative social experiences within gaming environments increased with age. Seeing people attack others rose from 1.7 to 2.9, and experiencing bullying increased from 1.3 to 1.6.

Table 4.6. *Descriptive statistics and endorsement rates for gaming mechanisms by age groups*

Gaming Mechanism	5–12 (n = 335–343)		13–17 (n = 211–227)		18–25 (n = 265)	
	Mean (SD)	% ≥4	Mean (SD)	% ≥4	Mean (SD)	% ≥4
Freedom to express oneself when gaming	3.3 (1.3)	45.4	—	—	3.4 (1.2)	48.3
Feeling accepted when gaming	3.3 (1.3)	43.0	3.6 (1.1)	54.7	3.4 (1.2)	44.2
Sense of community belonging through gaming	2.3 (1.2)	16.7	2.9 (1.4)	35.5	2.7 (1.3)	26.0

Gaming Mechanism	5–12 (n = 335–343)		13–17 (n = 211–227)		18–25 (n = 265)	
Using gaming for relaxation when feeling stressed	3.0 (1.3)	34.9	3.5 (1.2)	51.8	3.9 (1.1)	68.3
Using gaming to escape from life	2.5 (1.3)	22.6	3.0 (1.3)	37.4	3.5 (1.3)	52.5
Gaming as a fun way to relax	3.7 (1.1)	57.1	4.2 (1.0)	78.9	4.2 (1.0)	80.8
Using gaming to learn new skills	3.2 (1.1)	38.1	3.5 (1.2)	50.0	3.3 (1.2)	45.3
Using teamwork while gaming	3.2 (1.3)	42.6	3.6 (1.2)	58.3	3.4 (1.3)	52.5
Feeling confident and in control from gaming	3.0 (1.2)	36.3	3.3 (1.2)	45.5	3.2 (1.2)	45.7
Feeling socially connected with others from gaming	2.8 (1.3)	28.6	3.2 (1.2)	43.9	3.0 (1.4)	39.6
Positive support through gaming	2.7 (1.3)	26.7	3.3 (1.3)	44.5	2.8 (1.4)	35.1
Role-playing when gaming	2.6 (1.3)	25.9	2.3 (1.3)	21.9	2.6 (1.4)	29.4
Difficult to take breaks from gaming	2.6 (1.3)	26.2	2.4 (1.3)	24.4	2.1 (1.1)	11.7
Feeling upset when unable to game	2.3 (1.2)	15.5	1.9 (1.1)	10.4	1.8 (1.1)	9.4
Experiencing bullying when gaming	1.3 (0.6)	0.9	1.6 (1.0)	5.4	1.6 (0.9)	4.2
Feeling left out when gaming	1.5 (0.8)	2.4	1.7 (1.0)	6.9	1.6 (0.9)	4.9
Gaming being a distraction from other tasks	2.8 (1.3)	28.6	2.7 (1.3)	29.0	2.9 (1.2)	35.5
Gaming disrupting sleep	1.6 (0.9)	5.2	1.9 (1.1)	9.0	2.1 (1.2)	13.6
Seeing people attack others when gaming	1.7 (1.0)	8.0	2.6 (1.3)	25.9	2.9 (1.4)	34.3

Note.
% ≥4 indicates the percentage of participants who endorsed a score of 4 or above on a 1–5 point scale.
– indicates that the item was not administered to that age group.
n refers to the number of participants who completed each item; this varies across mechanisms as not all items were administered to all age groups.

As shown in Table 4.7, children's responses painted a largely positive picture of gaming. The most strongly endorsed mechanisms were gaming as a fun way to relax, feeling accepted, and a sense

of community belonging, with nearly all children rating these as at least a bit true (93–97%). Feelings of confidence and control and social connection were also widely reported. Using gaming to escape from real life and role-playing were moderately endorsed, with around 70% rating these as at least a bit true, and around three-quarters reported finding it difficult to take breaks, with half saying gaming can distract them from other tasks. More negative experiences were considerably less common, with feeling upset when unable to game, feeling left out, experiencing bullying, and sleep disruption each rated as at least a bit true by only 12–38% of children.

Table 4.7. *Descriptive statistics for gaming mechanisms among children (n = 34)*

Mechanism (n=34)	Mean (SD)	% ≥ 2
Feeling accepted when gaming	2.68 (0.54)	96.8
Sense of community belonging through gaming	2.75 (0.59)	92.9
Using gaming to escape from life	1.93 (0.74)	70.0
Gaming as a fun way to relax	2.82 (0.46)	97.0
Feeling confident and in control from gaming	2.50 (0.62)	93.8
Feeling socially connected with others from gaming	2.12 (0.61)	87.5
Role-playing when gaming	2.12 (0.86)	69.7
Difficult to take breaks from gaming	1.94 (0.68)	74.2
Feeling upset when unable to game	1.38 (0.49)	37.5
Experiencing bullying when gaming	1.23 (0.50)	19.4
Feeling left out when gaming	1.25 (0.44)	25.0
Gaming being a distraction from other tasks	1.53 (0.57)	50.0
Gaming disrupting sleep	1.18 (0.53)	12.1

4.3.3.3 AI companion mechanisms

As shown in Table 4.8, mean scores across all AI companion mechanisms were notably lower compared with other technologies. Feeling accepted and having the freedom to express oneself were the most strongly endorsed mechanisms, with mean scores approaching or reaching 3 in the 5–12 and 18–25 groups; 32% of children and 40% of young adults rated these mechanisms 4

or above. Trust in information from an AI companion was also notably higher among children (mean = 2.8; 25.9% rating 4 or above) compared with older groups (13–17: mean = 2.3; 19.4% rating 4 or above; 18–25: mean = 2.4; 17.0% rating 4 or above). Loss of time was most endorsed among children (mean = 2.2) and declined with age (18–25: mean = 1.7). In contrast, positive support, self-expression, and exposure to diverse perspectives showed modest increases with age, with young adults reporting the highest scores. There was no clear, uniform increase in AI companion engagement across age groups overall, as the 13–17 group consistently scored lowest across most mechanisms. Risk-related mechanisms, including experiencing abuse, dangerous ideas, and unwanted sexual content, were consistently low but non-zero across all age groups, with pressure to engage with sexualised content only emerging in the 18–25 group (mean = 1.3; % ≥4 = 4.0).

Table 4.8. *Descriptive statistics for generative ai companion by age group*

AI Companion Mechanisms	**5-12 (*n* = 23-27)**		**13-17 (*n* =71-74)**		**18-25 (*n* = 100)**	
	Mean (SD)	**% ≥4**	**Mean (SD)**	**% ≥4**	**Mean (SD)**	**% ≥4**
Freedom to express oneself with AI companion	2.9 (1.4)	28.0	—	—	3.0 (1.5)	47.0
Feeling accepted by AI companion	2.8 (1.3)	32.0	2.0 (1.3)	16.9	2.9 (1.5)	40.0
Using AI companion for relaxation	1.8 (1.3)	12.0	1.7 (1.1)	9.5	1.9 (1.2)	13.0
Using AI companion to escape from life	1.6 (1.0)	8.0	1.6 (1.1)	9.9	1.8 (1.3)	13.0
Positive support from AI companion	1.9 (1.1)	11.5	2.1 (1.2)	13.9	2.3 (1.3)	24.0
Trusting information from AI companion	2.8 (1.3)	25.9	2.3 (1.3)	19.4	2.4 (1.2)	17.0
Exposure to diverse perspectives through AI companion	2.2 (1.2)	15.4	2.0 (1.3)	16.4	2.3 (1.4)	22.0
Self-expression with AI companion	1.8 (1.1)	8.3	1.8 (1.2)	16.2	2.2 (1.3)	20.0
Forming a strong bond with AI companion	1.5 (1.1)	8.0	1.6 (1.1)	11.3	1.6 (1.0)	6.0
Feeling connected to AI companion	1.7 (1.0)	4.0	1.5 (1.0)	8.5	1.7 (1.1)	7.0
Loss of time when using AI companion	2.2 (1.6)	25.9	1.6 (1.0)	8.5	1.7 (1.1)	10.0
Experiencing unhealthy behaviour from AI companion	1.4 (1.1)	8.3	—	—	1.3 (0.7)	2.0

AI Companion Mechanisms	5-12 (*n* = 23-27)		13-17 (*n* =71-74)		18-25 (*n* = 100)	
Experiencing dangerous ideas from AI companion	1.4 (0.9)	8.0	1.2 (0.6)	1.4	1.4 (0.9)	3.0
Experiencing abuse from AI companion	1.2 (0.7)	4.2	1.1 (0.4)	0.0	1.3 (0.7)	2.0
Receiving unwanted sexual content from AI companion	1.1 (0.4)	0.0	1.3 (0.7)	1.4	1.3 (0.8)	4.0
Pressure to engage with sexualised content from AI companion	—	—	—	—	1.3 (0.8)	4.0

Note.
% ≥4 indicates the percentage of participants who endorsed a score of 4 or above on a 1–5 point scale.
– indicates that the item was not administered to that age group.
n refers to the number of participants who completed each item; this varies across mechanisms as not all items were administered to all age groups.

Within the children's interviews, only four children reported using an AI companion. Of these, feeling accepted by an AI companion and receiving positive support were the most strongly endorsed mechanisms, with three out of four children (75%) rating both as *very true*. Feeling connected to an AI companion and using an AI companion to escape from life were each endorsed by one in four children (25%). In contrast, loss of time when using an AI companion, experiencing abuse from an AI companion, and feeling pressure to talk to an AI companion in a way that made them uncomfortable were not endorsed by any child.

4.3.3.4 AI generative mechanisms

Generative AI mechanisms were measured across two age groups only (5–12 and 18–25) and shown in Table 4.9. Accessing information was the highest-rated mechanism across both groups, with mean scores increasing from 3.1 among children to 3.3 among young adults, and the proportion rating it ≥ 4 rising from 35.7% to 44.0%. Exposure to diverse perspectives followed a similar pattern, increasing from 2.9 to 3.1 with age, with a notably larger proportion of young adults rating it ≥ 4 (40.7%) compared with children (27.6%). In contrast, trusting information from generative AI was the only mechanism to decrease with age, falling from 2.8 among children to 2.5 among young adults, accompanied by a substantial drop in the proportion rating it ≥ 4 (34.5% vs. 11.3%), suggesting that older users are more critical and discerning in their evaluation of AI-generated content.

Table 4.9. *Descriptive statistics for generative AI mechanisms by age group*

AI Companion Mechanisms	5-12 (*n* = 28-29)		18-25 (*n* = 150)	
	Mean (SD)	% ≥4	Mean (SD)	% ≥4
Accessing information through generative AI	3.1 (1.2)	35.7	3.3 (1.2)	44.0
Trusting information from generative AI	2.8 (1.2)	34.5	2.5 (1.0)	11.3
Exposure to diverse perspectives through generative AI	2.9 (1.1)	27.6	3.1 (1.3)	40.7
Skill development through generative AI	2.7 (1.3)	25.0	2.9 (1.1)	25.3

Note.
% ≥4 indicates the percentage of participants who endorsed a score of 4 or above on a 1–5 point scale.
– indicates that the item was not administered to that age group.

4.3.3.5 Prevalence of Negative Mechanisms Across Age Groups

Potentially highly negative experiences regarding bullying and sleep disruption were reported across all age groups at non-negligible levels. The percentage of participants reporting any such experiences (i.e., a little/somewhat/quite/very true) ranged from 22-40% for experiencing bullying while gaming, and 34-62% for gaming disrupting sleep (see Appendix C)

Although low proportions of participants endorsed as quite or very true experiences that may be considered harmful when engaging with an AI companion, as shown in Appendix C, any experience of these potentially highly negative aspects of engagement with an AI companion were reported at non-negligible levels. For example, the percentage of participants reporting any such experiences (i.e., a little/somewhat/quite/very true) ranged from 8-13% for experiencing abuse from an AI companion, 18-21% for receiving dangerous ideas, and 4-19% for receiving unwanted sexual content from an AI companion.

Potentially highly negative experiences were reported across all age groups at non-negligible levels in the sample. For example, the percentage of participants reporting any such experiences (i.e., a little/somewhat/quite/very true) ranged from 30-34% for bullying on social media, 52-75% for social media interfering with sleep, 24% for pressure to present oneself in a sexualised way (young adults only), and 24-42% for receiving unwanted sexual content on social media.

4.3.4 Mental health outcomes

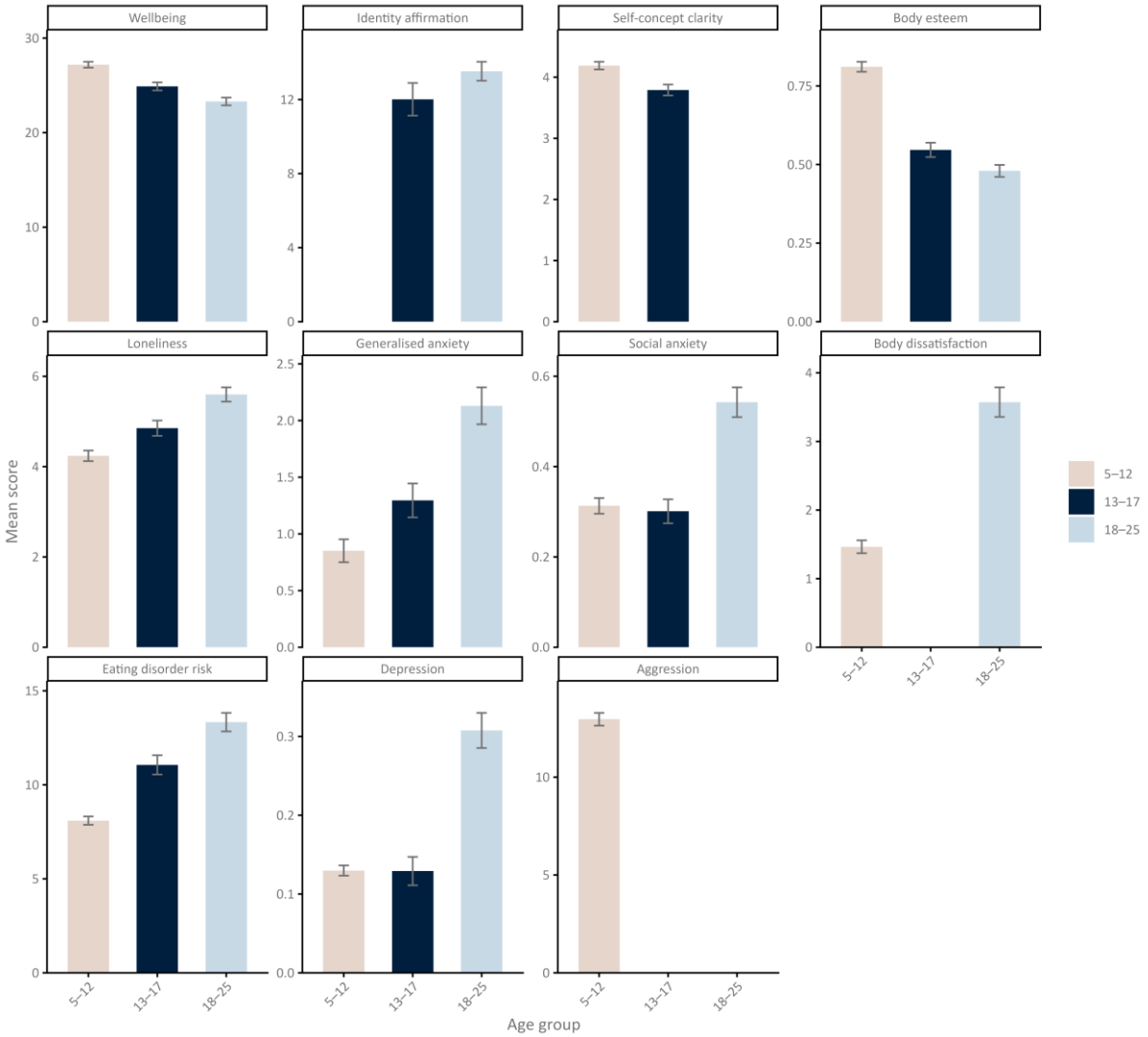
Figure 4.20 shows the means (and 95%CIs) for mental health variables for each age group.

A consistent pattern across age groups was observed, with more favourable profiles in childhood and less favourable profiles in young adulthood. Wellbeing was highest among children aged 5–12 years and lower in adolescent (13-17) and young adult (18-25) groups. A similar pattern was seen for body esteem and self-concept clarity, with children reporting more positive views of themselves and their bodies than adolescents, while young adults fell in between children and adolescents on body esteem and were not assessed for self-concept clarity. Among

LGBTQA+ participants, identity affirmation was moderate to high in both adolescents and young adults, with slightly higher scores in the older group.

By contrast, most negative outcomes tended to increase with age. Loneliness, generalised anxiety, and social anxiety were lowest in childhood, somewhat higher in adolescence, and highest in young adulthood. Eating disorder risk and body dissatisfaction also increased from childhood to adolescence and were highest among young adults. Depressive symptoms showed the largest age contrast, being relatively low in children and adolescents and substantially higher in young adults. Overall, the pattern suggests that positive mental health decreases and a range of mental health difficulties become more pronounced from childhood into adolescence and young adulthood.

Figure 4.20. *Mental health and wellbeing outcomes by age group (5-12, 13-17 and 18-25 years)*



Note. Error bars show 95% confidence intervals. Because the number of items differs across the body esteem, social anxiety and depression scales, the values plotted for these three outcomes are mean total scores divided by the maximum possible score (proportion of the maximum) to make them comparable across age groups; all other scales are plotted as mean total scores. On the original total-score scales, mean body esteem scores were 9.73 (SD = 2.44) in children (5–12 years), 4.37 (SD = 1.91) in adolescents (13–17 years) and 5.98 (SD = 2.65) in young adults (18–25 years); mean social anxiety (MINI-SPIN) scores were

2.82 (SD = 2.71), 2.41 (SD = 2.21) and 4.88 (SD = 3.45), respectively; and mean depression scores were 3.11 (SD = 3.61), 1.16 (SD = 1.69) and 8.50 (SD = 6.23), respectively.

4.3.5 Relationships between digital technology and mental health outcomes

4.3.5.1 Correlations between screen time and mental health outcomes

Correlations between screen time (both total daily use and time spent on specific apps and platforms) and mental health outcomes are shown in Table 4.10. Across age groups, total time on digital technology showed limited associations with mental health, with few significant associations observed, and where they were observed, typically being of small effect size. However, some platform-specific patterns emerged.

Among children (parent-reported), overall time spent on digital technology (device screen time) was not significantly associated with any mental health outcome, and no associations were observed between mental health outcomes for Instagram, Facebook/messaging, or gaming. In contrast, YouTube use showed the strongest pattern of associations, being linked to higher loneliness, more depressive symptoms, greater generalised anxiety, higher body dissatisfaction, and more eating disorder risk. Greater TikTok use was also associated with higher loneliness and depression, and Snapchat use was associated with lower self-concept clarity. Additionally, there was no significant subgroup differences across gender (i.e., boys versus girls) and neurodivergent status.

Among adolescents, there were similarly few correlations between overall time on digital technology (device screen time) and mental health, and use of specific apps were not associated with outcomes for the most part. Exceptions were observed for gaming apps and for messaging apps. Gaming app use was positively associated with higher depression and social anxiety but also with higher body esteem. Greater use of messaging apps was associated with higher eating disorder risk. Again, no subgroup differences were found.

For young adults, total time on digital technologies (device screen time) was not significantly associated with most mental health outcomes, with the exception of depression, for which greater overall screen time was linked to higher depression scores. Platform-specific associations were more varied: internet forum use was associated with lower loneliness and depression; among LGBTQA+ participants, greater time on TikTok was associated with higher LGBTQA+ identity affirmation; greater Snapchat use was associated with higher generalised and social anxiety; and YouTube use was related to lower wellbeing, higher loneliness, and higher social anxiety. Messaging app use showed mixed associations, being linked to lower LGBTQA+ identity affirmation but higher body esteem, whereas Instagram, Facebook, gaming, and AI tools were not significantly associated with mental health outcomes in this age group. No subgroup differences were found by gender, LGBTQA+ identity, or neurodivergent status.

Table 4.10. *Correlation matrix between time spent on digital platforms and mental health outcomes*

		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Depression	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Aggression[c]
Total average time spent	5-12	-0.07	-	-0.08	-0.01	0.09	0.10	0.00	-0.06	0.03	0.07	0.04
	13-17	0.00	-0.06	0.01	-0.02	-0.03	0.01	0.03	0.08	-	0.05	-
	18-25	-0.04	0.10	-	-0.07	0.06	0.09*	0.08	0.06	0.05	0.07	-
Internet forum	5-12	-	-	-	-	-	-	-	-	-	-	-
	13-17	-	-	-	-	-	-	-	-	-	-	-
	18-25	0.04	0.03	-	0.12	-0.21*	-0.20*	-0.19	-0.16	-0.08	-0.17	-
Instagram	5-12	0.11	-	-0.06	0.54	-0.24	-0.65	-0.54	-0.07	-0.43	-0.13	-0.40
	13-17	-0.10	0.06	-0.10	-0.03	0.07	0.06	0.04	0.05	-	-0.01	-
	18-25	0.01	0.00	-	0.06	-0.08	-0.00	-0.02	0.00	-0.05	-0.06	-
TikTok	5-12	-0.38	-	-0.12	-0.25	0.45*	0.42*	0.10	0.37	0.30	0.33	-0.01
	13-17	0.11	0.13	-0.02	-0.06	-0.05	-0.05	-0.01	0.00	-	0.02	-
	18-25	-0.08	0.26*	-	-0.06	0.06	0.12	0.08	0.13	0.02	0.04	-
Snapchat	5-12	-0.44	-	-0.48*	-0.08	0.38	0.36	0.10	0.16	-0.04	0.15	-0.02
	13-17	0.01	0.06	0.05	-0.11	-0.08	-0.10	-0.09	-0.07	-	0.01	-
	18-25	-0.03	0.14	-	-0.06	0.10	0.20	0.35*	0.35*	-0.05	0.10	-
YouTube	5-12	-0.16	-	-0.11	-0.11	0.24*	0.20*	0.24*	0.17	0.24*	0.21*	0.12
	13-17	-0.04	0.28	0.04	-0.11	-0.13	-0.03	-0.09	0.01	-	-0.05	-
	18-25	-0.20**	0.19	-	-0.07	0.22*	0.10	0.05	0.16*	0.01	0.08	-
Facebook	5-12	0.06	-	0.03	-0.27	0.34	-0.02	-0.33	-0.11	-0.28	-0.31	-0.00
	13-17	0.11	0.22	0.16	0.10	-0.10	0.03	-0.08	0.07	-	0.18	-
	18-25	0.05	-0.18	-	-0.04	-0.02	0.03	-0.07	-0.02	0.00	0.05	-
Twitter/X	5-12	-	-	-	-	-	-	-	-	-	-	-
	13-17	-	-	-	-	-	-	-	-	-	-	-

	18-25	0.22	0.06	-	-0.01	0.03	-0.04	0.00	-0.07	-0.17	-0.25	-
Messenger apps	5-12	0.04		-0.11	-0.15	-0.08	0.01	-0.05	-0.15	0.14	-0.01	0.17
	13-17	-0.09	0.22	-	-0.02	0.13	0.09	0.02	0.08	-	0.26**	-
	18-25	0.00	-0.34*	-	0.17*	-0.08	-0.02	-0.01	0.09	-0.07	-0.12	-
Gaming apps	5-12	0.10		-0.00	0.12	0.05	-0.07	-0.04	-0.02	0.13	-0.03	0.01
	13-17	0.09	-0.48	-	0.26*	-0.12	0.23*	0.02	0.27*	-	-0.10	-
	18-25	-0.05	0.43*	-	0.03	0.11	0.13	0.18	-0.05	0.28	0.23	-
AI tools	5-12	-	-	-	-	-	-	-	-	-	-	-
	13-17	-	-	-	-	-	-	-	-	-	-	-
	18-25	0.11	-0.21	-	0.44	-0.18	-0.02	-0.35	0.30	0.22	0.22	-

Note. * p < .05, ** p < .01, *** p < .001.

[a]. Identity affirmation was administered only to participants who identified as part of the LGBTQA+ community.

[b.] Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[c.] Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

4.3.5.2 Correlations between social media mechanism and mental health outcomes, and subgroup differences

Relationships between social media mechanisms and mental health outcomes are explored here. Results are organised thematically by mechanism type, separately for age groups, with a brief summary of the overall pattern provided at the end of each age group section. Table 4.11 presents correlations between social media mechanisms and mental health outcomes for each age group. Subgroup analyses, where conducted, are reported within each mechanism cluster.

Table 4.11. *Social media mechanism and mental health outcomes*

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Freedom to express oneself on social media	5-12	0.07	—	0.19	-0.06	-0.15	-0.12	0.11	-0.04	0.12	0.15	-0.09
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	0.22***	0.10	—	0.23***	-0.19***	-0.10*	-0.20***	-0.09	-0.06	-0.04	—
Acceptance of identity on social media	5-12	0.08	-	0.14	0.10	-0.12	0.05	0.13	-0.02	0.05	0.15	-0.05
	13-17	0.52***	0.18	0.42***	0.36**	-0.40***	-0.32**	-0.23*	—	-0.05	-0.33**	—
	18-25	0.28***	0.21**	—	0.31***	-0.27***	-0.10*	-0.17***	-0.15***	-0.09*	-0.10*	—
Using social media to access information	5-12	-0.06	—	-0.06	-0.16	0.07	0.23*	0.17	0.09	0.25*	0.32**	0.04
	13-17	0.15*	0.19	0.08	0.03	-0.05	-0.02	-0.01	—	-0.03	-0.05	—
	18-25	0.05	0.04	—	0.05	0.01	0.04	0.07	0.05	0.08	0.08	—
Using social media for relaxation	5-12	-0.20	—	-0.17	-0.23*	0.20	0.28*	0.21	0.20	0.26*	0.34**	0.13
	13-17	-0.06	0.06	-0.07	-0.15*	0.12*	0.10	0.18**	—	0.13*	0.07	—
	18-25	-0.05	0.06	—	-0.05	0.12**	0.16***	0.16***	0.16***	0.15**	0.17***	—
	5-12	-0.18	—	-0.20	-0.15	0.19	0.39***	0.32**	0.28*	0.36**	0.45***	0.27*
	13-17	-0.25***	-0.14	-0.14*	-0.18**	0.14*	0.26***	0.27***	—	0.11	0.24***	—

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Using social media to escape from life	18-25	-0.21***	0.09	—	-0.16***	0.24***	0.23***	0.28***	0.31***	0.31***	0.34***	—
Exposure to diverse content on social media	5-12	0.17	—	0.11	-0.02	-0.08	0.09	0.07	0.09	0.18	0.17	-0.16
	13-17	0.09	0.30*	-0.01	-0.13*	0.12*	0.08	0.14*	—	0.14*	0.04	—
	18-25	0.01	0.16*	—	0.01	0.09	0.14**	0.13**	0.09	0.09*	0.13**	—
Using social media for entertainment	5-12	-0.08	—	-0.06	-0.14	0.04	0.08	0.15	0.04	0.16	0.1	0.08
	13-17	0.21***	0.38*	0.12*	-0.06	-0.07	0.03	0.11	—	-0.02	-0.02	—
	18-25	0.05	0.10	—	0.08	0.02	0.03	0.09*	0.06	0.07	0.05	—
Using social media for general learning	5-12	0.02	—	0.07	0.03	-0.04	0.13	0.27*	-0.03	0.13	0.16	-0.11
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	0.03	0.07	—	0.04	0.03	0.05	0.04	0.09	0.10*	0.09	—
Using social media to learn about what is popular	5-12	0.00	—	-0.08	-0.04	-0.08	0.12	0.19	0.08	0.13	0.11	0.07
	13-17	0.01	-0.03	-0.01	-0.06	-0.03	0.12*	0.11	—	0.04	0.07	—
	18-25	0.04	-0.01	—	-0.00	0.09*	0.06	0.08	0.11*	0.11*	0.05	—
Social connections on social media	5-12	-0.11	—	0.03	-0.19	-0.16	-0.01	-0.02	0.07	0.18	0.06	0.06
	13-17	0.06	0.18	0.11	0.02	-0.08	-0.00	0.00	—	-0.05	-0.08	—
	18-25	0.22***	0.01	—	0.14**	-0.20***	-0.11*	-0.14**	-0.07	-0.06	-0.09*	—
Positive support on social media	5-12	0.16	—	0.2	-0.09	-0.09	-0.13	0.12	0.05	0.06	0.04	-0.06
	13-17	0.10	0.23	0.10	0.04	-0.02	-0.05	-0.05	—	0.03	-0.07	—
	18-25	0.31***	0.07	—	0.23***	-0.27***	-0.17***	-0.22***	-0.13**	-0.14**	-0.17***	—

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Mental health support on social media	5-12	0.06	—	0.03	-0.15	-0.04	0.15	0.19	0.18	0.31**	0.29*	0.07
	13-17	0.02	0.20	0.10	-0.06	-0.02	-0.02	0.08	—	0.04	-0.03	—
	18-25	0.14**	0.05	—	0.06	-0.04	0.01	-0.01	0.06	0.04	0.05	—
Anxiety from not accessing social media	5-12	-0.39***	—	-0.39***	-0.07	0.27*	0.37***	0.21	0.34**	0.37***	0.30**	0.26*
	13-17	-0.19***	-0.26	-0.21***	-0.10	0.08	0.27***	0.24***	—	0.10	0.24***	—
	18-25	-0.12**	0.06	—	-0.04	0.18***	0.15***	0.24***	0.22***	0.30***	0.29***	—
Experiencing bullying on social media	5-12	-0.16	—	-0.33**	-0.14	0.19	0.31**	0.20	0.30**	0.40***	0.44***	0.29**
	13-17	-0.28***	-0.41**	-0.19**	-0.13*	0.14*	0.31***	0.25***	—	0.17**	0.38***	—
	18-25	-0.12**	-0.07	—	-0.16***	0.19***	0.22***	0.15***	0.24***	0.34***	0.35***	—
Feeling left out on social media	5-12	-0.23*	—	-0.33**	-0.2	0.37***	0.42***	0.32**	0.49***	0.56***	0.53***	0.28*
	13-17	-0.24***	-0.27	-0.30***	-0.24***	0.14*	0.39***	0.39***	—	0.13*	0.41***	—
	18-25	-0.19***	-0.08	—	-0.21***	0.37***	0.20***	0.27***	0.25***	0.34***	0.36***	—
Loss of time scrolling on social media	5-12	-0.26*	—	-0.30**	-0.32**	0.37***	0.24*	0.15	0.22*	0.25*	0.24*	0.28*
	13-17	-0.06	0.01	-0.10	-0.13*	0.01	0.21***	0.17**	—	0.05	0.15**	—
	18-25	-0.15***	0.14	—	-0.10*	0.14**	0.15***	0.22***	0.18***	0.19***	0.20***	—
Social media being a distraction from other tasks	5-12	-0.52***	—	-0.46***	-0.25*	0.41***	0.40***	0.18	0.29**	0.28*	0.40***	0.40***
	13-17	-0.10	-0.15	-0.18**	-0.16**	0.02	0.25***	0.25***	—	0.05	0.23***	—
	18-25	-0.21***	0.07	—	-0.10*	0.23***	0.21***	0.28***	0.25***	0.27***	0.26***	—
	5-12	-0.22	—	0.18	-0.09	0.19	0.30**	0.1	0.32**	0.31**	0.41***	0.34**
	13-17	-0.17**	0.07	-0.14*	-0.20***	0.08	0.23***	0.16**	—	0.15*	0.18**	—

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Social media interfering with sleep	18-25	-0.23***	-0.03	—	-0.07	0.20***	0.19***	0.29***	0.24***	0.28***	0.32***	—
Worrying about being judged on social media	5-12	-0.12	—	-0.30**	-0.13	0.01	0.04	0.00	0.18	0.25*	0.19	0.12
	13-17	-0.17**	-0.21	-0.25***	-0.29***	0.09	0.27***	0.28***	—	0.17**	0.23***	—
	18-25	-0.21***	-0.03	—	-0.22***	0.26***	0.25***	0.39***	0.30***	0.32***	0.31***	—
Fear of missing out from social media	5-12	-0.17	—	-0.21	-0.19	0.08	0.09	0.02	0.33**	0.40***	0.22	0.14
	13-17	-0.12*	0.04	-0.13*	-0.21***	0.09	0.29***	0.25***	—	0.15*	0.21***	—
	18-25	-0.09*	0.06	—	-0.04	0.15**	0.12**	0.20***	0.20***	0.25***	0.19***	—
Seeing people attack others on social media	5-12	-0.22	—	-0.22*	-0.34**	0.18	0.16	0.19	0.38***	0.34**	0.34**	0.25*
	13-17	-0.17**	-0.08	-0.12*	-0.24***	0.05	0.23***	0.11	—	0.05	0.12*	—
	18-25	-0.10*	-0.05	—	-0.13**	0.15**	0.21***	0.24***	0.20***	0.20***	0.21***	—
Seeing extreme trends on social media	5-12	-0.05	—	-0.19	0.02	0.02	0.04	0.16	0.05	0.15	0.27*	0.13
	13-17	-0.09	-0.11	-0.10	-0.09	-0.03	0.17**	0.07		0.02	0.08	—
	18-25	-0.08	-0.10	—	-0.11*	0.11*	0.13**	0.18***	0.18***	0.22***	0.21***	—
Perception of the perfect life on social media	5-12	-0.09	—	-0.2	0.05	0.14	0.05	0.15	0.16	0.22	0.23*	0.12
	13-17	-0.02	-0.11	-0.10	-0.10	-0.01	0.21***	0.32***	—	0.04	0.15**	—
	18-25	-0.13**	-0.14	—	-0.14**	0.16***	0.12**	0.20***	0.24***	0.24***	0.18***	—
Social media influencing self-image	5-12	-0.16	—	-0.32**	-0.06	0.13	0.27*	0.22*	0.31**	0.36**	0.30**	0.21
	13-17	-0.12*	0.06	-0.12*	-0.18**	0.08	0.18**	0.11*	—	0.17**	0.14*	—
	18-25	-0.14**	-0.00	—	-0.12**	0.20***	0.16***	0.19***	0.26***	0.29***	0.21***	—
	5-12	-0.08	—	-0.03	-0.07	0.15	0.1	0.07	0.22*	0.16	0.22*	0.12

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Showing one's best version on social media	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	0.03	0.12	—	0.02	0.06	0.11*	0.14**	0.14**	0.13**	0.07	—
Trusting information from social media	5-12	-0.09	—	-0.21	-0.05	0.12	0.28*	0.20	0.17	0.27*	0.26*	0.21
	13-17	0.01	-0.15	-0.00	0.06	0.03	0.17**	0.18**	—	0.06	0.15*	—
	18-25	0.10*	0.07	—	0.13**	-0.02	-0.04	0.03	0.02	0.04	0.05	—
Exposure to extreme opinions social media	5-12	-0.15	—	-0.05	-0.22	0.2	0.19	0.22	0.40***	0.31**	0.45***	0.26*
	13-17	-0.05	0.23	-0.10	-0.16**	-0.05	0.08	0.09	—	-0.04	0.02	—
	18-25	-0.07	0.03	-	-0.09	0.11*	0.17***	0.20***	0.18***	0.19***	0.17***	—
Compulsive checking of social media	5-12	-0.18	—	-0.25*	-0.13	0.06	0.12	0.16	0.24*	0.31**	0.29**	0.12
	13-17	-0.07	0.17	-0.09	-0.25***	0.02	0.17**	0.04	—	0.10	0.09	—
	18-25	-0.05	0.07	—	-0.00	0.14**	0.09*	0.16***	0.13**	0.17***	0.16***	—
Pressure to present oneself in a certain way on social media	5-12	-0.17	—	-0.2	-0.06	0.15	0.24*	0.17	0.27*	0.32**	0.32**	0.18
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	-0.06	0.04	—	-0.05	0.18***	0.17***	0.23***	0.17***	0.23***	0.15**	—
Pressure to present oneself in a sexualised way on social media	5-12	—	—	—	—	—	—	—	—	—	—	—
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	-0.02	-0.14	-	-0.01	0.07	0.03	0.03	0.15***	0.22***	0.14**	—
	5-12	-0.14	—	-0.08	-0.06	0.13	0.17	0.26*	0.2	0.38***	0.49***	0.2

Social media mechanism		Wellbeing	Identity affirmation [a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Posting to express oneself on social media	13-17	-0.03	0.13	-0.09	-0.09	0.08	0.10	0.02	—	0.16**	0.10	—
	18-25	0.08	0.15*	—	0.09*	0.02	0.02	-0.10*	0.03	0.08	0.03	—
Difficulty taking breaks from social media	5-12	-0.27*	—	-0.33**	-0.13	0.07	0.25*	0.14	0.27*	0.35**	0.30**	0.16
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	-0.16***	0.03	—	-0.04	0.15***	0.11*	0.19***	0.17***	0.18***	0.25***	—
Receiving unwanted sexual content on social media	5-12	-0.31**	—	-0.31**	-0.21	0.23*	0.39***	0.23*	0.39***	0.50***	0.52***	0.48***
	13-17	-0.17**	-0.21	-0.17**	-0.07	0.12*	0.40***	0.25***	—	0.18**	0.32***	—
	18-25	-0.04	-0.09	—	-0.01	0.09*	0.03	0.08	0.15***	0.22***	0.17***	—
Comparing to others on social media	5-12	-0.13	—	-0.36***	-0.15	0.28*	0.27*	0.22*	0.42***	0.42***	0.34**	0.20
	13-17	-0.28***	-0.32*	-0.29***	-0.35***	0.02	0.32***	0.26***	—	0.12*	0.25***	—
	18-25	-0.22***	-0.06	—	-0.20***	0.24***	0.22***	0.28***	0.32***	0.35***	0.25***	—

Note. * p < .05, ** p < .01, *** p < .001.

[a]. Identity affirmation was administered only to participants who identified as part of the LGBTQA+ community.

[b]. Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[c]. Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

4.3.5.2.1 Children

Correlations between social media mechanisms and mental health outcomes from parent-report data for the 5–12 cohort are shown in Table 4.11. No subgroup analyses were conducted for this age group, given the small number of parents who reported that their child used social media. Overall, none of the tested mechanisms appeared to be correlated with good mental health, i.e., mechanisms were not correlated with lower scores for negative mental health indicators or higher scores for positive mental health indicators. By contrast, feeling left out, distraction from other tasks, and unwanted sexual content emerged as most frequently correlated with poor mental health among children, each being significantly associated with nine of the 10 tested mental health outcomes.

Identity and connection mechanisms, including identity freedom, identity acceptance, social connection, and positive support, were not significantly associated with any mental health outcome. Mechanisms such as accessing information, using social media for mental health support showed, at most, small and limited associations.

Using social media to escape from everyday life and to relax or take a break when stressed were both associated with poorer mental health. Escapism was associated with higher depression, generalised anxiety, social anxiety, body dissatisfaction, eating disorder risk, and aggression. Similarly, using social media for relaxation was associated with higher depressive symptoms, generalised anxiety, greater eating disorder risk, and poorer body esteem.

Information and learning mechanisms showed a mixed pattern of associations. Learning what is popular, exposure to diverse content, and entertainment were not significantly associated with any mental health outcome. Accessing information was significantly associated with higher depression, higher generalised anxiety, and greater eating disorder risk, with all other outcomes non-significant. Trusting the information encountered on social media was associated with higher depression, higher generalised anxiety, and greater eating disorder risk, with all other outcomes non-significant. Learning general information from social media was associated with higher social anxiety only, with all other outcomes non-significant.

Compulsive and time-consuming use, including difficulty taking breaks, compulsive checking, anxiety when not having access, and time loss due to scrolling, showed significant but selective associations, most often with higher depression and anxiety, greater body dissatisfaction and eating disorder risk, and lower self-concept clarity

Negative social experiences were among the mechanisms most consistently associated with mental health outcomes in this age group. Most notably, feeling left out emerged as one of the key mechanisms overall, being significantly associated with nine of the 10 mental health outcomes, including lower wellbeing and self-concept clarity, and higher depression, generalised anxiety, aggression, loneliness, body dissatisfaction, eating disorder risk, and social anxiety. This breadth of association places feeling left out amongst the most prominent variable associated with poorer mental health among children. Beyond feeling left out, a broader cluster of negative social experience mechanisms, including experiencing bullying online, seeing people attack others, worry about being judged, and fear of missing out, also showed consistently negative associations across a range of outcomes. As a group, these mechanisms were associated with

higher depression and generalised anxiety, and most were also linked to higher body dissatisfaction, eating disorder risk, and at least one of loneliness, aggression, or lower self-concept clarity.

Self-image and self-presentation mechanisms, including comparison with others, influence on self-image, pressure around self-presentation, and self-expression through posting, showed significant but more selective associations, most often with higher depression and anxiety, greater body dissatisfaction and eating disorder risk, and lower self-concept clarity.

Harmful content exposure, including unwanted sexual content and exposure to extreme opinions, as well as distraction from other tasks, showed some of the strongest and most consistent associations with poorer mental health in this age group. Distraction from other tasks and unwanted sexual content were each significantly associated with nine of the 10 mental health outcomes, being linked to lower wellbeing and self-concept clarity, and higher depression, generalised anxiety, aggression, loneliness, body dissatisfaction, and eating disorder risk. Distraction from other tasks was associated with poorer body esteem but not social anxiety, whereas unwanted sexual content was associated with higher social anxiety but not body esteem. Exposure to extreme opinions showed more selective associations, most often with higher depression and anxiety and lower self-concept clarity.

Overall, the correlations between social media mechanisms and mental health indicators suggest that harmful and disruptive experiences on social media, particularly distraction, feeling excluded, and exposure to unwanted content, show the strongest and most consistent links to poorer mental health in this age group. Positive and identity-affirming mechanisms, by contrast, showed no significant associations with mental health outcomes.

4.3.5.2.2 Adolescents

Correlations between social media mechanisms and mental health outcomes among adolescents are shown in Table 4.11. Overall, identity-affirming mechanisms showed the most favourable associations with mental health, whilst mechanisms reflecting negative social experiences, compulsive use, and harmful content exposure were most consistently associated with poorer outcomes. Where subgroup differences were found, harmful associations tended to be stronger among non-LGBTQA+ than LGBTQA+ adolescents, whereas patterns by neurodivergence were more mixed: some negative effects were stronger among non-neurodivergent adolescents (e.g. for mechanisms of sleep interference, exposure to unwanted content), while others were stronger among neurodivergent adolescents (e.g. social media influencing self-image and social comparison in relation to depression mechanisms). See Table 4.12 for a summary of subgroup differences in correlations between social media mechanisms and mental health outcomes.

Identity and connection mechanisms showed the most favourable pattern of associations. Identity acceptance was associated with higher wellbeing, lower loneliness, lower generalised and social anxiety, higher body esteem, greater self-concept clarity, and lower depression. Subgroup analyses showed that the link between identity acceptance on social media and generalised anxiety was much stronger for neurodivergent adolescents than non-neurodivergent adolescents. Among adolescents who identified as neurodivergent, greater

acceptance on social media was associated with substantially lower generalised anxiety. In contrast, among non-neurodivergent adolescents, this association was small and not statistically significant. Both receiving positive support and mental health support from social media did not show any significant correlations with any tested mental health outcomes. However, subgroup analyses showed different patterns for adolescents according to neurodivergent status. Mental health support on social media was not significantly related to body esteem among non-neurodivergent adolescents, but it was significantly associated with poorer body esteem among neurodivergent adolescents. For self-concept clarity, mental health support was significantly associated with higher self-concept clarity among non-neurodivergent adolescents, whereas among neurodivergent adolescents the association was small, negative, and not statistically significant. These differences between the two groups were themselves statistically significant.

Information and entertainment mechanisms showed a mixed profile in relationships with mental health outcomes. Using social media to access information was linked to higher wellbeing, with subgroup analyses indicating a positive association with higher wellbeing among males but not among females. Entertainment use was similarly associated with higher wellbeing and additionally with higher self-concept clarity and LGBTQA+ identity affirmation. However, other information-related mechanisms showed less favourable patterns. Exposure to diverse content was associated with higher LGBTQA+ identity affirmation but also with higher loneliness, higher social anxiety, greater eating disorder risk, and lower body esteem. Learning what is popular from social media was associated with higher generalised anxiety and greater eating disorder risk, and trusting information on social media was related to higher generalised anxiety, higher social anxiety, and higher depression.

Subgroup analyses indicated that these mechanisms were generally associated with poorer mental health for non-LGBTQA+ than LGBTQA+ adolescents and for non-neurodivergent than neurodivergent adolescents. For example, learning what is popular on social media was significantly associated with higher depression, generalised and social anxiety among non-LGBTQA+ adolescents, but was not significantly related to these mental health variables among LGBTQA+ adolescents, and these group differences were statistically significant. Similarly, seeing extreme trends or people attacking others on social media was associated with lower wellbeing and higher loneliness, depression, and generalised and social anxiety among non-LGBTQA+ adolescents, whereas the corresponding associations were small and not statistically significant among LGBTQA+ adolescents. Trusting information on social media was associated with poorer wellbeing among non-LGBTQA+ adolescents but with significantly higher wellbeing among LGBTQA+ adolescents, and this difference was statistically significant. Trusting information was also associated with higher social anxiety among non-neurodivergent adolescents but not among neurodivergent adolescents. Exposure to diverse content was linked to higher wellbeing among LGBTQA+ adolescents but not among non-LGBTQA+ adolescents.

Alongside these findings, some information-related mechanisms showed gender-specific patterns. For instance, using social media to learn what is popular was associated with higher identity affirmation among male adolescents but not among female adolescents, and this gender difference was statistically significant. Trusting information was additionally associated with higher social anxiety among non-neurodivergent adolescents, whereas this relationship was not

statistically significant among neurodivergent adolescents, and the difference in these correlations between these groups was significant.

Mechanisms related to escapism and relaxation showed consistent associations with poorer mental health. Using social media to escape from everyday life was associated with lower wellbeing and body esteem, and higher loneliness, generalised, and social anxiety, as well as higher depression across almost all outcomes. The association between escapism and lower wellbeing was stronger among LGBTQA+ than non-LGBTQA+ adolescents. Using social media to relax or take a break when feeling stressed was associated with higher generalised and social anxiety, higher loneliness, greater eating disorder risk, and lower body esteem. Subgroup analyses indicated that use for relaxation from stress was associated with lower body esteem among LGBTQA+ participants, with negligible or weaker associations among non-LGBTQA+ participants.

Negative social experience mechanisms were among the most prominently associated with poor mental health for adolescents. Experiencing bullying and comparing oneself with others on social media were significantly associated with all nine mental health outcomes, each being linked to lower wellbeing, body esteem, and self-concept clarity, and higher loneliness, generalised and social anxiety, eating disorder risk, and depression. Subgroup analyses showed that online bullying was significantly associated with lower body esteem among male adolescents, whereas among females the association was also negative in direction but not statistically significant. This indicates a stronger association between lower body esteem and online bullying for males than for females. Social comparison was also more strongly associated with lower wellbeing among males than females, and the mechanism was linked to higher social anxiety with a stronger association among non-LGBTQA+ adolescents than among LGBTQA+ adolescents: that is, the association with social anxiety was statistically significant in non-LGBTQA+ adolescents, but weaker and not significant in LGBTQA+ adolescents.

A second cluster of mechanisms — feeling left out, distracted from other tasks, sleep interference, worry about being judged, and fear of missing out — showed a similarly broad pattern of associations with poorer mental health. Each was significantly associated with up to eight of the nine outcomes, relating to lower wellbeing, body esteem, and self-concept clarity, and to higher loneliness, generalised and social anxiety, eating disorder risk, and depression, but not to LGBTQA+ identity affirmation. Distraction from other tasks, sleep interference, and worry about being judged were all associated with higher social anxiety, with these effects concentrated among non-LGBTQA+ adolescents. Sleep interference in particular, was linked to higher generalised and social anxiety among non-LGBTQA+ adolescents (but not LGBTQA+ adolescents), and to higher generalised and social anxiety and lower wellbeing among non-neurodivergent adolescents (with no statistically significant associations among neurodivergent adolescents). There were no significant subgroup differences among the patterns of associations between fear of missing out and these multiple mental health outcomes.

Self-image and self-presentation mechanisms – including negative influence on self-image and posting for self-expression – were generally associated with poorer mental health across a range of outcomes. These mechanisms were linked to lower body esteem and self-concept clarity,

alongside higher depression, generalised and social anxiety, eating disorder risk, and, in some cases, higher loneliness. Subgroup analyses indicated that associations with poorer mental health within this cluster of mechanisms tended to be stronger among non-LGBTQA+ and neurodivergent adolescents than among their LGBTQA+ and non-neurodivergent peers, as shown in Table 4.12.

Compulsive and time-consuming use mechanisms, including anxiety when unable to access social media, compulsive checking, and scrolling that leads to time loss, were also associated with poorer mental health. Across these mechanisms, significant associations were observed with combinations of lower wellbeing and self-concept clarity, and higher depression, generalised and social anxiety, and eating disorder risk. Many of these were stronger among non-LGBTQA+ adolescents; specifically, anxiety when unable to access social media and compulsive checking, were each associated with higher depression among non-LGBTQA+ but not LGBTQA+ adolescents.

Harmful content exposure mechanisms – including unwanted sexual content, witnessing others being attacked, and exposure to extreme trends or opinions – were generally associated with poorer wellbeing and body esteem, and with higher depression, anxiety, loneliness, and eating disorder risk, typically across fewer outcomes than bullying or social comparison but still showing a consistent negative pattern. Unwanted sexual content was related to poorer wellbeing and lower body esteem, with stronger effects among males than females, and was significantly associated with higher generalised anxiety among non-neurodivergent adolescents but this association was not significant among neurodivergent adolescents. Seeing people attack others on social media was linked to higher loneliness, depression, generalised and social anxiety among non-LGBTQA+ adolescents, but these associations were not significant among LGBTQA+ adolescents. This mechanism was also associated with lower body esteem among non-neurodivergent adolescents, but not among neurodivergent adolescents.

Table 4.12. *Summary of subgroup analyses examining the relationships between social media mechanisms and mental health outcomes for adolescents*

Social media mechanism	Mental Health Outcome	Gender		LGBTQA+ identity		Neurodivergent status	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Access information	Wellbeing	0.17	1.13*	—	—	—	—
Anxiety from no access	Depression	0.64*	0.16	0.60*	0.07	—	—
Bullying experiences	Body esteem	-0.03	-0.64*	—	—	-0.53*	0.11
Comparing to others	Wellbeing	-0.56	-1.49*	—	—	—	—
	Eating disorder risk	1.79	-1.07	—	—	—	—
	Depression	—	—	0.57*	0.22	0.24*	0.89*
	Generalised anxiety	—	—	0.60*	0.30*	—	—
	Social anxiety	—	—	0.83*	0.21	—	—
Compulsive checking of social media	Social anxiety	—	—	0.37*	-0.36*	—	—
	Depression	—	—	0.37*	-0.22	—	—
Distraction from other tasks	Social anxiety	—	—	0.66*	0.22	—	—
Exposure to diverse content	Social anxiety	—	—	0.58*	0.08	—	—
Exposure to extreme opinions	Generalised anxiety	—	—	0.28*	-0.11	—	—
Expressing oneself via posting	Generalised anxiety	—	—	0.35*	-0.10	—	—
	Depression	—	—	0.38*	-0.11	—	—
Extreme or dangerous trends seen	Body esteem	—	—	—	—	-0.28*	0.30
	Wellbeing	—	—	-0.72*	0.51	—	—
	Loneliness	—	—	0.29*	-0.10	—	—
	Generalised anxiety	—	—	0.47*	-0.02	—	—
	Social anxiety	—	—	0.49*	-0.20	—	—
	Depression	—	—	0.34*	-0.13	—	—
Feeling left out (FOMO)	Social anxiety	—	—	1.01	0.55	—	—

Social media mechanism	Mental Health Outcome	Gender		LGBTQA+ identity		Neurodivergent status	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Identity acceptance (by others)	Generalised anxiety	—	—	—	—	-0.15	-1.06*
Influence on self-image	Depression	—	—	0.42*	-0.01	0.11	0.67*
	Social anxiety	—	—	0.52*	-0.09	—	—
Learning what's popular	Identity affirmation	-0.34	2.25*	—	—	—	—
	Wellbeing	—	—	-0.57	0.72	—	—
	Loneliness	—	—	0.24	-0.20	—	—
	Generalised anxiety	—	—	0.34*	-0.06	—	—
	Social anxiety	—	—	0.51*	-0.22	—	—
	Depression	—	—	0.32*	-0.18	—	—
	Self-concept clarity	—	—	-0.09	0.12	—	—
Loss of time scrolling	Eating disorders	—	—	0.39	1.68*	—	—
Mental health support	Body esteem	—	—	—	—	0.02	-0.55*
	Self-concept clarity	—	—	—	—	0.12*	-0.17
Perception of the perfect life	Self-concept clarity	0.03	-0.16*	—	—	—	—
	Social anxiety	—	—	0.72*	0.28	—	—
Receiving unwanted sexual content	Wellbeing	-0.68*	-1.84*	—	—	—	—
	Body esteem	0.06	-0.52*	—	—	—	—
	Generalised anxiety	—	—	—	—	0.69*	0.13
	Depression	—	—	0.74*	0.32	—	—
Relaxation when stressed	Body esteem	—	—	0.01	-0.43*	—	—
Seeing people attack others	Body esteem	—	—	—	—	-0.47	0.13
	Loneliness	—	—	0.52*	0.16	—	—
	Generalised anxiety	—	—	0.57*	-0.05	—	—
	Social anxiety	—	—	0.50*	-0.08	—	—
	Depression	—	—	0.45*	-0.18	—	—
Sleep interference	Wellbeing	—	—	-1.24*	-0.26	-1.43*	0.59
	Generalised anxiety	—	—	0.51*	-0.01	0.41*	0.23

Social media mechanism	Mental Health Outcome	Gender		LGBTQA+ identity		Neurodivergent status	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
	Social anxiety	—	—	0.50*	-0.02	0.30*	-0.29
	Depression	—	—	0.44*	0.001	—	—
Trusting information	Social anxiety	—	—	—	—	0.56*	-0.61
	Wellbeing	—	—	-0.66	1.09*	—	—
Worrying about being judged	Social anxiety	—	—	0.73*	0.14	—	—
	Depression	—	—	0.47*	0.11	—	—

*Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent, non-ND=non-neurodivergent. * p < .05.*

4.3.5.2.3 Young Adults

Correlation analyses examining social media mechanisms and mental health outcomes among young adults are shown in Table 4.11, with subgroup differences presented in Table 4.13. Overall, associations were mostly small to moderate in size. Broadly, mechanisms tied to identity affirmation and supportive interactions were associated with better mental health outcomes, whilst mechanisms reflecting escapism, compulsive use, hostile interactions, and self-presentation pressure tended to be associated with poorer outcomes. Many of these associations varied in strength across gender, LGBTQA+ identity, and neurodivergence.

Identity and connection mechanisms showed the most favourable pattern of associations. Mechanisms reflecting identity affirmation on social media were generally positively associated with wellbeing and body esteem and negatively associated with loneliness. Feeling accepted on social media showed the broadest pattern, correlating significantly with all nine tested mental health outcomes: positively with wellbeing and body esteem, and negatively with generalised and social anxiety, loneliness, eating disorder risk, and depressive symptoms. Similarly, perceived positive support was associated with higher wellbeing and body esteem and with lower loneliness and social anxiety. These positive associations were most evident among marginalised groups: feeling accepted on social media was significantly associated with lower eating disorder risk among LGBTQA+ and neurodivergent participants but not among non-LGBTQA+ or non-neurodivergent participants, whilst identity freedom was linked to lower eating disorder risk among gender-diverse and neurodivergent participants, with little association for non-gender-diverse or non-neurodivergent participants. Using social media for social connections and accessing positive support networks was associated with better mental health, specifically with higher wellbeing and body esteem, and with lower loneliness,

generalised and social anxiety, and depression. When social media was used specifically for social support, these associations extended to lower eating disorder risk, with no notable subgroup differences.

Using social media for mental health support showed a more nuanced pattern of associations with mental health outcomes. Although mental health support use was associated with higher wellbeing overall, subgroup analyses indicated divergent associations: this mechanism was linked to slightly higher depression among non-neurodivergent adolescents versus slightly lower depression among neurodivergent participants, with the contrast between these groups reaching significance even though the within-group effects were modest, and also linked to lower loneliness among non-LGBTQA+ participants but not among LGBTQA+ participants.

Information and entertainment mechanisms showed a mixed profile. There were no strong associations in the overall sample between entertainment use and mental health outcomes; however, subgroup analyses revealed important differences. Among gender-diverse participants, entertainment use was associated with higher wellbeing and lower social anxiety, with no such benefits observed for males or females. Entertainment use was associated with higher eating disorder risk among females but lower symptoms among gender-diverse participants, with no clear association for males. A similar pattern emerged by sexual identity and neurodivergence: entertainment use was linked to higher social anxiety among non-LGBTQA+ participants but not among LGBTQA+ participants, and to lower loneliness among neurodivergent participants, with little or no association among non-neurodivergent participants. Accessing information and learning-oriented uses generally showed minimal associations with mental health outcomes. Trusting information on social media was associated with lower loneliness among gender-diverse participants, and self-expression showed a small positive association with wellbeing among non-LGBTQA+ participants.

Escapism and relaxation showed consistent associations with poorer mental health. Using social media to escape from everyday life was associated with higher loneliness, generalised anxiety and social anxiety, depression, eating disorder risk, and body dissatisfaction. The association between escapism and social anxiety was stronger among non-LGBTQA+ participants than among LGBTQA+ participants. Using social media to relax or take a break when stressed showed a similarly negative pattern, being associated with higher loneliness, generalised and social anxiety, eating disorder risk, increased body dissatisfaction, and more depressive symptoms. The associations between using social media for relaxation when stressed and both loneliness and eating disorder risk were stronger among non-LGBTQA+ compared with LGBTQA+ participants.

Compulsive and time-consuming use mechanisms — including feeling left out, experiences of bullying, losing track of time whilst scrolling, sleep interference, distraction from tasks, worry about being judged, and difficulty taking breaks — were consistently associated with higher loneliness, generalised anxiety, social anxiety, depression, and eating disorder risk, and with lower wellbeing and body esteem. These effects were often stronger among non-LGBTQA+ young adults and frequently weaker or absent among LGBTQA+ young adults, whilst patterns by neurodivergence were more mixed, with some effects stronger among neurodivergent young adults (e.g., distraction and “perfect life” perceptions) and others stronger among non-

neurodivergent young adults. Gender differences were also evident for some outcomes: compulsive social media checking showed a stronger association with depressive symptoms among males and was strongest among gender-diverse participants, whilst anxiety about being unable to access social media was more strongly related to lower body esteem among gender-diverse participants.

Negative social experiences — including bullying and exposure to online hostility — were consistently associated with higher depression, anxiety, and eating disorder risk across groups. The association between feeling left out on social media and depressive symptoms was observed most strongly among males, whereas exposure to hostility appeared more strongly linked to eating disorder risk among females and gender-diverse participants.

Table 4.13. *Summary of subgroup analyses examining the relationships between social media mechanisms and mental health outcomes for young adults (18-25)*

Social media mechanism	Mental Health Outcome	Gender			LGBTQA+ identity		Neurodivergent status	
		Female	Male	Gender diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Access information	Body esteem	—	—	—	0.37*	0.09	—	—
Anxiety from no access	Loneliness	—	—	—	0.49*	0.11	—	—
	Social anxiety	—	—	—	1.21*	0.23	—	—
	Body esteem	-0.07	0.13	0.97* GD ≠ M*	—	—	—	—
Bullying experiences	Generalised anxiety	—	—	—	0.57*	0.15	0.58*	0.18
Comparing to others	Body esteem	—	—	—	—	—	0.32*	0.72*
Compulsive checking	Loneliness	—	—	—	0.33*	0.04	0.29*	0.01
	Social anxiety	—	—	—	0.70*	0.05	—	—
	Depression	0.23	1.58*	2.85* GD≠F*	—	—	—	—
Difficulty taking breaks	Social anxiety	—	—	—	0.81*	0.03	0.67*	0.03
	Depression	0.74* GD ≠F*	1.51*	2.94*	—	—	—	—
Distraction from other tasks	Social anxiety	—	—	—	0.99*	0.31	—	—
	Eating disorder risk	—	—	—	—	—	0.82*	1.88*
Entertainment	Wellbeing	0.16	0.07	2.53* GD≠F**, GD≠M**	—	—	0.10	-1.35*

Social media mechanism	Mental Health Outcome	Gender			LGBTQA+ identity		Neurodivergent status	
		Female	Male	Gender diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
	Generalised anxiety	0.15	-0.02	-0.59* GD≠F*	—	—	—	—
	Social anxiety	0.30	0.55*	-1.01 GD≠M*	0.56*	0.11	—	—
	Eating disorder risk	0.61	0.51	-2.47* GD≠F**, GD≠M**	—	—	—	—
	Depression	0.33	0.49	-4.71* GD≠F***, GD≠M***	0.56	0.90	0.32	-1.35*
Escape from life	Social anxiety	—	—	—	1.14*	0.29	—	—
	Depression	1.17*	2.00*	3.49* GD≠F*	—	—	—	—
Exposure to extreme opinions	Loneliness	—	—	—	0.27*	0.08	—	—
Expressing oneself via posting	Wellbeing	—	—	—	0.80*	0.02	—	—
	Identity affirmation	-0.86 F≠M*	-31.46*	0.14 GD ≠M*	—	—	—	—
Extreme or dangerous trends seen	Body esteem	0.42* F ≠M*	0.07	0.36	—	—	—	—
Feeling left out (FOMO)	Depression	1.99* GD ≠F*	2.55* M ≠GD**	0.89	2.66*	0.74	—	—
Freedom to express self	Eating disorder risk	0.34	0.21	-1.89* GD≠M*	—	—	0.05	-1.01*
	Body esteem	—	—	—	0.71*	0.29	—	—
Identity acceptance (by others)	Eating disorder risk	—	—	—	0.04	-1.58*	0.17	-1.32*
Influence on self-image	Depression	0.81* GD ≠F***	1.19* GD ≠M**	4.92*	—	—	—	—

Social media mechanism	Mental Health Outcome	Gender			LGBTQA+ identity		Neurodivergent status	
		Female	Male	Gender diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Loss of time scrolling	Loneliness	—	—	—	0.33*	0.0001	0.34*	0.02
	Social anxiety	—	—	—	0.94*	0.03	0.74*	0.14
	Depression	0.77	0.70	3.81* GD ≠F**, GD ≠M**	—	—	—	—
Mental health support	Loneliness	—	—	—	0.21*	0.08	—	—
	Depression	—	—	—	—	—	0.52	0.50
Perception of the perfect life	Social anxiety	—	—	—	—	—	0.37	0.96*
	Body esteem	—	—	—	—	—	0.19	0.88*
	Depression	0.93* GD ≠F*	1.05* GD ≠M*	4.25*	—	—	—	—
Pressure to present oneself in a certain way	Social anxiety	0.35* M ≠F**	1.19*	0.41	0.96*	0.15	—	—
	Eating disorder risk	—	—	—	1.43*	0.48	—	—
	Depression	—	—	—	1.23*	0.08	—	—
Relaxation when stressed	Social anxiety	—	—	—	0.87*	0.15	—	—
	Eating disorder risk	—	—	—	1.07*	0.14	—	—
Seeing people attack others	Eating disorder risk	1.31* F ≠M*	0.20	1.49	—	—	—	—
	Depression	1.75* F ≠M*	0.23	0.68	—	—	—	—
Showing one's best self	Social anxiety	—	—	—	0.61*	0.01	—	—

Social media mechanism	Mental Health Outcome	Gender			LGBTQA+ identity		Neurodivergent status	
		Female	Male	Gender diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
	Eating disorder risk	—	—	—	0.95*	0.05	—	—
Sleep interference	Loneliness	0.36* F≠GD*	0.41* M ≠GD*	0.23	0.47*	0.05	—	—
	Social anxiety	—	—	—	1.05*	0.47*	—	—
Trusting information	Loneliness	-0.08	0.19 M ≠GD*	0.68*	—	—	—	—
	Depression	0.01	1.12* GD ≠F*	3.36*	—	—	—	—
Worrying about being judged	Wellbeing	—	—	—	—	—	-1.11*	0.37

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ≠ denotes a statistically significant pairwise difference between the two groups indicated (e.g. F≠M = significant difference between Female and Male; GD≠F* = significant difference between Gender-diverse and Female).
F = Female, M = Male, GD = Gender-diverse, ND = neurodivergent, non-ND=non-neurodivergent.
* p < .05, ** p < .01, *** p < .001.*

4.3.5.3 Relationship between social media mechanisms in combination and mental health outcomes: Decision tree analyses

In the decision tree analyses examining the relationships between social media mechanisms collectively and mental health outcomes, we used variable importance plots to identify the most influential mechanisms for each outcome and the fitted trees to describe how these mechanisms and their cut-offs distinguished lower from higher scores.

Importance scores summarise each predictor's contribution across the full tree, whereas the trees show only the main splits, so some variables appear in the importance plots but not as visible splits in the trees. Importance plots are presented in Table 4.14 only for outcomes with at least one split (non-trivial trees); outcomes without splits (all predictors with zero importance) are omitted from the table. Outcomes from decision tree analyses therefore permitted variable importance to be reported for all outcomes except self-concept clarity for adolescents, and for all outcomes except body dissatisfaction for young adults, as no valid trees were obtained for these two mental health outcomes.

Table 4.14. *Social media mechanisms and number of mental health outcomes in which each mechanism was identified as important across mental health outcomes for adolescents and young adults (ticks = count)*

Social media mechanisms	Adolescents	Young adults
Positive social media mechanisms		
Freedom to express oneself on social media	—	✓✓
Acceptance of identity on social media	—	✓✓✓
Using social media to access information	—	✓
Using social media for relaxation	—	✓
Using social media to escape from life	—	✓✓✓
Exposure to diverse content on social media	—	—
Using social media for entertainment	✓	✓✓
Using social media for general learning	—	—
Using social media to learn about what is popular	—	✓
Social connections on social media	—	✓✓✓
Positive support on social media	—	✓✓✓✓
Mental health support on social media	—	✓✓
Posting to express oneself on social media	—	✓
Negative social media mechanisms		
Anxiety from not accessing social media	✓✓✓✓	✓✓✓
Experiencing bullying on social media	✓✓✓✓✓✓	✓✓
Feeling left out on social media	✓✓✓✓✓✓	✓✓✓✓

Social media mechanisms	Adolescents	Young adults
Loss of time scrolling on social media	✓✓	✓✓
Social media being a distraction from other tasks	✓	✓✓
Social media interfering with sleep	✓✓	✓
Worrying about being judged on social media	✓✓✓✓✓	✓✓✓✓
FOMO from social media	✓	—
Seeing people attack others on social media	✓	✓
Seeing extreme trends on social media	—	—
Perception of the perfect life on social media	✓✓✓	—
Social media influencing self-image	✓✓	✓✓✓✓
Showing one's best version on social media	—	✓
Trusting information from social media	✓	—
Exposure to extreme opinions on social media	—	—
Compulsive checking of social media	✓✓	✓✓
Pressure to present oneself in a certain way on social media	—	✓✓✓✓✓
Pressure to present oneself in a sexualised way on social media	—	✓✓✓
Difficulty taking breaks from social media	—	✓✓
Receiving unwanted sexual content on social media	✓✓✓✓✓	✓
Comparing to others on social media	✓✓✓✓	✓✓✓

Note. The number of ticks (✓ to ✓✓✓✓) reflects how often each mechanism appeared as an important predictor in the variable importance plots within that age group (more ticks = mechanism identified across more outcomes).
Importance counts are based on 7 valid trees per age group: for adolescents all outcomes except self-concept clarity, and for young adults all outcomes except body dissatisfaction.
– indicates that the mechanism was not included in the list of those identified as important for the tested relationships.

Table 4.14 shows that in the young adult group, pressure to present oneself in a certain way on social media was the most recurrent mechanism, appearing in all outcomes with valid trees (5/7;71%). A second tier of mechanisms, including feeling left out on social media, worrying about being judged, social media influencing self-image, and positive support on social media, each appeared in 4 of the 7 valid trees (4/7; 57%). A further set of mechanisms occurred in 3 of 7 valid trees (3/7; 43%): these were acceptance of identity on social media, using social media to escape from life, social connections on social media, anxiety from not accessing social media, pressure to present oneself in a sexualised way, and comparing oneself to others.

Among adolescence, experiencing bullying and feeling left out on social media were the most recurrent mechanisms, each appearing in all 6 outcomes with valid trees (6/7; 86%). A second tier, including worrying about being judged on social media and receiving unwanted sexual content, appeared in 5 of the 7 valid trees (5/7; 71%). Anxiety from not accessing social media and comparing oneself to others appeared in 4 of the 7 valid trees (4/7; 57%), with several additional mechanisms (e.g. loss of time scrolling, social media influencing self-image, compulsive checking, and difficulty taking breaks) present in 2 of the 7 valid trees (2/7; 29%).

Overall, worrying about being judged, feeling left out, and comparing oneself to others emerged repeatedly in models across both age groups.

After identifying the most influential mechanisms from the variable importance models, we examined the corresponding decision trees to see how these mechanisms, and their cut-offs, combined to distinguish lower from higher scores on each outcome.

4.3.5.3.1 Adolescents: Decision tree models

For the adolescent group, the decision tree models for self-concept clarity did not identify any meaningful splits. The decision trees for the remaining outcomes are summarised below in text, with findings presented according to mental health outcome variable. Additionally, an exemplar decision trees is presented visually to demonstrate the nature of these outcomes.

Wellbeing. Feeling left out on social media emerged as the key mechanism for adolescents' wellbeing: in the decision tree, those who reported feeling left out to a low degree (scores < 2; "not at all" or "a little") had higher wellbeing scores, whereas those who felt left out at least "somewhat" (scores ≥ 2) had lower wellbeing.

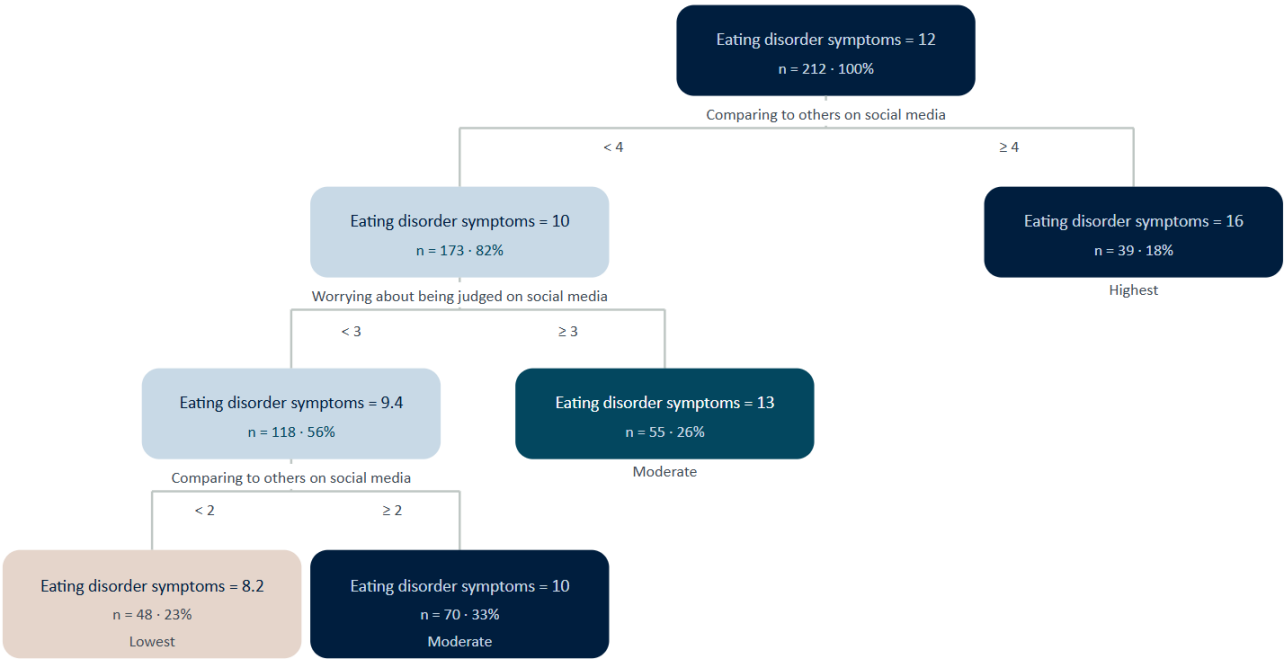
Loneliness, depression and social anxiety. Feeling left out on social media emerged as the most important mechanism for loneliness, depression and social anxiety in adolescents: those who felt left out at least "somewhat" (scores 3–5) had higher loneliness, depression and social anxiety scores, whereas those who felt left out "not at all" or "a little" (scores 1–2) had lower scores on those outcomes.

Generalised anxiety. Unwanted sexual content on social media was the key mechanism for adolescents' anxiety: those who reported receiving such content at least "somewhat" (scores 3–5) had markedly higher generalised anxiety scores (mean = 3; meeting the threshold for possible cases for generalised anxiety disorder) than those who reported receiving such content "not at all" or "a little" (scores 1–2; mean generalised anxiety = 1.1).

Eating disorder risk. As shown in Figure 4.21, among adolescents, comparing oneself to others and worrying about being judged on social media were key mechanisms for eating-disorder risk and symptoms. Adolescents who compared themselves "quite a bit" or "very much so" (scores ≥ 4) had mean eating disorder scores around 16 (high-risk range); among adolescents who compared themselves with others on social media to a lower extent (scores < 4), those who worried about being judged at least "somewhat" (scores ≥ 3), had a mean score of around 13 for eating disorder risk (moderate-risk range), significantly higher than those who worried about being judged to a lesser extent (scores < 3), whose mean score for eating disorder risk was

around 9. Adolescents with lower comparison and/or lower worry (means = 8–10) fell in the low-risk range with eating disorder risk mean score of around 8.

Figure 4.21. Decision tree model of eating disorder risk and social media mechanisms for adolescents



Body esteem. Among adolescents, the decision tree analysis again identified social media interfering with sleep as an important mechanism for body esteem. Adolescents who reported no to little sleep inteference from social media engagement (score < 2) had higher body esteem (mean = 5.1) than those who reported at least some sleep interference (scores ≥ 2; body esteem mean =3.8).

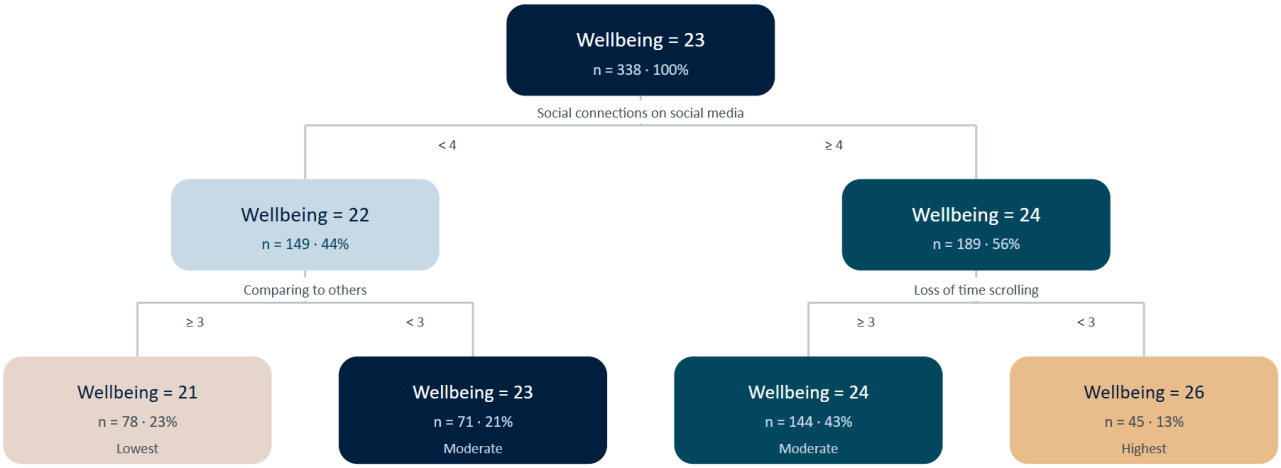
4.3.5.3.1 Young adults: Decision tree models

For the young adults, the decision tree did not identify any meaningful splits for body dissatisfaction, indicating that the social media mechanisms in the model did not distinguish between young adults with higher versus lower body dissatisfaction. The decision trees for remaining outcomes are included below with a visual illustration of the decision tree outcomes presented for wellbeing.

Wellbeing. The decision tree for wellbeing, shown in Figure 4.22, highlighted three key social media mechanisms related to this mental health outcome: using social media to feel socially connected, comparing oneself to others, and losing track of time while scrolling. The most positive pathway was observed among young people who reported using social media frequently for social connection (scores ≥ 4; “quite a bit” or “very much so”) and who did not feel that they often lost track of time scrolling (scores < 3). This combination was associated with the highest predicted wellbeing.

In contrast, lower wellbeing was observed among young adults who made only moderate or low use of social media to feel connected (scores < 4), particularly when they at least somewhat compared themselves to others (scores ≥ 3). Moreover, even among those who did feel strongly connected, wellbeing was lower when they reported often losing track of time while scrolling (scores ≥ 3). Taken together, the decision tree model suggests that wellbeing is higher when social media use is for connection, and lower when young people feel less connected online, frequently compare themselves to others, and/or experience significant time loss while scrolling.

Figure 4.22. Decision tree model of wellbeing and social media mechanisms among young adults



Loneliness. For loneliness among young adults, the decision tree model identified feeling left out and receiving positive support as the two key social media mechanisms. The most favourable pattern (i.e. lowest loneliness scores) was seen among young people who rarely felt left out on social media (scores < 3) and also experienced high levels of positive support (scores ≥ 4) - somewhat similar to the model seen among adolescents.

In contrast, loneliness was higher among those who did not feel particularly left out but reported lower levels of positive support (scores < 4), compared with their more supported peers. The highest loneliness scores, however, were found among young adults who frequently felt left out on social media (scores ≥ 3), regardless of how much positive support they reported.

Depression. The decision tree for depression revealed two contrasting pathways, one associated with lower risk and one with higher risk. On the lower-risk side, young adults who reported low levels of bullying on social media (scores < 2) generally had lower depression scores. Within this low-bullying group, the tree identified a particularly low-risk profile: individuals who were not easily distracted from other tasks by social media (scores < 3) and felt little or no pressure to present a perfect version of themselves online (scores <2) had the lowest predicted depression scores.

In contrast, the higher-risk pathway was characterised by experiencing bullying on social media. Young adults who reported at least some bullying (scores ≥ 2) had higher depression scores than those who reported little or none. Within this bullied group, frequently using social media for

escapism (score >4) further increased risk; those who both experienced bullying and tended to use social media to escape from their life had the highest depression scores in the sample. Together, these patterns suggest that depression risk is lowest when social media use is relatively undistracting and not strongly tied to self-presentation, and highest when negative social experiences such as bullying are combined with escape use of social media.

Generalised and social anxiety. For generalised anxiety among young adults, the decision tree highlighted four key social media experiences: using social media to escape from life, worrying about being judged, feeling left out, and using it for entertainment. On the lower-anxiety side of the tree, young adults tended to report lower levels of using social media to escape and worrying about being judged (both scores <4) and higher levels of using it for entertainment (scores ≥4). This pattern was associated with the lowest predicted anxiety scores, suggesting that when social media is used mainly for enjoyment, and is not strongly tied to escape or concerns about judgement, generalised anxiety tends to be lower.

In contrast, on the higher-anxiety side, young adults were more likely to endorse social media as an escape to a high extent (scores ≥ 4) and to feel at least moderately left out online (scores ≥ 3). In these branches of the tree, predicted anxiety scores were highest. Overall, the pattern suggests that anxiety is lower when social media use is primarily recreational and less tied to escape and exclusion, and higher when it functions as a form of escape and is accompanied by feeling left out.

For social anxiety, the decision tree identified worry about being judged on social media as the only important mechanism. Young adults who reported worrying at least "somewhat" about being judged (scores ≥ 3) had higher predicted social anxiety, whereas those who worried less (scores < 3) had lower predicted social anxiety. This pattern suggests that fear of being judged by others online is important contributor to both generalised and social anxiety in this age group.

Eating disorder risk. For eating disorder risk among young adults, the decision tree showed a clear progression from low clinical risk to groups who are at high risk or already likely to meet criteria for an eating disorder according to endorsement of different social media mechanisms. The first and most important split was on using social media to escape. Young adults who reported using social media "very much so" to escape their life (score = 5) had the highest predicted scores (around 19), suggesting they are likely to have a sub-threshold or threshold eating disorder and would warrant referral for specialist assessment.

Among those who used social media to escape less than "very much so" (scores < 5), eating-disorder risk depended on other social media experiences. Young adults who reported at least "a little" exposure to unwanted sexual content (scores ≥ 2) and frequently compared themselves to others (scores ≥ 4) had predicted scores around 17, placing them in the high-risk range for developing an eating disorder. Within the subgroup who reported no or little exposure to unwanted sexual content (scores < 2), those who also worried "quite a bit" or more about being judged (scores ≥ 4) had predicted scores around 15, consistent with moderate risk.

The lowest eating disorder scores were seen in the branch where endorsement of several social media mechanisms were all relatively low: social media was not used at the very highest level to escape (escapism < 5), there was no or very little exposure to unwanted sexual content (scores < 2), worry about being judged was below "quite a bit" (scores < 4), and sleep was disturbed less than "somewhat" by social media (scores < 3). Young adults with this combination had predicted scores of around 9.5 (well below low-risk range).

Overall, the tree suggests that eating-disorder risk is lowest when social media is not used intensely to escape, there is no exposure to unwanted sexual content, and worry about being judged and sleep disruption are all relatively low. Risk increases as these mechanisms accumulate, with the highest risk and "showing signs" profile seen in young adults who use social media very strongly as an escape and, in the broader sample, when escape use co-occurs with unwanted sexual content, fear of judgement, sleep disruption, and strong comparison with others.

Body esteem. For body esteem, the decision tree highlighted identity acceptance and positive support on social media as the key mechanisms. The first important split was on feeling that one's identity is accepted on social media. Young adults who felt less than "quite a bit" accepted (scores < 4;) had an average body esteem score of 5.5. Within this group, those who also reported low positive support (scores < 3;) had the lowest body esteem scores; whereas those who felt at least moderately supported (positive support scores ≥ 3) had higher scores.

In contrast, young adults who felt their identity was "quite a bit" or "very much" accepted on social media (identity acceptance scores ≥ 4) had the highest body esteem scores. Overall, the tree suggests that more positive body esteem is associated with feeling that one's identity is accepted and supported on social media, whereas lower body esteem is linked to feeling less accepted and receiving little positive support online

4.3.5.4 Social media behaviours: Associations with mental health outcomes and with social media mechanisms, and exploration of subgroup differences

Table 4.15 presents correlations between social media behaviours and mental health outcomes, whilst Table 4.16 presents correlations between social media behaviours and social media mechanisms. Together, these tables contextualise how different patterns of social media use are related to young people's mental health. Results for each age group are organised by level of engagement, from the most passive to the most active forms of use, before considering the role of content source. Where subgroup analyses were conducted, findings are reported within each behaviour. Each age group section concludes with a brief summary of the overall pattern of findings.

Table 4.15. *Correlations between social media behaviours and mental health across age groups*

Social media behaviours	Age	Wellbeing	Identity Affirmation[a]	Self-concept Clarity [b]	Body Esteem	Loneliness	Generalised anxiety	Social Anxiety	Body Dissatisfaction	Eating Disorder Risk	Depression	Aggression[c]
Viewing content	5-12	-0.04	—	-0.13	0.08	0.08	0.21	0.14	0.02	0.06	0.15	-0.08
	13-17	0.02	0.26	0.00	0.02	0.10	0.06	0.14*	—	0.00	0.08	—
	18-25	0.01	0.11	—	-0.04	0.09*	0.08	0.09*	—	0.07	0.07	—
Posting content	5-12	-0.26*	—	-0.14	-0.07	0.22	0.24*	0.32**	0.21	0.43***	0.48***	0.23*
	13-17	0.00	0.02	-0.05	-0.07	0.13*	0.11	0.01	—	0.27***	0.17**	—
	18-25	0.08	0.05	—	0.09*	0.01	0.02	-0.03	—	0.13**	0.11*	—
Sharing content	5-12	-0.24*	—	-0.04	-0.12	0.09	0.13	0.07	0.06	0.23*	0.25*	0.24*
	13-17	-0.01	0.18	-0.02	-0.07	0.09	0.10	0.05	—	0.23***	0.08	—
	18-25	0.08	0.08	—	0.04	0.06	-0.01	0.00	—	0.13**	0.09*	—
Using messaging or chat functions	5-12	-0.23*	—	-0.08	-0.23*	0.14	0.05	0.16	0.21	0.2	0.14	0.19
	13-17	0.04	0.22	-0.01	0.01	-0.02	0.08	-0.01	—	0.09	-0.01	—
	18-25	0.14**	-0.02	—	0.10*	-0.17***	-0.05	-0.09*	—	-0.00	-0.01	—
Content from people followed	5-12	-0.01	—	-0.09	0.01	0.05	0.18	0.21	0.14	0.08	0.13	0.16
	13-17	0.11	0.25	0.00	0.09	0.01	0.06	0.11*	—	0.08	0.08	—
	18-25	0.15**	0.01	—	-0.00	-0.03	-0.01	0.07	—	0.04	0.03	—
Content recommended from apps	5-12	-0.03	—	-0.05	-0.08	0.25*	0.27*	0.10	0.06	0.06	0.34**	0.25*
	13-17	0.03	-0.09	-0.03	-0.02	0.10	0.07	0.09	—	0.09	0.09	—
	18-25	0.01	-0.04	—	-0.02	0.00	0.07	0.02	—	0.03	0.08	—
Using likes or reactions	5-12	-0.06	—	0.01	-0.19	0.09	0.16	0.05	0.21	0.18	0.11	0.05
	13-17	-0.02	0.20	-0.05	-0.15**	0.09	0.16**	0.04	—	0.18**	0.06	—

Social media behaviours	Age	Wellbeing	Identity Affirmation[a]	Self-concept Clarity [b]	Body Esteem	Loneliness	Generalised anxiety	Social Anxiety	Body Dissatisfaction	Eating Disorder Risk	Depression	Aggression[c]
	18-25	0.07	0.09	—	-0.06	0.04	0.17***	0.10*	—	0.10*	0.16***	—
Commenting	5-12	-0.25*	—	-0.12	-0.07	0.10	0.13	0.07	0.23*	0.34**	0.22*	0.23*
	13-17	-0.01	-0.04	-0.08	0.01	0.11	0.07	0.08	—	0.21***	0.09	—
	18-25	0.08	-0.11	—	-0.04	0.03	0.01	0.05	0.16*	0.18***	0.16***	—
Using beauty filters	5-12	-0.20	—	-0.11	-0.23	0.25*	0.22	0.22	-0.05	0.17	0.17	-0.20
	13-17	-0.06	-0.17	-0.08	-0.00	0.10	0.18**	0.17**	—	0.24***	0.17**	—
	18-25	-0.05	-0.11	—	-0.05	0.15**	0.15**	0.19***	—	0.28***	0.26***	—
Using special effects	5-12	-0.20	—	-0.09	-0.23	0.25*	0.20	0.21	-0.07	0.14	0.16	-0.21
	13-17	0.02	0.03	-0.09	0.09	0.08	0.19**	0.10	—	0.19**	0.14*	—
	18-25	-0.03	-0.08	—	-0.06	0.17***	0.08	0.08	—	0.23***	0.20***	—

Note. * p < .05, ** p < .01, *** p < .001.

[a]. Identity affirmation was administered only to participants who identified as part of the LGBTQA+ community.

[b.] Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[c.] Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

Table 4.16. *Correlations between social media behaviours and social media mechanisms across age groups*

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
Freedom to express oneself on social media	5-12	-0.11	0.17	0.13	0.35**	0.12	0.01	0.11	0.25*	-0.1	-0.10
	13-17	—	—	—	—	—	—	—	—	—	—
	18-25	0.06	0.18***	0.15**	0.09*	0.10*	0.00	0.18***	0.17***	0.04	0.05
Acceptance of identity on social media	5-12	0.05	0.15	0.13	0.26*	0.04	0.15	0.15	0.27*	-0.08	-0.08
	13-17	0.10	0.23*	0.02	0.03	0.18	0.07	-0.01	-0.01	-0.05	0.08
	18-25	0.07	0.15***	0.16***	0.14**	0.13**	0.01	0.16***	0.09*	-0.01	0.03
Using social media to access information	5-12	0.12	0.42***	0.27*	0.22	0.24*	0.24*	0.31**	0.32**	0.15	0.13
	13-17	0.14*	0.05	0.10	0.08	-0.01	0.13*	0.22***	0.14*	-0.04	-0.03
	18-25	0.17***	0.06	0.11*	-0.01	0.05	0.01	0.12**	-0.03	0.02	0.01
Using social media for relaxation	5-12	0.20	0.13	0.06	0.31**	0.13	0.30**	0.28*	0.31**	0.20	0.19
	13-17	0.16**	0.10	-0.02	0.12*	-0.01	0.16**	0.10	0.09	0.02	0.01
	18-25	0.22***	0.09*	0.10*	0.02	0.01	0.16***	0.18***	0.06	0.05	0.07
Using social media to escape from life	5-12	0.12	0.19	0.05	0.35**	0.20	0.19	0.40***	0.34**	0.22	0.20
	13-17	0.15**	0.07	0.07	0.12*	-0.02	0.09	0.12*	0.14*	0.10	0.06
	18-25	0.15***	0.11*	0.01	-0.01	0.00	0.15**	0.19***	0.11*	0.09*	0.10*
Exposure to diverse content on social media	5-12	0.25*	0.02	-0.04	0.06	0.10	0.12	0.29*	0.21	0.31*	0.30*
	13-17	0.26***	0.04	0.05	0.15**	0.03	0.23***	0.16**	0.05	-0.02	-0.05
	18-25	0.23***	0.02	0.08	0.05	0.09	0.14**	0.21***	-0.03	0.01	0.00
	5-12	0.14	-0.05	-0.02	0.04	0.06	0.11	0.21	0.10	0.20	0.21

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
Using social media for entertainment	13-17	0.35***	0.03	0.11	0.22***	0.15**	0.21***	0.30***	0.10	0.11	0.08
	18-25	0.26***	0.04	0.15**	0.04	0.01	0.20***	0.23***	0.00	-0.01	0.02
Using social media for general learning	5-12	0.21	0.06	-0.08	-0.06	-0.11	0.26*	0.07	0.08	0.32*	0.30*
	13-17	—	—	—	—	—	—	—	—	—	—
	18-25	0.15***	0.11*	0.14**	0.01	0.07	0.18***	0.23***	0.10*	0.05	0.05
Using social media to learn about what is popular	5-12	0.19	0.17	0.11	0.25*	0.27*	0.26*	0.32**	0.25*	0.10	0.10
	13-17	0.13*	0.09	0.11	0.20***	0.09	0.14*	0.21***	0.14*	0.17**	0.20***
	18-25	0.23***	0.11*	0.11*	0.09	0.08	0.27***	0.20***	-0.01	0.09	0.08
Social connections on social media	5-12	-0.15	0.38***	0.34**	0.51***	0.13	0.1	0.38***	0.49***	-0.11	-0.11
	13-17	0.02	0.11	0.20***	0.43***	0.21***	0.00	0.27***	0.20***	0.08	0.07
	18-25	0.03	0.14**	0.15***	0.36***	0.17***	0.08	0.23***	0.05	0.04	0.11*
Positive support on social media	5-12	-0.09	0.25*	0.24*	0.32**	0.13	0.02	0.28*	0.25*	-0.05	-0.05
	13-17	0.00	0.10	0.10	0.24***	0.08	0.04	0.24***	0.09	0.03	0.05
	18-25	-0.07	0.20***	0.14**	0.33***	0.15***	-0.05	0.22***	0.14**	0.10*	0.11*
Mental health support on social media	5-12	-0.08	0.33**	0.18	0.20	-0.02	0.16	0.29**	0.24*	0.08	0.06
	13-17	0.09	0.00	0.08	0.08	0.04	0.09	0.09	0.08	-0.02	0.00
	18-25	0.02	0.16***	0.15***	0.25***	0.17***	-0.08	0.25***	0.20***	0.15**	0.12*
Posting to express oneself on social media	5-12	-0.06	0.57***	0.37***	0.37***	0.22	0.21	0.36**	0.58***	-0.11	-0.11
	13-17	0.00	0.37***	0.26***	0.16**	0.12*	0.03	0.30***	0.36***	0.18**	0.27***
	18-25	-0.12**	0.46***	0.31***	0.17***	0.12**	-0.07	0.28***	0.35***	0.16**	0.23***

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
Difficulty taking breaks from social media	5-12	0.21	0.22	0.09	0.25*	0.17	0.09	0.26*	0.26*	0.08	0.08
	13-17	—	—	—	—	—	—	—	—	—	—
	18-25	0.19***	0.10*	0.11*	-0.09*	0.04	0.16***	0.16***	0.05	0.09	0.09
Anxiety from not accessing social media	5-12	0.14	0.25*	0.16	0.41***	0.31**	0.10	0.28*	0.47***	0.03	0.03
	13-17	0.05	0.32***	0.17**	0.18**	0.07	0.08	0.12*	0.20***	0.26***	0.22***
	18-25	0.00	0.21***	0.20***	0.01	0.09*	0.04	0.16***	0.24***	0.25***	0.23***
Experiencing bullying on social media	5-12	0.03	0.34**	0.17	0.39***	0.10	0.28*	0.21	0.30**	-0.07	-0.07
	13-17	-0.06	0.23***	0.18**	0.16**	0.08	-0.02	0.13*	0.25***	0.29***	0.21***
	18-25	-0.10*	0.21***	0.25***	0.01	0.09*	0.04	0.16***	0.24***	0.25***	0.26***
Feeling left out on social media	5-12	0.00	0.28*	0.15	0.27*	0.10	0.16	0.22*	0.26*	0.15	0.16
	13-17	-0.01	0.21***	0.13*	0.11	0.02	0.07	0.07	0.14*	0.20***	0.14*
	18-25	-0.04	0.15**	0.12**	-0.03	0.08	-0.06	0.10*	0.18***	0.21***	0.19***
Loss of time scrolling on social media	5-12	0.12	0.04	0.12	0.23*	0.16	0.32**	0.28*	0.19	0.13	0.12
	13-17	0.19***	0.09	0.08	0.16**	0.09	0.24***	0.28***	0.08	0.14*	0.16**
	18-25	0.17***	0.01	0.08	-0.03	-0.01	0.20***	0.11*	0.00	0.06	0.04
Social media being a distraction from other tasks	5-12	0.01	0.28*	0.24*	0.32**	0.22	0.16	0.25*	0.33**	-0.05	-0.05
	13-17	0.13*	0.11	0.08	0.13*	0.10	0.26***	0.19***	0.10	0.15*	0.11
	18-25	0.17***	0.05	0.07	0.00	-0.01	0.18***	0.09*	0.01	0.10*	0.08
	5-12	0.08	0.24*	0.12	0.36**	0.10	0.17	0.33**	0.39***	-0.14	-0.15
	13-17	0.05	0.14*	0.20***	0.19**	0.06	0.11*	0.16**	0.07	0.18**	0.03

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
Social media interfering with sleep	18-25	0.09*	0.10*	0.11*	0.08	0.05	0.18***	0.11*	0.06	0.11*	0.07
Worrying about being judged on social media	5-12	0.01	0.33**	0.27*	0.42***	0.22	0.22	0.37***	0.54***	-0.12	-0.11
	13-17	0.08	0.19***	0.17**	0.16**	0.11*	0.13*	0.20***	0.19***	0.30***	0.26***
	18-25	0.10*	0.11*	0.04	0.00	0.05	0.12**	0.17***	0.07	0.18***	0.15**
Fear of missing out from social media	5-12	0.02	0.32**	0.28*	0.51***	0.18	0.24*	0.42***	0.50***	-0.13	-0.12
	13-17	0.05	0.22***	0.18**	0.29***	0.07	0.07	0.21***	0.19***	0.26***	0.16**
	18-25	0.12**	0.21***	0.14**	0.06	0.17***	0.12**	0.20***	0.18***	0.11*	0.16**
Seeing people attack others on social media	5-12	0.18	0.35**	0.31**	0.33**	0.10	0.30**	0.41***	0.26*	-0.07	-0.07
	13-17	0.13*	0.08	0.11*	0.21***	0.09	0.21***	0.17**	0.05	-0.01	0.03
	18-25	0.17***	-0.03	0.03	0.03	-0.01	0.09*	0.09	-0.01	0.04	0.04
Seeing extreme trends on social media	5-12	0.21	0.28*	0.29**	0.46***	0.24*	0.29*	0.36**	0.37***	-0.12	-0.11
	13-17	0.08	0.06	0.12*	0.18**	0.09	0.14*	0.12*	0.05	0.06	0.06
	18-25	0.05	0.05	0.14**	0.07	0.07	0.13**	0.11*	0.09	0.06	0.14**
Perception of the perfect life on social media	5-12	0.21	0.18	0.12	0.31**	0.13	0.27*	0.17	0.24*	-0.08	-0.08
	13-17	0.12*	0.19***	0.20***	0.21***	0.15*	0.16**	0.14*	0.10	0.23***	0.18**
	18-25	0.14**	0.10*	0.09*	0.05	0.11*	0.09*	0.12**	0.09*	0.15*	0.09
Social media influencing self-image	5-12	0.27*	0.21	0.17	0.19	0.23*	0.24*	0.21	0.38***	0.05	0.02
	13-17	0.15**	0.18**	0.13*	0.14*	0.06	0.15*	0.26***	0.21***	0.18**	0.18**
	18-25	0.23***	0.12**	0.13**	-0.01	0.04	0.16***	0.21***	0.10*	0.17***	0.15**
	5-12	0.02	0.33**	0.18	0.51***	0.17	0.36**	0.51***	0.52***	-0.14	-0.12

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
Showing one's best version on social media	13-17	—	—	—	—	—	—	—	—	—	—
	18-25	0.16***	0.19***	0.11*	0.11*	0.05	0.11*	0.20***	-0.01	0.10*	0.07
Trusting information from social media	5-12	0.23*	0.10	0.14	0.07	0.18	0.29**	0.17	0.14	-0.04	-0.04
	13-17	0.13*	0.15**	0.14*	0.21***	0.06	0.09	0.21***	0.21***	0.25***	0.13*
	18-25	0.09*	0.15***	0.14**	0.01	0.07	0.02	0.19***	0.15***	0.10*	0.05
Exposure to extreme opinions social media	5-12	0.00	0.31**	0.33**	0.48***	0.09	0.32**	0.40***	0.30**	0.02	0.02
	13-17	0.15**	-0.04	0.04	0.03	0.05	0.12*	0.11*	-0.04	-0.11	0.00
	18-25	0.14**	-0.08	-0.02	0.02	0.00	0.14**	0.02	-0.01	0.01	0.03
Compulsive checking of social media	5-12	0.04	0.35**	0.31**	0.51***	0.21	0.25*	0.43***	0.48***	-0.09	-0.09
	13-17	0.04	0.28***	0.16**	0.23***	0.08	0.09	0.24***	0.20***	0.26***	0.20***
	18-25	0.19***	0.19***	0.09*	0.04	0.13**	0.15***	0.25***	0.10*	0.14**	0.13*
Pressure to present oneself in a certain way on social media	5-12	0.10	0.31**	0.18	0.36**	0.18	0.37***	0.32**	0.49***	-0.04	-0.03
	13-17	—	—	—	—	—	—	—	—	—	—
	18-25	0.09	0.13**	0.12*	0.03	0.08	0.02	0.20***	0.10*	0.13*	0.14**
Receiving unwanted sexual content on social media	5-12	0.01	0.30**	0.21	0.27*	0.12	0.19	0.21	0.52***	0.04	0.02
	13-17	0.06	0.22***	0.16**	0.13*	0.18**	0.07	0.11	0.13*	0.25***	0.16**
	18-25	-0.12*	0.21***	0.16***	0.06	0.12*	-0.02	0.06	0.27***	0.19***	0.19***
Pressure to present oneself	5-12	—	—	—	—	—	—	—	—	—	—
	13-17	—	—	—	—	—	—	—	—	—	—

Social media mechanism	Age	Viewing content	Posting content	Sharing content	Using messaging/ chat functions	Content from people followed	Content recommended from apps	Using likes/ reactions	Commenting	Using beauty filters	Using special effects
in a sexualised way on social media	18-25	-0.09	0.14**	0.15**	0.03	0.04	-0.05	0.07	0.19***	0.20***	0.25***
Comparing to others on social media	5-12	0.06	0.33**	0.20	0.30**	0.19	0.46***	0.27*	0.26*	-0.13	-0.12
	13-17	0.08	0.16**	0.19**	0.23***	0.18**	0.18**	0.26***	0.16**	0.28***	0.24***
	18-25	0.12*	0.09*	0.05	0.03	0.03	0.05	0.13**	0.05	0.17***	0.11*

Note. * p < .05, ** p < .01, *** p < .001.
– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

4.3.5.4.1 Children

5-12. Given the report by parents of 5–12-year-old children of low use of social media by children, no formal subgroup analyses were conducted for this age group. As shown in Tables 4.15 and 4.16, none of the social behaviours explored here appeared to be associated with good mental health outcomes. The findings are described below, moving from the most passive to the most active forms of use.

Passive viewing of content did not correlate with any mental health outcomes. This was mirrored at the mechanisms level, where it was associated with only three of the 33 tested mechanisms: greater exposure to diverse content, stronger influence on self-image, and higher trust in information presented on social media were positively associated with social media content viewing.

Using **likes and reactions** also did not correlate with any of the tested mental health outcomes. However, at the mechanisms level, this use was positively associated with 11 positive mechanisms, including access to information, exposure to diverse content, learning what is popular, social connection, positive support, mental health support, self-expression, relaxation, and escapism (the latter considered both positive and negative). On the negative side, using likes and reactions was correlated with a wide range of problematic mechanisms, including compulsive and time-consuming use (difficulty taking a break, compulsive checking, time loss due to scrolling), emotional and social distress (anxiety when not having access, feeling left out, fear of missing out, worry about being judged), attentional and sleep disruption (distraction, sleep interference), and self-image concerns (exposure to others' opinions and comparison with others).

Public sharing of content was correlated with four of the 10 tested mental health outcomes: with lower wellbeing and with higher depressive symptoms, eating disorder risk, and aggression. At the mechanisms level, it was associated with 11 of the 33 tested mechanisms. On the positive side, it was positively correlated with access to information, social connection, positive support, and self-expression. On the negative side, it was also associated positively with distraction from other tasks, worry about being judged, fear of missing out, seeing people attack others, exposure to extreme trends and opinions, and compulsive checking.

Commenting showed the second-highest number of associations with mental health outcomes (five out of 10) and was related to lower wellbeing and to higher depression, social anxiety, eating disorder risk, and aggression. At the mechanisms level, commenting was associated with most of the tested mechanisms. It was positively correlated with almost all negative mechanisms, except for time loss due to scrolling and trust in information. At the same time, it was positively associated with identity, freedom, acceptance, access to information and useful learning, social connection, positive support, and self-expression.

Posting showed the largest number of associations with mental health outcomes (6 out of 10) and was linked to lower wellbeing and to higher depression, generalised and social anxiety, eating disorder risk, and aggression. At the mechanisms level, posting was positively correlated with 20 of the 33 tested mechanisms. On the positive side, it was associated with self-expression, greater social connectedness, positive support, and mental health support. On the

negative side, posting was correlated with a broad range of harmful mechanisms, including compulsive and time-consuming use (compulsive checking, time loss due to scrolling), emotional and social distress (anxiety when unable to access social media, feeling left out, fear of missing out, worry about being judged), attentional and sleep disruption (distraction from other tasks, sleep interference), self-image concerns (exposure to others' opinions and comparison with others), as well as exposure to extreme trends and opinions and unwanted sexual content.

Private messaging/chatting was correlated with lower wellbeing and lower body esteem, including among the small number of children whose parents reported that they used these features. At the mechanisms level, private messaging showed the second-highest number of correlations overall (26 out of 33). On the positive side, it was associated with identity, acceptance, freedom, learning what is popular, social connection, positive support, self-expression, and relaxation. On the negative side, it was positively correlated with almost all negative mechanisms, with the exception of influence on self-image and trust in information.

Focusing on appearance-related behaviours, both using **beauty filters** and **special effects filters** were associated with higher loneliness. These behaviours showed few associations with the tested mechanisms, apart from learning general information and exposure to diverse content. Notably, beauty filter use was not correlated with any tested negative mechanisms; however, this should be interpreted cautiously, as the majority of parents reported that their child does not post photos online, resulting in a small effective sample size.

Turning to the **source of consumed content**, material from people the child follows was not correlated with any of the tested mental health outcomes, whilst app-recommended content was associated with higher loneliness, depression, generalised anxiety, and aggression. At the mechanisms level, receipt of greater content from both sources were associated with learning what is popular and accessing information, whilst app-recommended content was additionally correlated with using social media for relaxation and learning general information. On the negative side, content from people followed was related to only three negative mechanisms: anxiety when not having access, exposure to extreme trends, and influence on self-image. By contrast, app-recommended content was positively correlated with 13 negative mechanisms, including experiences of bullying, time loss due to scrolling, compulsive checking, influence on self-image, and pressure to present oneself in a certain way.

Overall, these findings indicate that among children, more active and public forms of social media use, particularly posting and commenting, show the greatest number of associations with poorer mental health outcomes, whilst more passive behaviours, such as viewing content, show comparatively fewer associations. It is important to note, however, that the low number of parents reporting their child's social media use in this age group limits the conclusions that can be drawn, and these patterns should be interpreted with caution. The source of content also appears worthy of attention, with algorithm-recommended material showing a notably broader range of associations with negative mechanisms than content from followed accounts, though again the small sample size warrants careful interpretation of these findings.

4.3.5.4.2 Adolescents

As shown in Tables 4.15 and 4.16, relatively few social media behaviours were significantly correlated with mental health outcomes among adolescents. However, where associations are present, appearance-focused behaviours, particularly beauty filter use, emerge as the most consistently related to poor mental health; being associated with 4 of the 9 tested outcomes. The findings are described below, including for subgroup analyses presented in Table 4.17, moving from the most passive to the most active forms of use.

Passive content viewing was associated with higher social anxiety. Subgroup analyses indicated that passive viewing was linked to more depressive symptoms among females but not males. In contrast, passive viewing was associated with lower self-concept clarity among females, while males showed a small non-significant positive association with self-concept clarity. At the mechanisms level (Table 4.16), passive viewing was associated with 13 of the 28 tested mechanisms. On the positive side, it was linked with access to information, exposure to diverse content, learning what is popular, entertainment, and relaxation. On the negative side, it was associated with time loss due to scrolling, distraction from other tasks, exposure to extreme trends and opinions, perceiving other people's lives as perfect, and a negative influence on self-image.

Using likes and reactions was associated with higher generalised anxiety, greater eating disorder risk, and lower body esteem. Subgroup analyses (Table 4.17) indicated that the association with lower body esteem was significant among females but not among males. At the mechanisms level, likes and reactions showed one of the broadest patterns of associations (alongside private messaging), being related to 23 of the 28 tested mechanisms. On the positive side, they were linked with exposure to diverse content, entertainment, learning what is popular, social connection, and positive support. On the negative side, they were associated with almost all mechanisms classified as harmful, including anxiety when unable to access social media, compulsive checking, time loss due to scrolling, sleep disturbances, experiences of bullying, feeling left out, social comparison, and perceiving that others have perfect lives.

Publicly sharing content on social media is associated only with higher eating disorder risk, with no subgroup differences. At the mechanisms level, public sharing shows the third highest number of correlations, being linked with 16 of the 28 mechanisms tested. It is associated with two positive mechanisms, social connection and self-expression, whilst correlating with almost all of the negative mechanisms, including anxiety when not having access, experiencing bullying, feeling left out, sleep disturbances, worrying about being judged, fear of missing out and exposure to unwanted sexual content.

Commenting is associated only with higher eating disorder risk, and not with other mental health outcomes. Subgroup analyses reveal a nuanced pattern: greater use of commenting on social media was significantly linked to higher wellbeing among neurodivergent participants, while showing a non-significant negative trend among males and non-neurodivergent participants. Similarly, commenting was significantly associated with higher eating disorder risk among non-neurodivergent participants, but with a non-significant negative trend among neurodivergent participants. At the mechanisms level, commenting is associated with 15 of the

28 mechanisms tested. It was linked to several positive mechanisms, including access to information, learning what is popular, using posts as a form of self-expression and building social connections. At the same time, it is also related to a range of negative mechanisms, such as anxiety when unable to access social media, experiencing bullying, feeling left out, worrying about being judged, fear of missing out, compulsive checking, mistrust or uncertainty about information, exposure to unwanted sexual content and making comparisons with others.

Posting content is significantly associated with higher loneliness, greater eating disorder risk and higher levels of depression. Subgroup analyses indicate that posting content shows a notably different pattern across demographic groups. Among gender groups, posting was significantly associated with higher eating disorder risk and more depressive symptoms among females, while no significant associations were found among males, and these differences between groups were statistically significant. Posting showed opposing patterns according to gender and sexual diversity: for non-LGBTQA+ participants, posting was significantly associated with lower wellbeing, higher loneliness, and more depressive symptoms. In contrast, among LGBTQA+ participants, posting was associated with higher wellbeing, lower loneliness, and fewer depressive symptoms, though the associations with loneliness and depression were not statistically significant. Among neurodivergent participants, posting was significantly associated with higher wellbeing, while among non-neurodivergent participants it was associated with lower wellbeing, with this difference being statistically significant. At the mechanisms level, posting was associated with 14 of the 28 mechanisms examined. Among mechanisms classified as positive, it is linked with only two, identity acceptance and using posts as a means of self-expression. By contrast, it was associated with a wide range of negative mechanisms, including feeling anxious when unable to access social media, experiencing bullying, feeling left out, worrying about being judged, fear of missing out, negative influence on self-image, compulsive checking and exposure to unwanted sexual content.

Private messaging and chatting were not correlated with any of the mental health outcomes tested at the overall sample level. Subgroup analyses show that private messaging was significantly associated with lower social anxiety among females, while showing a non-significant positive trend among males, with this difference between groups being statistically significant. Regarding self-concept clarity, neither within-group association for neurodivergent or non-neurodivergent participants reached statistical significance when examined separately. However, non-neurodivergent participants showed a small positive trend and neurodivergent participants a small negative trend, and the difference between these two associations was statistically significant.

At the mechanisms level, chatting and messaging were associated with 23 of the 28 mechanisms tested—the highest number of correlations alongside likes and reactions. Messaging was related to almost all mechanisms classified as positive, with the exception of identity acceptance, access to information and mental health support. Among negative mechanisms, chatting and messaging was associated with nearly all those considered harmful, with the exception of feeling left out and exposure to extreme opinions.

Use of appearance-focused features, specifically **beauty filters** and **special effects filters**, was consistently associated with poorer mental health. Beauty filter use was correlated with four of

the nine mental health outcomes examined: higher generalised and anxiety, greater eating disorder risk and more depressive symptoms. Using special effects "for fun" shows a similar pattern, being associated with these outcomes except social anxiety. Subgroup analyses highlight important differences. Beauty filter use was significantly associated with lower wellbeing among males and non-neurodivergent participants, while among females there was a small non-significant positive trend. Interestingly, among neurodivergent participants, beauty filter use was significantly associated with higher wellbeing. Regarding body esteem, beauty filter use showed a small non-significant positive association among females but a small non-significant negative association among males, with the difference between groups being statistically significant. In addition, among non-neurodivergent participants, filter use was significantly linked to higher social anxiety and eating disorder risk, and to lower self-concept clarity, while neurodivergent participants showed opposing non-significant trends across these outcomes. At the mechanisms level, both beauty filters and special effects are positively associated with learning what is popular. For negative mechanisms, beauty filter use is correlated with all mechanisms classified as harmful, with the exception of seeing extreme trends, exposure to extreme opinions, and seeing people attack each other. Special effects use is also related to almost all negative mechanisms, except five: distraction from other tasks, sleep interference, escapism, seeing people attack others and exposure to extreme trends and opinions.

Finally, the **source of consumed content** also appears important. Consuming content from people whom participants follow is positively correlated with higher social anxiety overall. At the subgroup level, content from followed accounts showed a non-significant positive trend with eating disorder risk and depressive symptoms among females, and a non-significant negative trend among males, with the differences between groups being statistically significant in both cases. Content from followed accounts was also significantly associated with higher social anxiety among neurodivergent adolescents, while showing no meaningful association among non-neurodivergent adolescents, with this difference between groups being statistically significant. At the subgroup level, content from followed accounts is positively associated with higher eating disorder risk and more depressive symptoms among females but negatively associated with eating disorder risk among males (a slight downward trend, indicating a small negative correlation). Content from followed accounts is also correlated with higher social anxiety among neurodivergent participants but shows no significant correlation among non-neurodivergent participants. At the mechanisms level, content from people followed is correlated with 7 of the 23 mechanisms examined. It is positively associated with three positive mechanisms, entertainment, self-expression and social connection, and with several negative mechanisms, including worry about being judged, exposure to unwanted sexual content and comparison with others.

By contrast, consuming app-recommended content is not correlated with any of the tested mental health outcomes, and no subgroup differences are found. At the mechanisms level, however, app-recommended content is associated with 15 of the 23 mechanisms tested. Among mechanisms classified as positive, these associations are mainly information-related, including exposure to diverse content, learning what is popular, and entertainment. Among mechanisms classified as negative, app-recommended content is related to displacement effects such as time

lost due to scrolling, distraction from tasks and sleep interference, as well as worry about being judged, exposure to extreme opinions and comparison with others.

Overall, the findings for adolescents highlight that appearance-focused behaviours, particularly beauty filter use, show the most consistent associations with poorer mental health outcomes across the group as a whole. However, subgroup analyses reveal that the direction of associations can differ meaningfully by gender, neurodivergence, and sexual identity, with behaviours such as posting and commenting showing a more positive or neutral pattern among LGBTQA+ and neurodivergent adolescents compared with their peers.

Table 4.17. *Subgroup Differences in the Association Between Social Media Behaviours and Mental Health Outcomes Among Adolescents Aged 13–17*

Social Media Behaviour	Mental Health Outcome	Gender		LGBQTA+ identity		ND identity	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Viewing content	Depression	0.27*	0.09	—	—	—	—
Viewing content	Self-concept clarity	0.12*	0.06	—	—	—	—
Using likes or reactions	Body esteem	0.29*	0.01	—	—	—	—
Commenting	Wellbeing	0.41	0.62	—	—	0.27	1.23*
Commenting	Eating disorder risk	—	—	—	—	1.25*	0.36
Posting content	Wellbeing	—	—	0.36*	0.77*	0.30	1.26*
Posting content	Loneliness	—	—	0.33**	0.13	—	—
Posting content	Eating disorder risk	1.46*	0.19	—	—	—	—
Posting content	Depression	0.39*	0.07	0.45*	0.20	—	—
Using beauty filters	Wellbeing	0.25	-1.06*	—	—	0.51*	1.17*
Using beauty filters	Social anxiety	—	—	—	—	0.35*	0.16
Using beauty filters	Eating disorder risk	—	—	—	—	1.27*	0.01
Using beauty filters	Body esteem	0.13	0.25	—	—	—	—
Using beauty filters	Self-concept clarity	—	—	—	—	0.10*	0.09
Content from people followed	Eating disorder risk	0.61	0.52	—	—	—	—
Content from people followed	Depression	0.21	0.13	—	—	—	—

Social Media Behaviour	Mental Health Outcome	Gender		LGBQTA+ identity		ND identity	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Content from people followed	Social anxiety	—	—	—	—	0.02	0.65*
Using messaging or chat functions	Social anxiety	0.22*	0.09	—	—	—	—
Using messaging or chat functions	Self-concept clarity	—	—	—	—	0.04	0.14

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported; ND = neurodivergent; * p < .05, ** p < .01, *** p < .001

4.3.5.4.3 Young Adults

As shown in Tables 4.15 and 4.16, the pattern of findings for young adults differs in important ways from younger age groups. Whilst some behaviours show consistently negative associations with mental health, others, particularly private messaging, show a notably more favourable pattern. The findings are described below, moving from the most passive to the most active forms of use, before considering the role of content source. An exception is made for private messaging, which is discussed first given its distinctively positive pattern of associations.

Private messaging and chatting showed the most consistently favourable pattern of any tested behaviour among young adults. At the mental health level, messaging and chatting were associated with higher wellbeing, lower loneliness, and lower anxiety. Subgroup analyses (Table 4.18) revealed that these associations were particularly pronounced among marginalised groups: messaging and chatting were associated with significantly lower loneliness among LGBTQA+ young adults, while showing only a small non-significant negative trend among non-LGBTQA+ young adults. Similarly, messaging was associated with significantly lower loneliness and generalised anxiety among neurodivergent young adults, compared with a negligible non-significant association among non-neurodivergent young adults. At the mechanisms level, messaging and chatting were most strongly correlated with social connection and positive support and were also positively associated with access to mental health support, identity acceptance, identity freedom, and self-expression. Notably, messaging and chatting were not significantly correlated with any of the measured negative mechanisms, suggesting that the relationship to positive mental health may be explained by private messaging and chatting's strong links to supportive, identity-affirming, and connective experiences, without the accompanying exposure to harmful content or compulsive use patterns observed for other behaviours.

Beyond private messaging, engagement patterns for young adults are again described from the most passive to the most active forms. Overall, passive behaviours (such as passive viewing and using likes/reactions) tend to show more consistently negative associations with mental health, whereas active public behaviours (such as posting or commenting) show a more mixed pattern, with direction and strength of associations varying across subgroups.

Passive content viewing was associated with higher loneliness, greater social anxiety and higher body dissatisfaction, with no subgroup differences observed. At the mechanism level, passive viewing showed a dual pattern, correlating significantly with 24 out of 34 tested social media mechanisms. On one hand, it was positively associated with accessing information, relaxation, entertainment, exposure to diverse content, learning what is generally popular, and keeping up with trends. On the other hand, passive viewing was simultaneously positively associated with a range of negative experiences, including difficulty taking breaks, time loss whilst scrolling, sleep interference, distraction from other tasks, escapism, fear of missing out, worry about being judged, trust in online information, exposure to extreme content, pressure to present oneself positively and upward social comparison.

Using likes or reactions was associated with higher generalised anxiety, social anxiety, eating disorder risk, body dissatisfaction and depression overall. Subgroup analyses revealed that likes

and reactions were associated with significantly lower loneliness among gender-diverse participants, while showing a non-significant positive trend among females and males. Likes and reactions were also associated with significantly higher depression among males, while gender-diverse participants showed a non-significant negative trend. Additionally, likes and reactions were associated with significantly greater eating disorder risk and depressive symptoms among non-LGBTQA+ participants, while LGBTQA+ participants showed small non-significant negative trends for both outcomes. At the mechanism level, likes and reactions were positively associated with almost all tested mechanisms, with the exception of seeing people attack each other, exposure to extreme opinions, pressure to engage in sexualised content and unwanted sexualised content.

Publicly sharing content was associated with higher eating disorder risk, body dissatisfaction and depressive symptoms in the overall sample. Subgroup analyses revealed that sharing was associated with lower depression among gender-diverse participants but higher depression among males, with only marginal effects for females. At the mechanism level, sharing content correlated significantly with 26 out of 34 tested mechanisms and was most strongly associated with self-expression. It was also positively associated with a range of identity-affirming and connective mechanisms, including identity freedom, identity acceptance, social connection, positive support, access to mental health information, entertainment, learning what is generally popular, exposure to diverse content, and self-expression. However, sharing was simultaneously positively associated with a broad range of vulnerability-related experiences, including difficulty taking breaks, anxiety when unable to access social media, experiences of bullying, feeling left out, sleep interference, fear of missing out, exposure to extreme trends, perceptions that others have perfect lives, influence on self-image, pressure to present the best version of oneself, trust in online information, compulsive checking, pressure to sexualise oneself and exposure to unwanted sexual content.

Commenting was associated with higher eating disorder risk, body dissatisfaction and depression overall. However, subgroup analyses revealed a more nuanced picture: whilst commenting was significantly associated with higher depression among females, males, and non-LGBTQA+ young adults, it was significantly associated with lower depression among gender-diverse young adults. Among LGBTQA+ young adults, there was a small non-significant positive trend, suggesting a weaker association compared with non-LGBTQA+ young adults. In addition, commenting was more strongly associated with lower generalised anxiety among neurodivergent than non-neurodivergent young adults. At the mechanism level, commenting correlated significantly with both positive and negative mechanisms. On one hand, commenting was positively associated with identity freedom, identity acceptance, positive support and access to mental health support. On the other hand, commenting was also positively associated with experiences of bullying, anxiety when lacking access, feeling left out, fear of missing out, influence on self-image, perception of others as having perfect lives, compulsive checking, pressure to engage in sexualised content and unwanted sexualised content.

Posting content was associated with increased eating disorder risk and more severe depressive symptoms overall. Subgroup analyses revealed a clear gender divide in the associations between posting content and mental health outcomes. Among females, posting was significantly

associated with higher wellbeing, lower loneliness, and lower social anxiety, with a small non-significant negative trend for depression. Among males, posting was significantly associated with lower wellbeing, higher loneliness, and more depressive symptoms, with a non-significant positive trend for social anxiety. Effects among gender-diverse participants were generally small and non-significant across all outcomes, though the difference between gender-diverse and male participants was significant for wellbeing. At the mechanism level, posting was most strongly associated with self-expression, the largest correlation observed across all tested mechanisms, and was also positively associated with identity freedom, identity acceptance, social connection, positive support, and access to mental health support. At the same time, posting was positively associated with a range of negative related experiences, including difficulty taking breaks, anxiety when unable to access social media, experiences of bullying, feeling left out, sleep interference, fear of missing out, worry about being judged, perceptions that others have perfect lives, influence on self-image, pressure to present the best version of oneself, compulsive checking, feeling pressured to sexualise oneself, exposure to unwanted sexual pressure, and social comparison.

Finally, use of appearance focused features, **beauty filters** and **special effects filters**, showed the most consistently harmful pattern for most groups, being associated with higher loneliness, eating disorder risk, body dissatisfaction, depression and anxiety. Subgroup analyses revealed notable differences: beauty filter use was associated with higher wellbeing among males but lower wellbeing among females and gender-diverse participants. Filter use was also more strongly associated with depression among non-LGBTQA+ than LGBTQA+ young adults, and with body dissatisfaction among non-neurodivergent but not neurodivergent young adults. The mechanism data help explain these harmful associations: beauty filter and special effects use were strongly linked to social comparison, pressure to present the best version of oneself, influence on self-image and compulsive use, and were notably negatively associated with social connection

Turning to the **source of consumed content**, consuming content from followed accounts and algorithm-recommended content showed notably different patterns of associations with mental health outcomes. Consuming content from followed accounts was associated with higher wellbeing overall, although subgroup analyses revealed important differences: it was linked to higher wellbeing among females but lower wellbeing among males, with marginal effects for gender-diverse participants, and to higher depression among non-LGBTQA+ participants compared with LGBTQA+ participants. At the mechanisms level, content from followed accounts correlated with 12 of the tested mechanisms. On the positive side, it was associated with identity acceptance, social connection, positive support, access to mental health support, and self-expression. On the negative side, it was linked to anxiety when lacking access, feeling left out, fear of missing out, compulsive checking, and experiences of unwanted sexualisation.

By contrast, consuming algorithm-recommended content was associated with greater body dissatisfaction, with no subgroup differences observed. At the mechanisms level, it correlated with 19 of the tested mechanisms. On the positive side, it was associated with exposure to diverse content, entertainment, and learning about both general and popular topics. On the negative side, it was correlated with a broad range of harmful experiences, including time loss

due to scrolling, escapism, distraction from other tasks, sleep interference, worry about being judged, fear of missing out, exposure to unwanted sexual content, seeing people attack others, exposure to extreme trends and opinions, perceptions of others having perfect lives, influence on self-image, pressure to present the best version of oneself, and compulsive checking.

Overall, the findings for young adults highlight the importance of considering both the type of behaviour and the subgroup in question. Whilst private messaging stands out as consistently associated with good mental health, particularly for marginalised groups, more public and appearance-focused behaviours tend to be more prominently associated with poor mental health, especially for non-LGBTQA+ and non-neurodivergent young adults. The source of content also matters, with algorithm-recommended material showing a broader and more consistently pattern of associations with negative mechanism than content from followed accounts.

Table 4.18. *Subgroup differences in the association between social media behaviours and mental health outcomes among adults aged 18–25*

Social Media Behaviour	Mental Health Outcome	Gender			LGBQTA+ identity		ND identity	
		Female	Male	Gender diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Using likes or reactions	Loneliness	0.03	0.08	0.39* GD≠M*	—	—	—	—
	Eating disorder risk	—	—	—	0.56*	0.19	—	—
	Depression	0.22	0.95*	0.69 GD≠M*	0.78*	0.09	—	—
Commenting	Generalised anxiety	—	—	—	—	—	0.10	0.26
	Depression	0.79*	1.45*	-1.92* GD≠F**, GD≠M***	1.23*	0.20	—	—
Sharing content	Depression	0.26	0.93*	0.96 GD≠M*	—	—	—	—
Posting content	Wellbeing	0.78*	-0.40*	-1.05 GD≠M*	—	—		
	Loneliness	0.25* F≠M**	0.31*	0.04	—	—	—	—
	Social anxiety	0.51* F≠M*	0.29	0.01	—	—	—	—
	Depression	0.11 F≠M*	1.35*	0.47	—	—	—	—
Using beauty filters	Wellbeing	0.36 F≠M*	0.65*	-1.27	—	—	—	—
	Body dissatisfaction	—	—	—	—	—		
	Depression	—	—	—	1.62*	0.45	—	—
Using special effects	Depression	—	—	—	1.32*	0.03	—	—
Content from people followed	Wellbeing	0.88* F≠M*	0.06	0.64	—	—	—	—
	Depression	—	—	—	0.53*	0.49	—	—

Social Media Behaviour	Mental Health Outcome	Gender			LGBQTA+ identity		ND identity	
Content recommended from apps	Loneliness	—	—	—	—	—	0.12	0.17
Using messaging or chat functions	Loneliness	—	—	—	0.08	0.31*	0.12	-0.33*
	Generalised anxiety	—	—	—	—	—	0.01	-0.23*
	Body dissatisfaction	—	—	—	0.18*	0.12	—	—
	Depression	—	—	—	0.29	0.37	—	—

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ≠ denotes a statistically significant pairwise difference between the two groups indicated (e.g. F≠M = significant difference between Female and Male; GD≠F* = significant difference between Gender-diverse and Female), where F = Female, M = Male, and GD = Gender-diverse. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

4.3.5.5 Gaming: Associations with mental health outcomes and exploration of subgroup differences

Table 4.19 presents correlations between gaming types and mental health outcomes across the three age groups. Overall, most gaming types showed limited associations with mental health outcomes. Streaming games was the most consistently associated with poorer mental health, particularly among younger age groups, whilst other gaming types showed few significant associations at the overall level. Where subgroup differences were found, they are reported within each age group section below.

Table 4.19. *Correlations between gaming types and mental health outcomes across age groups.*

Gaming Types		Wellbeing	Self-concept clarity [a]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression[b]
Solo player	5-12	-0.02	-0.08	0.03	0.10	0.08	0.04	-0.01	0.03	0.07	0.04
	13-17	-0.01	-0.04	-0.05	0.07	0.05	0.10	—	0.03	—	—
	18-25	-0.09	—	-0.10	0.23***	0.11	0.17**	—	0.06	—	—
Multiplayer	5-12	0.03	0.04	-0.05	-0.08	0.01	0.04	0.03	0.02	0.06	-0.02
	13-17	0.00	-0.01	0.02	-0.03	-0.04	0.02	—	0.10	—	—
	18-25	0.11	—	0.11	-0.21***	-0.10	-0.12	—	-0.04	—	—
Educational	5-12	0.07	-0.03	-0.02	0.00	-0.04	-0.06	0.00	0.06	-0.05	-0.05
	13-17	-0.02	0.00	-0.01	0.06	0.03	0.00	—	0.14*	—	—
	18-25	0.00	—	0.03	-0.04	0.05	0.00	—	0.10	—	—
Streaming	5-12	-0.12*	-0.13*	-0.11*	0.17**	0.05	0.09	0.22***	0.25***	0.14**	0.04
	13-17	-0.12	-0.13	0.00	0.06	0.12	0.15*	—	0.16*	—	—
	18-25	0.01	—	-0.08	0.07	0.03	0.00	—	0.07	—	—

Note. * p < .05, ** p < .01, *** p < .001.

[a.] Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[b.] Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

Among children, only streaming games was significantly correlated with mental health outcomes, being associated with lower wellbeing, body esteem, and self-concept clarity, and with higher loneliness, depression, body dissatisfaction. No other gaming types were significantly associated with any mental health outcome.

Subgroup analyses were conducted by gender and neurodivergent status (see Table 4.20). With respect to gender, playing multiplayer games was significantly associated with lower body esteem among males, whilst females showed a small non-significant positive trend. With respect to neurodivergent status, playing games solo was significantly associated with lower body dissatisfaction among neurodivergent children, whilst non-neurodivergent children showed a small non-significant positive trend. Solo gaming also showed a non-significant positive trend for eating disorder risk among non-neurodivergent children and a non-significant negative trend among neurodivergent children, with the difference between groups being statistically significant. Streaming games showed a divergent pattern by neurodivergent status: among non-neurodivergent children, it was significantly associated with higher aggression and lower self-concept clarity, whilst among neurodivergent children, the opposite pattern was observed, though neither association reached statistical significance.

Table 4.20. *Subgroup differences in the association between gaming types and mental health outcomes among children aged 5–12*

Gaming Type	Mental Health Outcome	Gender		ND identity	
		Female	Male	Non-ND	ND
Multiplayer	Body esteem	0.13	0.22*	—	—
Solo player	Body dissatisfaction	—	—	0.10	0.14*
	Eating disorder risk	—	—	0.23	-0.28
Streaming	Self-concept clarity	—	—	0.14*	0.09
	Aggression	—	—	0.60*	-0.71

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

Among adolescents, a somewhat different pattern emerged. Playing games solo and playing multiplayer games were not associated with any mental health outcomes. Playing educational games was associated with higher eating disorder risk, and streaming games was associated with higher social anxiety and higher eating disorder risk. Subgroup analyses as shown in Table 4.21 revealed further nuance. For educational gaming, LGBTQA+ adolescents showed significantly higher depression and a non-significant negative trend for wellbeing, whilst non-

LGBTQA+ adolescents showed a negligible association with depression and a small non-significant positive trend for wellbeing. Streaming was significantly associated with lower wellbeing and lower self-concept clarity among LGBTQA+ adolescents, with non-LGBTQA+ adolescents showing smaller non-significant negative trends for both outcomes. Finally, educational gaming showed opposing trends for self-concept clarity by neurodivergence status — a non-significant positive trend among neurodivergent adolescents and a non-significant negative trend among non-neurodivergent adolescents — with the difference between groups being statistically significant.

Table 4.21. *Subgroup differences in the association between gaming types and mental health outcomes among adolescents (13–17)*

Gaming Type	Mental Health Outcome	LGBTQA+ identity		ND Identity	
		Non-LGBTQA+	LGBTQA+	Non-ND	ND
Educational	Wellbeing	0.47	-0.79	—	—
	Depression	0.05	0.40*	—	—
	Self-concept clarity	—	—	-0.09	0.22
Streaming	Wellbeing	0.18	-1.16*	—	—
	Self-concept clarity	0.02	-0.26*	—	—

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

Among young adults, another pattern emerged. Playing games solo was associated with higher loneliness, social anxiety, and depression, whilst no significant overall associations were found between playing educational games, online or streaming games, or multiplayer games and any of the tested mental health outcomes. Subgroup analyses, however, as shown in Table 4.22, revealed meaningful gender differences. Among gender-diverse young adults, playing multiplayer games was associated with lower wellbeing, whilst the opposite pattern was observed among females, with negligible effects among males. Playing educational games showed no overall association with mental health outcomes but was associated with higher eating disorder risk among females and lower eating disorder risk among gender-diverse young adults, with negligible effects among males. No subgroup differences were observed by LGBTQA+ identity or neurodivergence.

Taken together, these findings suggest that streaming games shows the most consistent associations with poorer mental health, particularly among younger children and LGBTQA+ adolescents, whilst other gaming types show more limited or mixed associations that vary meaningfully by gender, neurodivergence, and LGBTQA+ identity.

Table 4.22. *Subgroup differences in the association between gaming types and mental health outcomes among adolescents aged 18-25*

Gaming types	Mental Health Outcome	Gender		
		Female	Male	Gender-diverse
Multiplayers	Wellbeing	0.75*	0.03	-1.09* F≠GD*
Educational	Eating disorder risks	0.87*	0.19	-1.01

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ≠ denotes a statistically significant pairwise difference between the two groups indicated (e.g. F≠M = significant difference between Female and Male; GD≠F* = significant difference between Gender-diverse and Female), where F = Female, M = Male, and GD = Gender-diverse. * p < .05, ** p < .01, *** p < .001.*

4.3.5.6 Gaming Mechanisms: Correlations with mental health outcomes and subgroup differences

4.3.5.6.1 Children

Correlations between gaming mechanisms and mental health outcomes for the 5–12 cohort (from parent-report survey data) are shown in Table 4.23. Overall, the pattern of findings was mixed, with some mechanisms showing favourable associations and others showing consistent links to poorer mental health. Subgroup analyses (Table 4.24) were conducted by gender and neurodivergent status and are reported within each mechanism cluster below.

Table 4.23. *Correlations between gaming mechanisms and mental health outcomes across age groups*

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Freedom to express oneself when gaming	5-12	0.09	-0.01	0.06	0.09	0.04	0.09	-0.04	—	0.07	0.08	-0.00
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	0.12*	-0.01	—	0.03	0.01	0.06	-0.00	0.03	-0.00	-0.01	
Feeling accepted when gaming	5-12	0.14*	-0.07	0.11*	0.12*	0.00	0.03	0.03	-	0.05	0.04	-0.10
	13-17	0.06	-0.23	0.03	0.11	-0.14*	-0.12	-0.03	-	0.00	-0.05	—
	18-25	0.18*	-0.06	—	0.01	-0.08	-0.03	-0.04	0.04	0.06	-0.05	—
Sense of community belonging through gaming	5-12	-0.07	0.04	0.05	-0.12*	0.11*	0.17**	0.12*	—	0.23***	0.20***	0.00
	13-17	-0.03	-0.03	-0.01	-0.01	-0.06	-0.02	0.11	—	0.01	-0.02	—
	18-25	0.07	-0.09	—	0.08	-0.06	0.01	0.06	0.05	0.02	0.01	—
Using gaming for relaxation when feeling stressed	5-12	-0.13*	0.17**	-0.14**	-0.07	0.26***	0.24***	0.00	—	0.21***	0.28***	0.14**
	13-17	-0.03	0.08	-0.04	-0.01	0.03	0.08	0.07	—	0.05	-0.00	—
	18-25	-0.02	-0.11	—	-0.09	0.06	0.13*	0.09	0.14*	0.09	0.10	—
Using gaming to escape from life	5-12	-0.23***	0.26***	-0.21***	-0.21***	0.29***	0.35***	0.17**	—	0.39***	0.40***	0.19***
	13-17	-0.16*	0.06	-0.00	-0.08	0.23***	0.19**	0.30***	—	0.09	0.16*	—
	18-25	-0.21**	-0.02	—	-0.25***	0.23***	0.28**	0.22**	0.25**	0.21**	0.28**	—
Gaming as a fun way to relax	5-12	0.10	-0.04	0.10	0.07	0.10	0.06	-0.00	—	0.09	0.04	-0.04
	13-17	0.12	0.16	0.05	0.08	-0.12	-0.11	-0.03	—	-0.08	-0.18**	—
	18-25	0.12	0.03	-	0.03	0.01	-0.01	-0.01	0.07	0.00	-0.04	—

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Using gaming to learn new skills	5-12	0.03	-0.07	0.03	-0.04	0.07	0.12*	0.02	—	0.16**	0.12*	-0.07
	13-17	0.12	0.31*	0.13	0.12	-0.08	-0.02	0.04	—	-0.00	-0.06	—
	18-25	-0.04	-0.10	—	-0.05	0.04	0.15*	0.08	0.10	0.10	0.08	—
Using teamwork while gaming	5-12	0.19***	-0.11*	0.24***	0.00	-0.07	-0.08	0.02	—	0.03	0.00	-0.11*
	13-17	0.03	0.29	0.08	-0.02	-0.12	0.02	-0.09	—	0.02	-0.11	—
	18-25	0.10	-0.10	—	0.10	-0.11	0.00	-0.02	0.09	0.08	-0.02	—
Feeling confident and in control from gaming	5-12	0.03	0.01	-0.02	-0.03	0.16**	0.14*	0.02	—	0.17**	0.16**	-0.02
	13-17	0.01	-0.04	0.05	0.07	0.00	-0.11	0.14*	—	0.02	-0.05	—
	18-25	0.05	-0.10	—	-0.06	0.05	0.07	0.08	0.13*	0.07	0.04	—
Feeling social connected with others from gaming	5-12	-0.02	0.00	0.02	-0.08	0.11*	0.13*	0.11*	—	0.19***	0.14**	-0.02
	13-17	-0.07	0.23	-0.03	-0.04	0.02	0.01	0.13	—	0.12	-0.00	—
	18-25	-0.00	-0.16	—	0.02	-0.00	0.11	0.11	0.08	0.11	0.11	—
Positive support through gaming	5-12	0.11*	-0.11*	0.11*	-0.01	-0.04	-0.01	0.10	—	0.12*	0.04	-0.18***
	13-17	-0.07	0.23	-0.03	-0.04	0.02	0.01	0.13	—	0.12	-0.00	—
	18-25	0.13*	-0.13	—	0.13*	-0.18*	0.00	0.01	0.01	0.03	-0.03	—
Role-playing when gaming	5-12	-0.00	0.12*	—	-0.02	0.14*	0.12*	0.03	—	0.18***	0.23***	0.03
	13-17	-0.00	-0.02	-0.08	0.04	0.12	0.05	0.07	—	0.08	0.06	—
	18-25	-0.12	0.07	—	-0.13*	0.21***	0.23***	0.15*	0.22*	0.15*	0.27*	—
	5-12	-0.26***	0.20***	-0.24***	-0.01	0.19***	0.19***	0.02	—	0.19***	0.34***	0.18***

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Difficult to take breaks from gaming	13-17	-0.25**	0.20	-0.07	-0.00	0.11	0.09	0.19**	—	0.11	0.14*	—
	18-25	-0.13*	-0.02	—	-0.08	0.09	0.13*	0.21***	0.09	0.02	0.14*	—
Feeling upset when unable to game	5-12	-0.27***	0.18***	—	-0.07	0.24***	0.21***	0.09	—	0.21***	0.37***	0.22***
	13-17	-0.13	0.12	-0.11	0.03	0.13*	0.11	0.27***	—	0.17*	0.21**	—
	18-25	-0.18**	-0.22*	—	-0.02	0.10	0.16**	0.19**	0.14*	0.12*	0.19**	—
Experiencing bullying when gaming	5-12	-0.11*	0.17**	—	-0.19***	0.14*	0.14*	0.24***	—	0.27***	0.26***	0.14*
	13-17	-0.17**	-0.08	-0.14*	-0.03	0.22***	0.26***	0.20**	—	0.24***	0.25***	
	18-25	-0.17**	-0.19*	—	-0.07	0.12*	0.14*	0.11	0.21***	0.19**	0.24***	—
Feeling left out when gaming	5-12	-0.21***	0.29***	-0.23***	-0.24***	0.13*	0.16**	0.15**	—	0.24***	0.30***	0.06
	13-17	-0.26***	0.03	-0.15*	-0.14*	0.37***	0.29***	0.26***	—	0.36***	0.38***	—
	18-25	-0.21***	0.05	—	-0.06	0.27***	0.22***	0.21***	0.13*	0.14*	0.22***	—
Gaming being a distraction from other tasks	5-12	-0.27***	0.25***	-0.26***	-0.07	0.21***	0.23***	0.10	—	0.26***	0.36***	0.16**
	13-17	-0.26***	-0.14	-0.08	0.04	0.21**	0.16*	0.31***	—	0.11	0.22**	—
	18-25	-0.21***	0.05	—	-0.06	0.27***	0.22***	0.21***	0.13*	0.14*	0.22***	—
Gaming disrupting sleep	5-12	-0.21***	0.14**	-0.21***	-0.09	0.09	0.10	0.09	—	0.23***	0.36***	0.09
	13-17	-0.27***	0.02	-0.16*	-0.16*	0.16*	0.18**	0.23***	—	0.23***	0.30***	—
	18-25	-0.21***	0.05	—	-0.06	0.27***	0.22***	0.21***	0.13*	0.14*	0.22***	—
	5-12	-0.00	0.12*	-0.03	-0.25***	0.07	0.13*	0.26***	—	0.23***	0.23***	0.10

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity [b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Seeing people attack others when gaming	13-17	-0.08	0.10	-0.06	-0.07	0.14*	0.15*	0.16*	—	0.15*	0.14*	—
	18-25	-0.05	-0.20*	—	-0.07	0.02	0.04	0.08	0.09	0.06	0.12*	—

Note. * p < .05, ** p < .01, *** p < .001.

[a]. Identity affirmation was administered only to participants who identified as part of the LGBTQA+ community.

[b.] Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[c.] Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

Identity and connection mechanisms showed a largely positive pattern with mental health outcomes. Identity acceptance was associated with higher wellbeing, better body esteem, and higher self-concept clarity, with all other outcomes non-significant. Identity freedom was not significantly associated with any mental health outcome. Teamwork was associated with higher wellbeing and self-concept clarity, and with lower loneliness and aggression, with all other outcomes non-significant. Positive support was associated with higher wellbeing and self-concept clarity, and with lower loneliness but with eating disorder. All other outcomes were non-significant. Social connection was associated with higher depression, generalised anxiety, social anxiety, body dissatisfaction, and eating disorder risk, with all other outcomes non-significant. Community belonging was associated with higher depression, social anxiety, body dissatisfaction, and eating disorder risk, with a small association with generalised anxiety, and all other outcomes non-significant.

Subgroup analyses revealed several differences within this cluster. Teamwork was significantly associated with lower loneliness and better body esteem among females, whilst showing non-significant negative trends for depression and eating disorder risk among females compared with non-significant positive trends among males, with these differences being statistically significant. Feeling left out was significantly associated with higher aggression among males but a non-significant negative trend among females. Role-playing was significantly associated with higher loneliness among non-neurodivergent children, whilst showing a non-significant negative trend among neurodivergent children. Role-playing also showed a non-significant positive trend for body esteem among non-neurodivergent children and a non-significant negative trend among neurodivergent children, with the difference between groups being statistically significant. Feeling socially connected through gaming was significantly associated with higher depression among neurodivergent children but showed no meaningful association among non-neurodivergent children. Seeing attacks on others was associated with a non-significant negative trend for self-concept clarity among non-neurodivergent children and a non-significant positive trend among neurodivergent children, with the difference between groups being statistically significant.

Skill, learning, and role-playing mechanisms showed a more mixed pattern. Learning new skills was associated with higher depression, social anxiety, and eating disorder risk, with all other outcomes among children non-significant. Confidence and control through gaming was associated with higher depression, generalised anxiety, social anxiety, and eating disorder risk, with all other outcomes non-significant. Role-playing was associated with higher loneliness, depression, generalised anxiety, social anxiety, and eating disorder risk, with all other outcomes non-significant.

Subgroup analyses revealed that role-playing was significantly associated with higher depression and higher generalised anxiety among males, whilst females showed a small non-significant positive trend for depression and a negligible association for generalised anxiety. Feeling confident and in control through gaming was significantly associated with higher depression and eating disorder risk among neurodivergent participants, whilst showing small non-significant negative trends among non-neurodivergent participants. Role-playing was also

significantly associated with higher eating disorder risk among neurodivergent participants, whilst non-neurodivergent participants showed a negligible non-significant positive trend. Learning new skills through gaming was significantly associated with lower aggression among neurodivergent participants but showed no meaningful association among non-neurodivergent participants.

Escapism and relaxation mechanisms showed consistent associations with poorer mental health. Using gaming for escapism was associated with lower wellbeing, body esteem, and self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, body dissatisfaction, eating disorder risk, and aggression,— the broadest pattern of associations of any mechanism in this age group. Using gaming for relaxation was associated with lower wellbeing and lower self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, eating disorder risk, and aggression, with body dissatisfaction and body esteem non-significant. Using gaming for fun and relaxation was not significantly associated with any mental health outcome at the overall level.

Subgroup analyses revealed that using gaming for relaxation was significantly associated with higher depression among males and neurodivergent children, whilst showing smaller non-significant positive trends among females and non-neurodivergent participants respectively. Gaming as a fun way to relax showed a similar pattern for depression — a non-significant positive trend among males and non-significant negative trend among females, with a similar opposing pattern among neurodivergent and non-neurodivergent children, though none of these associations reached statistical significance individually. Escapism was significantly associated with higher generalised anxiety among neurodivergent children, whilst non-neurodivergent children showed a small non-significant positive trend. Gaming as a fun way to relax was significantly associated with higher generalised anxiety and higher eating disorder risk among neurodivergent children, whilst showing negligible associations among non-neurodivergent children. Escapism was significantly associated with higher eating disorder risk among both neurodivergent and non-neurodivergent children, but the association was stronger among neurodivergent children. Identity freedom and identity acceptance were significantly associated with higher eating disorder risk among neurodivergent children, whilst non-neurodivergent participants showed small non-significant negative trends.

Compulsive and time-consuming use mechanisms showed consistent associations with poorer mental health. Difficulty taking breaks from gaming was associated with lower wellbeing and self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, eating disorder risk, and aggression, with body dissatisfaction and body esteem non-significant. Being upset when unable to access gaming was associated with lower wellbeing and self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, eating disorder risk, and aggression, with body dissatisfaction and body esteem non-significant. Distraction from other tasks was associated with lower wellbeing and self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, eating disorder risk, and aggression, with body dissatisfaction and body esteem non-significant. Sleep disruption was associated with lower wellbeing and self-concept clarity, and with higher loneliness, depression,

and eating disorder risk, with generalised anxiety, social anxiety, body dissatisfaction, body esteem, and aggression non-significant.

Subgroup analyses revealed several differences within this cluster. Being upset when unable to access gaming was significantly associated with higher body dissatisfaction and higher eating disorder risk among females, whilst males showed small non-significant positive trends for both outcomes. Experiencing bullying was significantly associated with higher body dissatisfaction and higher eating disorder risk among both males and females, but the associations were stronger among females. Sleep disruption was significantly associated with higher eating disorder risk among both females and males, but the association was stronger among females. Using gaming for relaxation was significantly associated with higher depression and higher social anxiety among neurodivergent children, whilst non-neurodivergent children showed smaller non-significant positive trends. Difficulty taking breaks and being upset when unable to access gaming were significantly associated with higher social anxiety among neurodivergent children but showed no significant association among non-neurodivergent children. Distraction from other tasks was significantly associated with higher depression among both neurodivergent and non-neurodivergent children, but the association was stronger among neurodivergent children and was significantly associated with higher generalised anxiety among neurodivergent children but not non-neurodivergent children. Sleep disruption was significantly associated with higher eating disorder risk and higher aggression among non-neurodivergent children, whilst neurodivergent children showed no significant associations.

Negative social experience mechanisms showed consistent associations with poorer mental health. Experiencing bullying through gaming was associated with poorer wellbeing and body esteem, and with higher loneliness, depression, generalised anxiety, social anxiety, body dissatisfaction, eating disorder risk, and aggression, with self-concept clarity non-significant. Feeling left out was associated with lower wellbeing, body esteem, and self-concept clarity, and with higher loneliness, depression, generalised anxiety, social anxiety, body dissatisfaction, and eating disorder risk, with aggression non-significant. Seeing attacks on others was associated with higher loneliness, depression, social anxiety, body dissatisfaction, eating disorder risk, and poorer body esteem, with wellbeing, generalised anxiety, aggression, and self-concept clarity non-significant.

Subgroup analyses revealed that experiencing bullying was significantly associated with higher body dissatisfaction and higher eating disorder risk among both males and females, but the associations were stronger among females. Feeling left out was significantly associated with higher aggression among males, whilst females showed a small non-significant negative trend.

Overall, the findings for children suggest that escapism and compulsive use mechanisms show the most consistent and broad associations.

Table 4.24. *Gaming mechanisms and mental health outcomes among children: Subgroup differences by gender and neurodivergent status*

Gaming Mechanism (experiences when gaming)	Mental Health Outcome	Gender		ND identity	
		Female	Male	Non-ND	ND
Bullying experiences	Body dissatisfaction	1.24*	0.36*	—	—
	Eating disorder risk	2.60*	1.18*	—	—
Difficulty taking breaks	Social anxiety	—	—	0.12	0.61*
Distraction from other tasks	Depression	—	—	0.77*	1.47*
	Generalised anxiety	—	—	0.08	0.34*
Escape from life	Generalised anxiety	—	—	0.10	0.32*
	Eating disorder risk	—	—	0.62*	1.12*
Feeling accepted	Eating disorder risk	—	—	0.15	0.56*
Feeling confident and in control	Depression	—	—	0.12	0.66*
	Eating disorder risk	—	—	0.06	0.79*
Feeling left out	Aggression	0.47	0.81*	—	—
Feeling socially connect with others	Depression			-0.07	0.83*
	Eating disorder risk	—	—	0.12	0.77*
Feeling upset when unable to game	Body dissatisfaction	0.45*	0.01	—	—
	Eating disorder risk	1.34*	0.32	—	—
	Social anxiety	—	—	0.17	0.71*
Freedom to express oneself	Eating disorder risk	—	—	0.12	0.44*
Learning new skills	Aggression	—	—	0.07	0.92*
Relaxation (for fun)	Depression	0.34	0.50	0.31	0.44
	Generalised anxiety	—	—	0.04	0.24*

Gaming Mechanism (experiences when gaming)	Mental Health Outcome	Gender		ND identity	
		Female	Male	Non-ND	ND
	Eating disorder risk	—	—	0.16	0.77*
Relaxation when stressed	Depression	0.41	1.11*	0.19	0.98*
	Social anxiety	—	—	0.12	0.68*
Role-playing	Depression	0.21	1.08*	—	—
	Generalised anxiety	0.02	0.25*	—	—
	Loneliness	—	—	0.18*	0.09
	Eating disorder risk	—	—	0.02	0.75*
	Body esteem	—	—	0.20	0.22
Seeing people attack others	Self-concept clarity	—	—	0.10	0.12
Sleep disruption	Eating disorder risk	1.39*	0.53*	1.10*	0.14
	Aggression	—	—	0.84*	0.27
Using teamwork	Loneliness	-0.34*	0.02	—	—
	Depression	0.52	0.33	—	—
	Eating disorder risk	0.25	0.29	—	—
	Body esteem	0.35*	0.20	—	—

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

Table 4.25 shows correlations among gaming mechanisms and mental health outcomes among children from child self-report data from interviews. Significant associations indicate that gaming relates to both positive and negative mental health outcomes, depending on how the gaming is experienced. A strong sense of community belonging through gaming was linked to higher wellbeing, markedly lower loneliness, and lower aggression, and viewing gaming as a fun way to relax was associated with lower anxiety, indicating potentially protective effects. In contrast, using gaming to escape from life was associated with greater body dissatisfaction, while feeling upset when unable to game was linked to higher loneliness and aggression.

Negative social experiences in gaming, such as being bullied or feeling left out, were also significantly associated with higher loneliness, greater social anxiety, and higher aggression.

Overall, the child interview findings for children are partly consistent with the parent reports. Patterns of associations in data from child and parent report are in accord, that problematic and negative gaming experiences (e.g., escapism, difficulty stopping, distress when unable to play, bullying and exclusion) are associated with poorer mental health across multiple outcomes. However, they differ on the more positive mechanisms: children's reports suggest that community belonging and fun, and relaxing gaming are linked to better mental health (e.g., higher wellbeing, lower loneliness), whereas parent-report of these mechanisms tend to coincide with reports of poorer mental health for children (e.g., higher loneliness and depression).

Table 4.25. *Correlations between gaming mechanisms and mental health outcomes in children aged 5–12 years (children interview)*

Gaming Mechanism	Wellbeing	Loneliness	Generalised Anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression
Feeling accepted when gaming	0.28	-0.22	-0.21	-0.23	-0.17	-0.33	-0.03	-0.10
Sense of community belonging through gaming	0.46*	-0.64***	-0.35	-0.36	-0.33	-0.20	-0.32	-0.43*
Using gaming to escape from life	-0.05	0.10	-0.14	0.24	0.40*	0.34	-0.11	0.19
Gaming as a fun way to relax	0.11	-0.23	-0.35*	-0.05	0.11	-0.09	-0.00	-0.15
Feeling confident and in control from gaming	0.29	-0.22	-0.28	-0.32	-0.16	-0.12	-0.07	-0.33
Feeling socially connected with others from gaming	0.30	-0.13	-0.27	-0.07	0.01	0.09	-0.11	-0.01
Role-playing when gaming	0.17	-0.02	0.12	-0.17	-0.23	0.05	-0.11	-0.17
Difficult to take breaks from gaming	-0.24	0.24	0.09	0.14	0.21	-0.02	0.25	0.26
Feeling upset when unable to game	-0.30	0.37*	0.32	0.34	0.19	-0.21	0.29	0.35*
Experiencing bullying when gaming	-0.35	0.39*	0.03	0.19	0.09	0.25	0.19	0.10
Feeling left out when gaming	-0.33	0.29	0.27	0.41*	0.23	0.07	0.33	0.42*

Gaming Mechanism	Wellbeing	Loneliness	Generalised Anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression
Gaming being a distraction from other tasks	0.03	0.33	0.29	0.01	-0.08	0.16	0.33	0.16
Gaming disrupting sleep	-0.15	0.02	0.03	0.17	0.20	0.14	0.18	0.32

Note. * p < .05, ** p < .01, *** p < .001.

4.3.5.6.2 Adolescents

Correlations between gaming mechanisms and mental health outcomes among adolescents are shown in Table 4.23, with subgroup differences presented in Table 4.26. Overall, mechanisms reflecting supportive or identity-affirming uses of gaming tended to show modest associations with more favourable mental health profiles, whilst mechanisms reflecting escapism, dysregulated use, and negative social experiences showed broader and more consistent associations with poorer outcomes.

Identity and connection mechanisms showed a mixed pattern. Positive support through gaming was associated with higher wellbeing and lower loneliness, with all other outcomes non-significant. Identity acceptance was associated with lower loneliness only, with all other outcomes non-significant. Community belonging, social connection, and using gaming for relaxation were not significantly associated with any mental health outcome at the overall level.

Subgroup analyses revealed several differences within this cluster. Positive support through gaming was significantly associated with lower loneliness, lower generalised anxiety, and higher self-concept clarity among neurodivergent adolescents, whilst non-neurodivergent adolescents showed negligible associations. Among gender groups, positive support was significantly associated with lower LGBTQA+ identity affirmation among males, whilst females showed a small non-significant positive trend. Learning new skills and social connection both showed divergent patterns by gender: learning new skills showed non-significant trends towards higher loneliness among females and lower loneliness among males, whilst social connection was significantly associated with higher loneliness among females but not males. Identity acceptance was significantly associated with better body esteem among males, whilst females showed a small non-significant negative trend. Finally, community belonging showed a non-significant negative trend for eating disorder risk among neurodivergent adolescents and a non-significant positive trend among non-neurodivergent adolescents, with the difference between groups being statistically significant.

Skill, learning, teamwork, and role-playing mechanisms showed a largely non-significant pattern at the overall level. Learning new skills was associated with higher LGBTQA+ identity affirmation only, with all other outcomes non-significant. **Playing games for fun and relaxation** was associated with lower depression only, with all other outcomes non-significant. **Confidence and control** through gaming was associated with higher social anxiety only, with all other outcomes non-significant. Subgroup analyses revealed meaningful differences. Playing games for fun and relaxation was associated with lower generalised anxiety among LGBTQA+ adolescents but showed no significant association among non-LGBTQA+ adolescents. Teamwork was associated with lower social anxiety among neurodivergent adolescents but showed no significant association among non-neurodivergent adolescents. Difficulty taking breaks was associated with higher social anxiety and higher eating disorder risk among non-neurodivergent adolescents, with negligible or opposite associations among neurodivergent adolescents. Role-playing was associated with higher loneliness among LGBTQA+ adolescents but showed no significant association among non-LGBTQA+ adolescents. Role-playing was also

associated with higher eating disorder risk among non-neurodivergent adolescents, with a negative trend observed among neurodivergent adolescents.

Escapism and relaxation mechanisms showed consistent associations with poorer mental health. Using gaming as a form of escapism was associated with poorer wellbeing, and higher loneliness, generalised and social anxiety, and depression, with eating disorder risk, body esteem, and self-concept clarity non-significant. Using gaming to relax or take a break when stressed was not significantly associated with any mental health outcome at the overall level; however, subgroup analyses indicated that relaxation use was associated with higher wellbeing among neurodivergent adolescents, whilst the association was in the opposite direction among non-neurodivergent adolescents, though not reaching significance.

Compulsive and time-consuming use mechanisms showed consistent associations with poorer mental health. **Feeling left out** whilst gaming showed the broadest pattern of associations, being significantly linked to lower wellbeing, body esteem, and self-concept clarity, and with higher loneliness, generalised and social anxiety, eating disorder risk, and higher depression. **Sleep disruption** due to gaming showed a similarly broad pattern, being associated with lower wellbeing, body esteem, and self-concept clarity, and with higher loneliness, generalised and social anxiety, eating disorder risk, and depression. **Distraction** from other tasks was associated with lower wellbeing, and with higher loneliness, generalised and social anxiety, and depression, with eating disorder risk, body esteem, and self-concept clarity non-significant. Distraction from other tasks was associated with higher eating disorder risk among non-neurodivergent adolescents, with a negative trend among neurodivergent adolescents. **Difficulty taking breaks** was associated with lower wellbeing, and higher social anxiety and depression, with loneliness, generalised anxiety, eating disorder risk, body esteem, and self-concept clarity non-significant. Being upset when unable to access gaming was associated with higher loneliness, social anxiety, eating disorder risk, and depression, with wellbeing, generalised anxiety, body esteem, and self-concept clarity non-significant. Subgroup analyses revealed several differences. Sleep disruption was significantly associated with lower wellbeing and lower body esteem among males, whilst females showed small non-significant trends. Among neurodivergence subgroups, sleep disruption was significantly associated with higher loneliness and generalised anxiety, and lower body esteem among non-neurodivergent adolescents, whilst neurodivergent adolescents showed negligible or no meaningful associations across all three outcomes.

Negative social experience mechanisms showed consistent associations with poorer mental health. Specifically, experiencing bullying through gaming was associated with lower wellbeing and lower self-concept clarity, and with higher loneliness, generalised and social anxiety, eating disorder risk, depression, with body esteem non-significant. Seeing attacks on others was associated with higher loneliness, generalised and social anxiety, eating disorder risk, and depression, with wellbeing, body esteem, and self-concept clarity non-significant. Subgroup analyses revealed that seeing attacks on others was associated with lower wellbeing among non-LGBTQA+ adolescents but showed no significant association, and a slight positive trend, among LGBTQA+ adolescents.

Overall, among adolescents, feeling left out and sleep disruption showed the most consistently negative associations with mental health, whilst positive support and identity acceptance showed more favourable patterns, particularly among neurodivergent adolescents. Subgroup analyses highlighted that many of the negative associations were stronger among non-LGBTQA+ and non-neurodivergent adolescents, whilst neurodivergent adolescents appeared to derive greater benefit from supportive gaming experiences such as positive support and teamwork.

Table 4.26. *Subgroup differences in the association between gaming mechanisms and mental health outcomes among adolescents*

Gaming Mechanism (experiences while gaming)	Mental Health Outcome	Gender		LGBTQA+ Identity		ND identity	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Community belonging (sense of)	Eating disorder risk	—	—	—	—	0.54	0.80
Difficulty taking breaks	Social anxiety	—	—	—	—	0.48*	0.10
	Eating disorder risk	—	—	—	—	0.75*	0.58
Distraction from other tasks	Eating disorder risk	—	—	—	—	0.87*	0.38
Feeling accepted	Body esteem	0.27	0.35*	—	—	—	—
Feeling socially connected	Loneliness	0.40*	0.08	—	—	—	—
Learning new skills	Loneliness	0.25	0.17	—	—	—	—
Positive support	Identity affirmation	0.20	-2.70*	—	—	—	—
	Loneliness	—	—	—	—	0.02	0.47*
	Generalised anxiety	—	—	—	—	0.03	0.37*
	Self-concept clarity	—	—	—	—	0.05	0.18*
Relaxation (for fun)	Generalised anxiety	—	—	0.0001	0.53*	—	—
Relaxation when stressed	Wellbeing	—	—	—	—	0.55	0.87
Role-playing	Loneliness	—	—	0.01	0.40*	—	—
	Eating disorder risk	—	—	—	—	0.89*	0.51
Seeing people attack others	Wellbeing	—	—	0.87*	0.64	—	—

Gaming Mechanism (experiences while gaming)	Mental Health Outcome	Gender		LGBTQA+ Identity		ND identity	
		Female	Male	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Sleep disruption	Wellbeing	0.34	-1.53*	—	—	—	—
	Loneliness	—	—	—	—	0.55*	0.06
	Generalised anxiety	—	—	—	—	0.50*	0.23
	Body esteem	0.12	0.48*	—	—	0.54*	0.00
Using teamwork	Social anxiety	—	—	—	—	0.07	0.69*

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

4.3.5.6.3. Young adults

Correlations between gaming mechanisms and mental health outcomes among young adults are shown in Table 4.23, with subgroup differences presented in Table 4.27. Overall, associations were mostly small to moderate in size. Mechanisms related to identity affirmation, positive support, and social connection through gaming were associated with better mental health, whilst mechanisms reflecting escapism, distraction from other tasks, and role-playing showed the broadest and most consistent associations with poorer mental health outcomes. The strength and direction of many associations differed across gender, LGBTQA+ identity, and neurodivergence.

Identity and connection mechanisms showed a largely favourable pattern. Identity freedom, identity acceptance, and positive support were generally associated with higher wellbeing. Positive support was also correlated with lower loneliness and higher body esteem across the sample, with no notable subgroup differences. Identity freedom and identity acceptance showed no overall associations with loneliness or body esteem. Subgroup analyses revealed meaningful differences by sexuality and neurodivergence. Identity acceptance when gaming was associated with significantly lower loneliness among LGBTQA+ young adults, whilst showing a negligible non-significant positive trend among non-LGBTQA+ young adults. Among neurodivergent young adults, both identity freedom and identity acceptance when gaming was associated with significantly lower loneliness, whilst non-neurodivergent young adults showed small non-significant positive trends. Additionally, identity freedom was associated with a non-significant positive trend for body esteem among neurodivergent young adults, whilst non-neurodivergent young adults showed a small non-significant negative trend, with the difference between groups being statistically significant.

Skill, learning, and social mechanisms, including community belonging, playing games as a fun way to relax, learning new skills, teamwork, and social connections, showed no significant overall associations with mental health outcomes. However, subgroup analyses revealed meaningful differences. Among females, using games as a fun way to relax and teamwork were associated with higher depression, whilst the opposite pattern emerged among males and gender-diverse young adults, though only the teamwork association among females reached statistical significance. Similarly, relaxation-oriented gaming was significantly associated with higher loneliness among non-neurodivergent young adults but a non-significant negative trend among neurodivergent young adults. Learning new skills and social connections showed a similarly divergent pattern: learning new skills was significantly associated with higher loneliness among non-LGBTQA+ and non-neurodivergent young adults but with lower loneliness among LGBTQA+ young adults (non-significant) and neurodivergent young adults (significant). Social connections showed a similar opposing pattern for loneliness and body esteem among neurodivergent and non-neurodivergent young adults, though associations were non-significant.

Escapism and relaxation mechanisms showed the most consistent associations with poorer mental health in this age group. Using gaming as a form of escapism showed the broadest pattern of associations, being significantly linked to lower wellbeing and lower body esteem, and to higher loneliness, generalised and social anxiety, eating disorder risk, body dissatisfaction, and depressive symptoms, with no meaningful differences by gender, LGBTQA+ identity, or neurodivergence. Subgroup analyses revealed that role-playing was significantly associated with lower wellbeing among non-LGBTQA+ and non-neurodivergent young adults, whilst showing non-significant positive trends among LGBTQA+ and neurodivergent young adults. Role-playing was also significantly associated with higher social anxiety and loneliness among non-LGBTQA+ young adults, whilst showing non-significant negative trends among LGBTQA+ young adults.

Compulsive and time-consuming use mechanisms showed consistent associations with poorer mental health. Distraction from other tasks showed a broad and consistent pattern, correlating significantly with almost all tested outcomes. Subgroup analyses indicated that the association between distraction and loneliness was stronger among non-LGBTQA+ young adults compared with LGBTQA+ young adults. Difficulty taking breaks and sleep disruption showed associations with a smaller subset of outcomes. Difficulty taking breaks was associated with higher loneliness among males but lower loneliness among gender-diverse young adults, with all other outcomes non-significant at the overall level. Sleep disruption was associated with lower wellbeing among males but showed negligible associations among females and gender-diverse young adults. Feeling upset when unable to access gaming was broadly associated with poorer mental health across multiple outcomes. Subgroup analyses revealed that its association with social anxiety was particularly pronounced among males and gender-diverse young adults compared with females, and it was associated with higher generalised and social anxiety among neurodivergent young adults but not non-neurodivergent young adults.

Negative social experience mechanisms were generally associated with poorer outcomes across almost all tested mental health outcomes. Experiencing bullying whilst gaming was most strongly associated with lower wellbeing and higher generalised anxiety among males, with

smaller non-significant negative trends among females and negligible associations among gender-diverse young adults. Similarly, feeling left out or ignored whilst gaming was significantly associated with higher generalised anxiety among both females and males, whilst gender-diverse young adults showed a small non-significant negative trend. Seeing others being attacked during gaming correlated with some but not most tested mental health outcomes, with no significant overall associations observed at the whole-sample level.

Overall, among young adults, escapism and distraction from other tasks showed the most consistently negative associations with mental health, whilst identity-affirming mechanisms such as identity freedom, identity acceptance, and positive support showed more favourable patterns. Subgroup analyses highlighted that many of the negative associations were stronger among non-LGBTQ+ and non-neurodivergent young adults, whilst LGBTQ+ and neurodivergent young adults appeared to derive greater benefit from identity-affirming gaming experiences.

Table 4.27. *Subgroup differences in the association between gaming mechanisms and mental health outcomes among young adults aged 18–25*

Gaming Mechanism (experiences while gaming)	Mental Health Outcome	Gender			LGBQTA+ identity		ND identity	
		Female	Male	Gender-diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
Bullying (experiences)	Wellbeing	0.24 F≠M*	-2.38*	0.06 GD≠M*	—	—	—	—
	Generalised anxiety	0.12	0.69*	0.11 GD≠M*	—	—	—	—
Difficulty taking breaks	Wellbeing	—	—	—	-1.47*	0.41	—	—
	Loneliness	0.09	0.52*	0.55 GD≠M**	0.58*	0.32*	—	—
Distraction from other tasks	Loneliness	—	—	—	0.50*	0.10	—	—
Feeling accepted	Loneliness	—	—	—	0.07	-0.45*	0.18	-0.55*
Feeling confident and in control	Wellbeing	—	—	—	0.31	0.88*	—	—
	Loneliness	—	—	—	0.36*	0.30*	0.44*	-0.30*
Feeling left out	Generalised anxiety	0.51*	0.89*	0.07 GD≠M*	—	—	—	—
Feeling socially connected	Loneliness	—	—	—	—	—	0.14	0.25
	Body esteem	—	—	—	—	—	0.25	0.34
Feeling upset when unable to game	Social anxiety	0.17 F≠M*	1.20*	0.79	—	—	0.12	0.79*
	Loneliness	—	—	—	0.41*	0.08	—	—

Gaming Mechanism (experiences while gaming)	Mental Health Outcome	Gender			LGBQTA+ identity		ND identity	
		Female	Male	Gender-diverse	Non-LGBTQA+	LGBTQA+	Non-ND	ND
	Generalised anxiety	—	—	—	—	—	0.29	0.38*
Freedom to express oneself	Loneliness	—	—	—	—	—	0.27	-0.39*
	Body esteem	—	—	—	—	—	0.21	0.43
Learning new skills	Loneliness	—	—	—	0.25*	0.19	0.36*	-0.37*
Relaxation (for fun)	Loneliness	—	—	—	—	—	0.38*	0.23
	Depression	1.04 F≠M*	-1.01	0.88	—	—	—	—
Relaxation when stressed	Body esteem	0.48* F≠GD*	0.26	0.57	—	—	—	—
	Depression	—	—	—	—	—	0.92	0.65
Role-playing	Wellbeing	—	—	—	0.99*	0.31	-1.04*	0.11
	Loneliness	—	—	—	0.47*	0.01	—	—
	Social anxiety	—	—	—	0.63*	0.07	—	—
Sleep disruption	Wellbeing	0.49	-1.80*	0.68 GD≠M**	-1.29*	0.17	—	—
Using teamwork	Depression	1.21* F≠M*, F≠GD*	0.51	0.55	—	—	—	—

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ≠ denotes a statistically significant pairwise difference between the two groups indicated (e.g. F≠M = significant difference between Female and Male; GD≠F* = significant difference between Gender-diverse and Female), where F = Female, M = Male, and GD = Gender-diverse. ND = neurodivergent. * $p < .05$, ** $p < .01$, *** $p < .001$.

4.3.5.7 Relationship between gaming mechanisms in combination and mental health outcomes: Decision tree analyses

In the decision tree analyses examining the relationships between gaming mechanisms collectively and mental health outcomes, we used variable importance plots to identify the most influential mechanisms for each outcome and the fitted trees to describe how these mechanisms and their cut-offs separated lower from higher scores. Importance scores summarise each predictor's contribution across the full tree, whereas the diagrams show only the main splits, so some variables appear in the importance plots but not in the trees. We report importance and trees only for outcomes with at least one split (non-trivial trees); outcomes with no splits are omitted from Table 4.28. This applies to loneliness, body dissatisfaction, and self-concept clarity for children; wellbeing, body esteem, and self-concept clarity for adolescents; and wellbeing, loneliness, generalised anxiety, and social anxiety for young adults.

Table 4.28. *Gaming mechanisms and number of mental health outcomes in which each mechanism was identified as important across mental health outcomes for children, adolescents, and young adults (ticks = count)*

Gaming Mechanism	Children	Adolescents	Young adults
Freedom to express oneself when gaming	✓✓	—	✓
Feeling accepted when gaming	✓	✓	—
Sense of community belonging through gaming	—	—	✓✓✓✓
Using gaming for relaxation when feeling stressed	✓✓✓✓✓	—	—
Using gaming to escape from life	✓✓✓✓✓✓	✓✓✓	✓✓✓
Gaming as a fun way to relax	✓	—	—
Using gaming to learn new skills	✓✓✓	✓	✓
Using teamwork while gaming	✓✓	—	—
Feeling confident and in control from gaming	✓✓	✓✓	✓✓
Feeling socially connected with others from gaming	✓✓✓	—	✓✓
Positive support through gaming	—	✓	✓
Role-playing when gaming	✓✓	—	✓✓
Difficult to take breaks from gaming	✓✓✓✓	✓	✓✓✓
Feeling upset when unable to game	✓✓✓	✓✓	✓✓
Experiencing bullying when gaming	✓	✓✓✓✓	✓
Feeling left out when gaming	✓✓✓✓	✓✓✓✓	✓✓✓

Gaming Mechanism	Children	Adolescents	Young adults
Gaming being a distraction from other tasks	✓✓✓✓	✓✓✓✓	✓✓✓
Gaming disrupting sleep	✓✓✓✓✓	✓✓✓✓	✓✓✓
Seeing people attack others when gaming	✓	✓✓✓	✓

Note. The number of ticks (✓ to ✓✓✓✓) reflects how often each mechanism appeared as an important predictor in the variable importance plots within that age group (more ticks = mechanism identified across more outcomes).
Importance counts are based on 7 valid trees per age group: for adolescents all outcomes except self-concept clarity, and for young adults all outcomes except body dissatisfaction.
– indicates that the mechanism was not included in the list of those identified as important for the tested relationships.

Table 4.28 shows that, among children, using gaming to escape from life was the most recurrent mechanism, appearing in 6 of the 7 outcomes with valid trees (6/7; 86%). A second tier of mechanisms, including using gaming for relaxation when stressed and gaming disrupting sleep, each appeared in 5 of the 7 valid trees (5/7; 71%). A further set of mechanisms occurred in 4 of 7 valid trees (4/7; 57%): difficulty taking breaks from gaming, feeling left out when gaming, and gaming being a distraction from other tasks.

In the adolescent group, experiencing bullying when gaming, feeling left out when gaming, gaming being a distraction from other tasks, and gaming disrupting sleep were the most recurrent mechanisms, each appearing in 4 of the 5 outcomes with valid trees (4/5; 80%). A second tier—using gaming to escape from life and seeing people attack others when gaming - appeared in 3 of the 5 valid trees (3/5; 60%).

Among young adults, a sense of community belonging through gaming was present in all outcomes with valid trees (4/4; 100%). A second tier of mechanisms, using gaming to escape from life, difficulty taking breaks from gaming, feeling left out when gaming, gaming being a distraction from other tasks, and gaming disrupting sleep, each appeared in 3 of the 4 valid trees (3/4; 75%).

Overall, across outcomes and age groups, using gaming to escape from life, feeling left out when gaming, gaming as a distraction from other tasks, and gaming disrupting sleep emerged as consistently implicated mechanisms.

4.3.5.7.1 Children: Decision tree models

Wellbeing. For children aged 5–12, the decision tree for wellbeing highlighted several gaming mechanism as important: becoming upset when unable to play, playing for fun and relaxation, using games to escape, feeling left out, feeling that they learn new skills, being distracted from other tasks, and teamwork in games.

On the higher-wellbeing side of the tree, children who did not often get very upset if they could not play games (scores < 3), rarely felt left out while gaming (scores < 2), were only mildly or rarely distracted from other tasks by gaming (scores < 3), and regularly engaged in teamwork in games (teamwork score = 5) had the highest predicted wellbeing, with scores around 29. Wellbeing remained relatively high even when children reported feeling left out "somewhat" or more (scores ≥ 2), provided they also felt they were learning new skills "quite a bit" or more from gaming (scores ≥ 4), in which case predicted wellbeing was still around 26.

On the lower-wellbeing side of the tree, children were more likely to become upset when they no access to gaming (scores ≥ 3) and did not strongly experience gaming as fun or relaxing (scores < 3); this combination was associated with the lowest predicted wellbeing (around 20). However, wellbeing was higher among children who still became upset when they could not play but also tended to use games for fun and relaxation.

Overall, the pattern suggests that wellbeing in younger children is higher when gaming is experienced as enjoyable, skill-building, and not something they become very upset about when not having access, and lower when gaming is tied to distress about not being able to play and is not experienced as particularly fun or relaxing

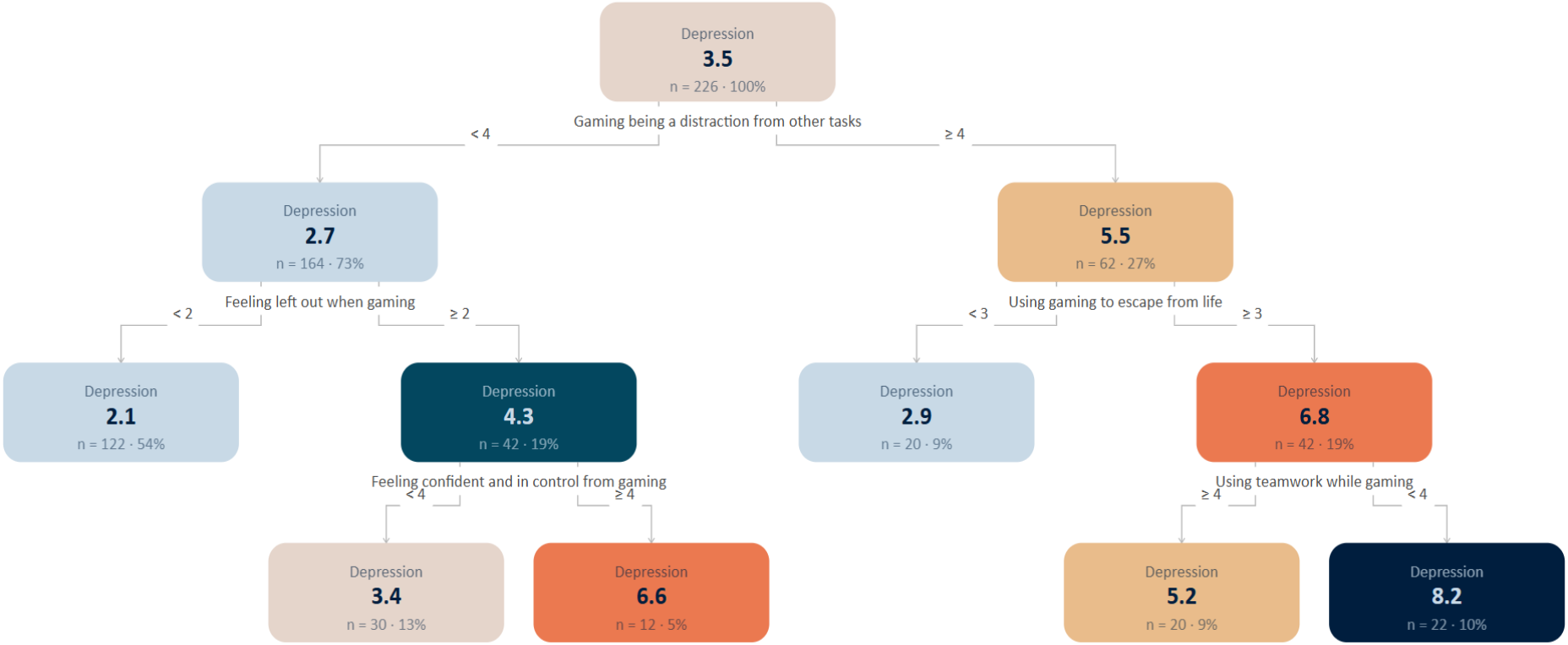
Depression. As shown in Figure 4.23 the decision tree for depressive symptoms in children who play games highlighted five key gaming experiences: being distracted from other tasks, feeling left out, feeling confident and in control while gaming, using games to escape, and teamwork in games.

A low-depression profile was characterised by children who said that games did not often distract them from other activities (scores < 4) and who hardly ever felt left out while gaming (scores < 2). In this group, predicted depression scores were lowest (mean = 2.1). Among children who did feel left out more than "a little" (scores ≥ 2), depression remained relatively low when they felt less confident and in control while playing (scores < 4) but was higher when they felt more confident and in control (scores ≥ 4).

A higher-depression profile emerged on the side of the tree where children reported that games often distracted them from other tasks (scores ≥ 4). Within this group, depressive symptoms were lower when children did not use games strongly as an escape (scores < 3) and often played in teams (scores ≥ 4; mean = 2.9). However, depression increased when children used games more for escapism (scores ≥ 3) and/or had less teamwork involvement, with the highest scores (mean = 8.2) seen in the branch that combined high distraction, high escapism, and lower teamwork.

Overall, the tree suggests that depressive symptoms are lowest when gaming is not highly distracting or exclusionary, is not strongly used as an escape, and particularly when play involves teamwork. In contrast, depression scores are highest when gaming frequently disrupts other activities, is used to escape, and is accompanied by little teamwork.

Figure 4.23. *Decision tree model of depressive symptoms and gaming mechanisms among children aged 5–12*



Generalised anxiety, social anxiety, and eating disorder risk. Across the models for generalised anxiety, social anxiety, and eating disorder risk, using gaming as a form of escapism was consistently identified as an important mechanism. When children reported higher levels of escapist gaming (scores ≥ 3 for social anxiety and eating disorder risk; scores ≥ 4 for generalised anxiety), their scores on these outcomes tended to be higher. In contrast, when children reported lower escapist use of gaming, their generalised anxiety, social anxiety, and eating disorder scores were reduced.

Body esteem. For body esteem, feeling left out while gaming emerged as the key mechanism. Children who were less likely to feel left out (scores < 2) had higher body esteem, whereas those who reported feeling left out "a little" or more often (scores ≥ 2) had lower body esteem. This suggests that feeling included in gaming contexts is linked to more positive body-related self-views in this age group.

Aggression. Aggression was assessed only in the 5–12 group. Here, the decision tree showed that feeling upset when unable to access gaming was associated with higher aggression scores. Children who reported being less upset when they could not play (scores ≤ 3) had lower aggression, whereas those who became more upset in these situations had higher aggression scores, indicating that difficulty tolerating time away from games may be linked with heightened aggression.

4.3.5.7.2 Adolescents: Decision tree models

For adolescents aged 13–17, the decision tree models for wellbeing, body esteem, and self-concept clarity did not identify any meaningful splits. The decision trees for the remaining outcomes are summarised below.

Loneliness, depression and generalised anxiety. For loneliness, depression, and generalised anxiety, the decision trees all pointed to feeling left out while gaming as the key mechanism. Adolescents who rarely felt left out (scores < 2; "not at all" or "a little") had lower scores on all three outcomes, whereas those who felt left out at least "somewhat" (scores ≥ 2) tended to report higher loneliness, depression, and generalised anxiety.

For generalised anxiety, feeling that one's identity is accepted while gaming also played a role. Although feeling left out still separated lower from higher anxiety, its impact depended on identity acceptance. Adolescents who felt left out but also felt strongly accepted (identity acceptance scores ≥ 4; "quite a bit" or "very much") showed comparatively lower anxiety, whereas the highest anxiety scores were seen among those who felt left out and did not feel strongly accepted (identity acceptance scores < 4). This pattern suggests that feeling both excluded and not accepted in gaming contexts is particularly linked to elevated generalised anxiety.

Social anxiety. For social anxiety, the decision tree identified gaming distracting from other tasks as the key mechanism. Adolescents who reported that gaming distracted them less than "somewhat" (scores < 3) had lower social anxiety scores, whereas those who said gaming distracted them "somewhat" or more (scores ≥ 3) showed higher social anxiety.

Eating disorders. Among adolescents aged 13–17, the decision tree indicated that experiencing bullying while gaming is an important mechanism for eating-disorder risk. Those who reported experiencing bullying at least "somewhat" (scores ≥ 3) had a mean eating-disorder score of around 14, which falls in the moderate-risk range. In contrast, when bullying was endorsed less often (scores < 3), the mean score dropped to about 9.3, within the low-risk range, indicating substantially lower eating-disorder symptoms.

4.3.5.7.3 Young adults: Decision tree models

Depression. For depressive symptoms, among young adults who game, the decision tree highlighted gaming as a distraction from other tasks and role-playing in games as key mechanisms.

Young adults who reported that gaming did not often distract them from other activities (scores< 4) had a lower mean depression score of 7.5. Within this group, those who used role-playing less than "somewhat" (scores < 3) had the lowest depression scores at 6, whereas those who engaged in role-playing at least "somewhat" (scores ≥ 3) had a higher mean score of 9.4, approaching the moderate range.

In contrast, young adults who reported that gaming often distracted them from other tasks (scores ≥ 4) had the highest depression scores (mean = 12), falling in the moderate range (10–14) and indicating likely depression that would typically warrant treatment.

Overall, this pattern suggests that depressive symptoms are lowest when gaming is not highly distracting and involves less role-playing, and highest when gaming frequently interferes with daily activities.

Eating disorder risk. Among young adults who game, the decision tree for eating disorder risk and symptomatology highlighted experiencing bullying while playing games as the key mechanism. Young adults who reported being bullied at least "a little" (scores ≥ 2) had a higher mean eating disorder score of 15, indicating moderate risk of developing an eating disorder. In contrast, those who reported no bullying (scores < 2) had a mean score of 12, falling within the low-risk range.

Body esteem. Among young adults who game, the decision tree for body esteem highlighted gaming as a distraction from other tasks and feeling a sense of community while gaming as key mechanisms. Young adults who reported that gaming often distracted them from other tasks (scores ≥ 4) had lower body esteem scores (mean =4.4), than those who were less distracted by gaming (scores < 4; mean = 6.3). Within the higher-distraction group, those who also reported at least "somewhat" feeling a sense of community while gaming (scores ≥ 3) had the highest body esteem scores (mean = 7.0), compared to those with lower community belonging (scores < 3; mean = 5.6). This pattern suggests that body esteem is higher when gaming tends to distract from other activities and is experienced as part of a community.

Body dissatisfaction. Among young adults who game, the decision tree for body dissatisfaction highlighted using games as a way to escape as the key mechanism. Young adults who reported using gaming less than "very much so" for escapism (escapism scores < 5) had a lower mean

body dissatisfaction score of 3.2, whereas those who reported using gaming "very much so" to escape (escapism score = 5) had a higher mean score of 4.6. This pattern suggests that body dissatisfaction is higher among young adults who use gaming very strongly as a form of escape.

4.3.5.8. AI companion mechanisms: Associations with mental health outcomes, and subgroup differences

4.3.5.8.1 Children

Correlations between AI companion mechanisms and mental health outcomes for the 5–12 cohort are shown in Table 4.29. Given the small number of parents who reported that their child used AI companions, no subgroup analyses were conducted. Overall, the pattern of findings was broadly negative, with most mechanisms showing associations with poorer mental health outcomes, and no mechanisms showing consistent beneficial associations.

Table 4.29. *Correlations between AI companion mechanisms and mental health outcomes*

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity[b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Freedom to express oneself with AI companion	**5-12**	-0.09	—	0.07	0.20	0.12	0.26	-0.05	-0.15	0.01	0.27	0.25
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	-0.07	-0.27	—	-0.05	0.17	0.05	0.12	0.04	0.14	0.03	—
Feeling accepted by AI companion	**5-12**	-0.05	—	-0.06	-0.19	0.11	0.14	0.02	0.09	0.30	0.04	0.03
	13-17	0.09	0.07	0.03	-0.17	0.18	0.04	0.10	—	0.23	0.06	—
	18-25	0.04	-0.22	—	-0.11	0.19	0.06	0.12	0.02	0.10	0.04	—
Using AI companion for relaxation	**5-12**	-0.41*	—	-0.25	-0.16	0.47*	0.12	0.35	0.15	0.42*	0.27	0.14
	13-17	-0.07	-0.04	-0.14	-0.23*	0.31**	0.06	0.17	—	0.33**	0.07	—
	18-25	-0.23*	0.01	—	-0.22*	0.25*	0.26**	0.28**	0.30**	0.31**	0.36**	—
Using AI companion to escape from life	**5-12**	-0.31	—	-0.19	-0.20	0.39	0.20	0.25	0.22	0.42*	0.24	0.11
	13-17	-0.11	0.05	-0.11	-0.14	0.33**	-0.05	0.20	—	0.12	0.01	—
	18-25	-0.18	-0.04	—	-0.11	0.23*	0.19	0.36***	0.30**	0.29**	0.35***	—
Positive support from AI companion	**5-12**	-0.32	—	-0.21	0.01	0.41*	0.14	0.18	0.03	0.00	0.08	0.05
	13-17	-0.03	-0.10	0.03	-0.23	0.16	-0.19	0.09	—	0.24*	-0.12	—
	18-25	-0.16	-0.33	—	-0.17	0.27**	0.14	0.23*	0.24*	0.27*	0.21*	—
	5-12	-0.50**	—	-0.53**	-0.41*	0.46*	0.26	0.45*	0.24	0.42*	0.24	0.15

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity[b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Trusting information from AI companion	**13-17**	0.28*	0.39	0.35**	-0.08	-0.06	-0.10	-0.06	—	0.13	-0.03	—
	18-25	0.13	0.20	—	0.03	0.13	0.22*	0.19	0.13	0.17	0.13	—
Exposure to diverse perspectives through AI companion	**5-12**	-0.14	—	-0.36	-0.02	0.20	0.07	0.21	0.08	0.18	0.02	0.04
	13-17	0.16	-0.47	-0.11	-0.26*	0.20	0.04	0.22	—	0.31**	0.04	—
	18-25	0.01	0.21	—	0.02	0.08	0.02	0.09	0.09	0.12	0.06	—
Self-expression with AI companion	**5-12**	-0.18	—	-0.30	-0.23	0.30	0.10	0.32	0.31	0.39	0.14	0.19
	13-17	-0.09	-0.07	0.12	0.23*	0.15	-0.14	0.12	—	-0.23*	0.08	—
	18-25	0.16	0.28	—	0.21*	0.24*	0.19	0.33***	0.27**	0.30**	0.25*	—
Forming a strong bond with AI companion	**5-12**	-0.29	—	-0.20	-0.31	0.40*	0.24	0.45*	0.46*	0.87***	0.38	0.27
	13-17	-0.08	-0.24	-0.15	-0.25*	0.28*	0.08	-0.25*	—	0.31*	0.09	—
	18-25	0.01	0.22	—	0.07	0.13	0.13	0.21*	0.22*	0.28**	0.20*	—
Feeling connected to AI companion	**5-12**	-0.41*	—	-0.42*	-0.16	0.61**	0.23	0.49*	0.39	0.45*	0.35	0.25
	13-17	0.04	0.17	-0.10	-0.12	0.11	0.09	0.18	—	0.12	0.00	—
	18-25	0.02	0.03	—	0.15	0.12	0.08	0.23*	0.27**	0.30**	0.20*	—
	5-12	-0.41*	—	-0.47*	-0.25	0.81***	0.37	0.43*	0.22	0.49**	0.47*	0.17

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity[b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
Loss of time when using AI companion	**13-17**	-0.20	-0.11	-0.20	-0.18	0.40***	0.22	0.25*	—	0.17	0.21	—
	18-25	0.15	0.00	—	0.18	0.33***	0.10	0.35***	0.17	0.36***	0.36***	—
Experiencing unhealthy behaviour from AI companion	**5-12**	-0.29	—	-0.16	-0.25	0.40	0.42*	0.50*	0.24	0.47*	0.72***	0.59**
	13-17	—	—	—	—	—	—	—	—	—	—	—
	18-25	0.08	0.02	-	0.03	0.23*	0.23*	0.28**	0.23*	0.38***	0.41***	—
Experiencing dangerous ideas from AI companion	**5-12**	-0.40*	—	-0.26	-0.35	0.45*	0.39	0.43*	0.33	0.70***	0.49*	0.36
	13-17	-0.10	0.11	-0.27*	-0.03	0.41***	0.31**	0.36**	—	0.27*	0.34**	—
	18-25	0.14	0.23	—	0.08	0.26**	0.10	0.26**	0.19	0.28**	0.29**	—
Experiencing abuse from AI companion	**5-12**	-0.47*	—	-0.41*	-0.50*	0.44*	0.34	0.49*	0.54**	0.85***	0.50*	0.45*
	13-17	-0.04	0.07	-0.16	0.12	0.21	0.25*	0.25*	—	0.22	0.31**	—
	18-25	0.05	0.02	—	0.06	0.24*	0.15	0.29**	0.18	0.43***	0.42***	—
Receiving unwanted sexual content from AI companion	**5-12**	-0.55**	—	-0.42*	-0.55**	0.54**	0.26	0.55**	0.43*	0.80***	0.53**	0.53**
	13-17	-0.13	-0.13	-0.25*	-0.08	0.28*	0.15	0.37**	—	0.19	0.30**	—
	18-25	0.09	0.06	—	0.05	0.27**	0.24*	0.32**	0.29**	0.42***	0.36***	—
Pressure to engage with	**5-12**	—	—	—	—	—	—	—	—	—	—	—
	13-17	—	—	—	—	—	—	—	—	—	—	—

Outcome		Wellbeing	Identity affirmation[a]	Self-concept clarity[b]	Body esteem	Loneliness	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Depression	Aggression [c]
sexualised content from AI companion	**18-25**	0.02	0.02	-	0.08	0.12	0.10	0.13	0.17	0.34***	0.29**	—

Note. * p < .05, ** p < .01, *** p < .001.

[a]. Identity affirmation was administered only to participants who identified as part of the LGBTQA+ community.

[b.] Self-concept clarity was assessed only in children aged 5–12 (parent report) and adolescents aged 13–17.

[c.] Aggression was assessed only in the parent-report survey for children aged 5–12.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

Positive and neutral mechanisms, including identity freedom, identity acceptance, self-expression, and exposure to diverse views and opinions, were not significantly associated with any mental health outcome. Mechanisms reflecting connection and emotional bonding showed more concerning patterns: feeling a sense of connection with an AI companion was associated with lower wellbeing, higher loneliness, higher social anxiety, higher eating disorder risk, and lower self-concept clarity, whilst forming a strong bond was associated with higher loneliness, higher social anxiety, higher body dissatisfaction, and higher eating disorder risk.

Among emotional reliance and coping mechanisms, trusting information from an AI companion showed the broadest pattern of associations, being linked to lower wellbeing, higher loneliness, higher social anxiety, higher eating disorder risk, lower body esteem, and lower self-concept clarity. Using AI companions for relaxation was associated with lower wellbeing, higher loneliness, and higher eating disorder risk, whilst positive support was associated with higher loneliness only and escapism with higher eating disorder risk only. Time loss when using an AI companion showed a broader pattern, being associated with lower wellbeing, higher loneliness, higher depression, higher social anxiety, higher eating disorder risk, and lower self-concept clarity.

Negative AI companion experiences showed the most consistent and widespread associations with poorer mental health in this age group. Experiencing abuse and unwanted sexual content each showed the broadest patterns, both being associated with lower wellbeing, higher loneliness, higher depression, higher social anxiety, higher body dissatisfaction, higher eating disorder risk, poorer body esteem, higher aggression, and lower self-concept clarity. Exposure to dangerous ideas was associated with lower wellbeing, higher loneliness, higher depression, higher social anxiety, and higher eating disorder risk, whilst exposure to unhealthy behaviours was associated with higher depression, higher generalised anxiety, higher social anxiety, higher eating disorder risk, and higher aggression.

Overall, AI companion use among children was broadly associated with poorer mental health outcomes, with experiencing abuse and unwanted sexual content showing the strongest and most consistent associations across almost all tested outcomes. These findings should be interpreted with caution given the small sample size.

4.3.5.8.2 Adolescents

Relations between AI companion use and mental health are shown in Table 4.29. Overall, exposure to dangerous ideas showed the broadest and most detrimental pattern of associations, whereas trusting information from an AI companion showed the most consistent links with more favourable indicators. Trusting AI information was associated with lower loneliness, lower generalised anxiety, lower social anxiety, and higher self-concept clarity, but also with higher eating disorder risk and lower body esteem.

Subgroup analyses (Table 4.30) showed that exposure to dangerous ideas was particularly harmful for LGBTQA+ adolescents, who showed significantly lower wellbeing, lower self-concept clarity, and higher social anxiety, whilst non-LGBTQA+ adolescents showed smaller or opposing non-significant trends. Among neurodivergence subgroups, dangerous ideas was

significantly associated with higher generalised anxiety and depression among non-neurodivergent adolescents, but non-significant negative trends among neurodivergent adolescents.

Using an AI companion for relaxation was associated with higher loneliness, higher eating disorder risk, and lower body esteem. Subgroup analyses indicated that using AI chatbots to take a break, relax, and feel connected was associated with higher generalised anxiety, social anxiety, and depression among non-LGBTQA+ adolescents, but with slightly lower generalised anxiety and negligible associations with social anxiety and depression among LGBTQA+ adolescents. Being exposed to diverse views and opinions through AI companions was associated with lower wellbeing, lower LGBTQA+ identity affirmation, and higher eating disorder risk; in subgroup analyses, this was associated with higher depression among non-neurodivergent adolescents and lower depression among neurodivergent adolescents. Time loss while using an AI companion was associated with lower wellbeing, higher social anxiety, more eating disorder risk, and higher depression. Losing track of time was further associated with significantly higher generalised anxiety among non-LGBTQA+ adolescents and higher depression among non-neurodivergent adolescents, whilst LGBTQA+ adolescents showed a negligible association with generalised anxiety and neurodivergent adolescents showed a non-significant negative trend for depression. Unwanted sexual content was associated with higher general anxiety and depression and lower self-concept clarity. Subgroup analyses showed that unwanted sexual content was associated with lower self-concept clarity among LGBTQA+ adolescents (and negligible effects among non-LGBTQA+ adolescents), lower wellbeing particularly among neurodivergent adolescents, and higher depression among non-neurodivergent compared with neurodivergent adolescents.

Several mechanisms – including using AI companions for escapism, connection, forming a strong bond, self-expression, and experiencing abuse – were not significantly associated with any mental health outcomes at the whole-sample level. Subgroup analyses indicated that forming a strong bond with an AI companion was significantly associated with higher eating disorder risk among non-neurodivergent adolescents, whilst neurodivergent adolescents showed no meaningful association. In contrast, forming a strong bond was significantly associated with lower depression among neurodivergent adolescents, whilst non-neurodivergent adolescents showed a small non-significant positive trend.

Using AI chat for escapism was associated with higher depression among non-neurodivergent adolescents, and lower depression among neurodivergent adolescents. No meaningful subgroup differences were observed by gender.

Overall, among adolescents, exposure to dangerous ideas was the most consistently detrimental AI companion mechanism, whilst trusting AI information showed a mixed but relatively more favourable pattern. Most other mechanisms were associated with poorer mental health outcomes, with associations generally stronger among non-LGBTQA+ and non-neurodivergent adolescents. No meaningful subgroup differences were observed by gender.

Table 4.30. *Subgroup differences in the association between AI companion mechanisms and mental health outcomes among adolescents aged 13-17*

AI Companion Mechanism	Mental Health Outcome	LGBTQA+ Identity		ND Identity	
		Non-LGBTQA+	LGBTQA+	Non-ND	ND
Using AI companion for relaxation	Generalised anxiety	0.93*	0.16	—	—
	Social anxiety	1.46*	0.11	—	—
	Eating disorder risk	4.39*	0.86	3.72*	0.25
	Depression	0.95*	0.12	0.47	0.83*
Using AI companion to escape from life	Depression	—	—	0.38	0.61
Exposure to diverse perspectives through AI companion	Depression	—	—	0.26	-0.89*
Forming a strong bond with AI companion	Eating disorder risk	—	—	3.64*	0.01
F	Depression	—	—	0.40	0.75*
Feeling connected to AI companion	Generalised anxiety	0.57*	0.26	0.61*	0.44
Loss of time when using AI companion	Generalised anxiety	0.79*	0.07	—	—
	Depression	—	—	0.89*	0.79
Experiencing dangerous ideas from AI companion	Wellbeing	0.46	-3.47*	—	—
	Generalised anxiety	—	—	1.03*	-1.43
	Social anxiety	0.88	2.98*	—	—

AI Companion Mechanism	Mental Health Outcome	LGBTQA+ Identity		ND Identity	
	Body esteem	0.31	-1.37	—	—
	Depression	—	—	1.17*	-1.95
	Self-concept clarity	0.17	-1.12*	—	—
Receiving unwanted sexual content from AI companion	Wellbeing	—	—	0.35	-4.56*
	Depression	—	—	0.91*	0.76
	Self-concept clarity	0.12	-0.64*	—	—

Note. Numbers represent unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

4.3.5.8.3 Young Adults

Correlations between AI companion mechanisms and mental health outcomes among young adults are shown in Table 4.29, with subgroup differences presented in Table 4.31. Overall, associations were mostly small to moderate in size. No AI companion mechanisms showed consistent associations with more favourable mental health outcomes. Instead, the pattern of findings was broadly negative, with mechanisms reflecting emotional reliance and coping showing the most consistent associations with poorer mental health, and negative AI companion experiences also associated with poorer outcomes across a range of mental health domains.

Among the emotional reliance and coping mechanisms, using AI companions for relaxation and escapism showed the strongest and most consistent associations with poorer mental health, being linked to higher depression, higher loneliness, higher social anxiety, greater eating disorder risk, and lower wellbeing. Subgroup analyses indicated that these associations were stronger among non-LGBTQA+ young adults compared with LGBTQA+ young adults, with weaker or negligible associations observed among the latter group. No meaningful subgroup differences were observed by gender or neurodivergent status for these mechanisms.

Using AI companions for positive support and self-expression showed a similar, though somewhat weaker, pattern, being associated with higher loneliness, greater eating disorder risk, higher body dissatisfaction, and higher depressive symptoms. No significant subgroup

differences were observed for these mechanisms by gender, LGBTQ+ status, or neurodivergent status.

Feeling a sense of connection and forming a strong bond with an AI companion showed the weakest associations within this cluster, but were still positively associated with higher loneliness, social anxiety, and body dissatisfaction. Subgroup analyses revealed that feeling a sense of connection with an AI companion was more strongly associated with higher social anxiety among neurodivergent young adults than non-neurodivergent young adults, with social anxiety increasing more clearly as perceived connection with the AI companion increased among the former group. No meaningful subgroup differences were observed by gender or LGBTQA+ identity for these mechanisms.

Among the negative AI companion experience mechanisms, exposure to dangerous ideas and exposure to unhealthy behaviours were associated with higher loneliness, higher social anxiety, greater eating disorder risk, and higher depressive symptoms. Subgroup analyses indicated that exposure to unhealthy behaviours was associated with higher eating disorder risk more strongly among non-LGBTQA+ young adults than LGBTQA+ young adults.

Experiencing abuse from an AI companion was associated with greater eating disorder risk and higher depressive symptoms, with all other outcomes non-significant. Subgroup analyses revealed that the association with eating disorder risk was stronger among non-LGBTQA+ young adults than LGBTQA+ young adults. No meaningful subgroup differences were observed by gender or neurodivergent status. Unwanted sexual content from an AI companion and time loss when using an AI companion were both associated with higher loneliness, higher social anxiety, greater eating disorder risk, and higher depressive symptoms.

Overall, the findings for young adults suggest that AI companion use, whether for emotional coping or as a context for negative experiences, is broadly associated with poorer mental health outcomes, with no mechanisms showing consistent beneficial associations. Associations were generally stronger among non-LGBTQA+ young adults, whilst neurodivergent young adults showed a particular sensitivity in the association between feeling connected to an AI companion and social anxiety.

Table 4.31. *Subgroup differences AI companion mechanisms and mental health* outcomes among 18-25

AI Companion Mechanism	Mental Health Outcome	LGBTQA+ Identity		ND Identity	
		Non-LGBTQA+	LGBTQA+	Non-ND	ND
Experiencing abuse from AI companion	Eating disorder risk	4.10*	0.59	—	—
Experiencing unhealthy behaviour from AI companion	Eating disorder risk	3.88*	0.21	—	—
Self-expression with AI companion	Depression	1.79*	0.50	—	—
Feeling connected with AI companion	Social anxiety	—	—	0.33	1.86*

Note. Numbers represent unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ND = neurodivergent. * p < .05, ** p < .01, *** p < .001.*

4.3.5.9 Correlations between AI generative mechanisms and mental health outcomes, and subgroup differences

Table 4.32 presents correlations between use of generative AI mechanisms and mental health outcomes. Given that generative AI was not assessed among adolescents, findings are reported for children and young adults only.

Table 4.32. *Correlation between AI generative mechanisms and mental health outcomes* across age groups.

AI generative	Age	Wellbeing	Loneliness	Depression	Generalised anxiety	Social anxiety	Body dissatisfaction	Eating disorder risk	Body esteem	Aggression	Self-concept clarity
Access Information	5 – 12	0.17	0.14	0.09	0.14	0.25	0.03	0.19	-0.21	-0.03	-0.21
	18 – 25	0.29***	-0.16*	-0.18*	-0.12	-0.04	-0.18*	-0.25**	0.22**	—	-0.08
Diverse exposure	5 – 12	0.22	0.17	0.21	0.27	0.28	0.09	0.15	-0.09	0.11	-0.32
	18 – 25	0.18*	-0.08	-0.07	-0.05	0.02	-0.17*	-0.21*	0.15	—	0.04
Trust information	5 – 12	-0.02	0.22	0.07	0.16	0.21	0.06	0.22	-0.15	-0.01	-0.48**
	18 – 25	0.16	-0.09	-0.03	0.06	0.07	-0.04	-0.05	0.12	—	0.05
Skill development	5 – 12	0.37*	-0.21	-0.03	-0.08	0.22	-0.18	0.03	-0.04	-0.21	-0.05
	18 – 25	0.24**	-0.24**	-0.19*	-0.12	0.01	-0.11	-0.15	0.23**	—	0.15

Note. * p < .05, ** p < .01, *** p < .001.

– Analysis could not be conducted due to low sample size or because the measure was not administered to that group.

Among children, generative AI use showed very limited associations with mental health outcomes, with most mechanisms not significantly associated with any tested outcome. Of the four mechanisms examined, accessing information and exposure to diverse views and opinions through generative AI were not significantly associated with any mental health outcome. The remaining two mechanisms each showed a single significant association: trusting information from generative AI was associated with lower self-concept clarity, whilst skill development through generative AI was associated with higher wellbeing — the only positive association observed across all generative AI mechanisms in this age group. Given the small number of parents who reported that their child used generative AI, no subgroup analyses were conducted, and these findings should be interpreted with caution.

The pattern of findings among young adults was notably more positive. In contrast to the 5–12 findings, greater engagement with generative AI mechanisms was broadly associated with better mental health outcomes. Using generative AI to access information was associated with lower eating disorder risk, body dissatisfaction, depression, and loneliness, as well as higher body esteem. Similarly, using generative AI for skill development was associated with higher wellbeing and body esteem, and lower loneliness and depression. Exposure to diverse content through generative AI was also associated with lower body dissatisfaction and lower eating disorder risk. Trusting information from generative AI, however, showed no significant associations with any of the tested mental health outcomes. Subgroup analyses (Table 4.33) revealed differences by gender, with no differences observed by LGBTQA+ identity or neurodivergence. Among gender-diverse young adults, both exposure to diverse content and using generative AI for skill development were associated with higher depressive symptoms, with no such associations observed among male or female participants.

Overall, the findings suggest a markedly different pattern of associations between generative AI use and mental health across the two age groups.

Table 4.33. *Subgroup differences between AI generative and mental health outcomes among 18-25*

AI Companion Mechanism	Mental Health Outcome	Gender		
		Female	Male	Gender-diverse
Exposure to diverse content via generative AI	Depression	0.06	0.46	5.33* GD≠M*
Skill development via generative AI	Depression	0.57	-1.01*	5.71* GD≠F*, GD≠M*

Note. Numbers represent beta unstandardised coefficients, reflecting the strength and direction of each association. Only mechanism–outcome combinations where at least one pairwise subgroup comparison was statistically significant are included. Colour coding indicates the direction and significance of associations within each subgroup: darker blue = significant positive association; lighter blue = non-significant positive association; darker orange = significant negative association; lighter orange = non-significant negative association. — indicates that no statistically significant pairwise difference was observed between subgroups for that mechanism–outcome combination and is therefore not reported. ≠

denotes a statistically significant pairwise difference between the two groups indicated (e.g. F≠M = significant difference between Female and Male; GD≠F* = significant difference between Gender-diverse and Female), where F = Female, M = Male, and GD = Gender-diverse. p < .05, ** p < .01, *** p < .001.*

4.3.5.10. Decision tree for AI generative mechanisms and mental health outcomes for 18-25

For young adults, the AI generative models did not produce decision trees for depression, social anxiety, body esteem, or body dissatisfaction, indicating that the AI mechanisms measured did not meaningfully distinguish higher from lower scores on these outcomes in this age group.

In contrast, for wellbeing, generalised anxiety, and eating disorder risk/symptoms, the decision trees consistently identified using AI generative tools to access information as an important mechanism. Young adults who reported using AI "quite a bit" or "very much" to access information (scores ≥ 4) had higher predicted wellbeing and lower generalised anxiety and eating disorder scores than those with lower endorsement (scores < 4).

For loneliness, using AI generative tools for skill development emerged as the key mechanism. Young adults who used AI at least "somewhat" for developing skills (scores ≥ 3) had lower loneliness scores than those who reported using it "a little" or not at all (scores < 3), suggesting that engaging with AI in a skill building way may be linked to feeling less lonely.

4.4. Discussion

This chapter investigated how children and young people in Australia interacted with digital technologies and how these experiences related to their mental health and wellbeing. It examined engagement with social media, gaming platforms, and emerging technologies such as artificial intelligence, considering both the positive and negative opportunities that these digital technology present presented.

4.4.1 Devices, screen time, app use, and mental health

Digital technology use was widespread across childhood, adolescence, and young adulthood, though patterns of engagement varied considerably by age, technology type, and the nature of use. Children were more likely to engage with tablets, gaming platforms, YouTube, educational content, and communication with known others. Adolescents and young adults, by contrast, increasingly used smartphones, social media, messaging platforms, internet forums, and AI tools.

Daily screen time was high across all cohorts and increased modestly with age, averaging 5.3 hours for children aged 5 to 12, 5.9 hours for adolescents aged 13 to 17, and 6.2 hours for young adults aged 18 to 25. Approximately 17% to 19% of all participants spent eight or more hours per day on digital devices. Despite these high levels of use, total screen time emerged as a generally weak predictor of mental health outcomes across all age groups. Platform-specific engagement and the quality of digital interactions proved to be more meaningful indicators of wellbeing.

When specific platforms were examined, some patterns emerged. Among children, YouTube use was the strongest predictor of negative outcomes, with TikTok use also associated with higher

loneliness and depression. For adolescents, gaming app use was the primary platform-level predictor, associated with higher depression and social anxiety, though also with higher body esteem. Among young adults, YouTube and Snapchat use were linked to poorer mental health outcomes, whilst internet forum engagement was associated with lower loneliness and depression, suggesting that more interactive and community-oriented forms of digital participation may carry a degree of protective value.

A consistent trend also emerged in the mental health data across age groups. Positive indicators such as wellbeing, body esteem, and self-concept clarity were highest in childhood and declined progressively through adolescence into young adulthood. Conversely, negative outcomes including loneliness and anxiety increased with age, with depressive symptoms showing a particularly substantial rise among young adults. Taken together, these findings underscored the importance of moving beyond simple screen time metrics and attending instead to what young people are doing online, on which platforms, and in what contexts, when seeking to understand the relationship between digital technology use and youth mental health.

4.4.2 Social media behaviours and mental health outcomes across developmental stages

The relationship between social media behaviours and mental health was complex, and the findings pointed to some meaningful differences across age groups and user characteristics. It is important to note, however, that given the cross-sectional nature of the data, these associations cannot be interpreted as causal. The findings indicate that certain behaviours co-occurred with poorer or better mental health outcomes, but the direction of these relationships remains unclear. Young people with pre-existing mental health difficulties may, for instance, be more likely to engage in certain online behaviours, rather than those behaviours causing harm. With this caveat in mind, the data suggested that outcomes were associated with the type of behaviour, the platform features involved, and the characteristics of the individual user, rather than reflecting a single, uniform pattern.

Among children aged 5 to 12, social media appeared to be used primarily for viewing content rather than creation or interaction. Passive viewing alone was not significantly associated with negative mental health outcomes in this age group, whilst more active behaviours showed stronger associations with poorer outcomes. Posting and commenting were associated with lower wellbeing, higher depression, and higher aggression. Notably, private messaging was also associated with lower wellbeing and body esteem in this younger cohort, a pattern that differed from older age groups where messaging tended to show more positive associations. Algorithmically recommended content was associated with higher loneliness, depression, and generalised anxiety, whilst content from accounts young people actively chose to follow showed no such associations.

Among adolescents, social media use appeared to become more socially and appearance-driven, and the pattern of associations shifted accordingly. Beauty filter use was consistently associated with poorer outcomes, correlating with higher generalised anxiety, social anxiety, and eating disorder risk. Engagement with likes and reactions was associated with higher generalised anxiety and lower body esteem, particularly among females, and passive viewing was associated with higher social anxiety. The associations with posting content were more

varied and differed considerably by subgroup. For the general adolescent population, posting was associated with higher loneliness and depression. For LGBTQA+ and neurodivergent adolescents, however, posting was associated with higher wellbeing and lower loneliness. Taken together, these correlational findings highlight the nuanced and specific ways in which distinct patterns of social media use are linked to both elevated and reduced mental health difficulties for different subgroups of youth during adolescence.

Among young adults, a divergence was observed between associations with public and private forms of engagement. Private messaging showed the most consistently positive associations, linked to higher wellbeing, lower loneliness, and reduced anxiety. In contrast, passive viewing and engagement with likes or reactions were associated with higher loneliness and social anxiety, beauty filter use was associated with poorer outcomes across multiple mental health domains, and exposure to algorithmically recommended content was associated with greater body dissatisfaction.

The experiences of LGBTQA+ and neurodivergent young people were a notable feature of the findings across age groups. For these groups, digital spaces appeared to offer opportunities for identity affirmation and social connection, and behaviours that showed negative associations in the broader population, such as posting or commenting, were often associated with more positive outcomes. The beneficial associations of private messaging were also most pronounced for LGBTQA+ and neurodivergent young adults, for whom it was linked to significantly lower loneliness.

These groups were not, however, without their own vulnerabilities in regard to digital technology. Gender-diverse young adults showed associations between beauty filter use and lower wellbeing. Among neurodivergent adolescents, engaging with content from accounts they actively followed was associated with higher social anxiety compared to their non-neurodivergent peers. Taken together, these findings underscored that marginalised young people occupy a dual position in digital spaces, one where affirming possibilities and distinct risks coexist.

4.4.3. Digital technology mechanisms and mental health

Among children aged 5 to 12, digital mechanisms were primarily associated with negative or neutral outcomes, with few protective factors identified. Across social media use, no tested mechanisms appeared associated with positive mental health for children. Feeling left out, distraction from other tasks, and exposure to unwanted sexual content were the most prominent mechanisms in regard to poor mental health, associated with lower wellbeing and higher depression and anxiety. Using social media for relaxation or escapism was also associated with poorer mental health in this age group, including higher generalised anxiety and eating disorder risk. Within gaming, escapism was the strongest predictor of negative outcomes such as anxiety and depression, and distress when unable to access games was the primary predictor of heightened aggression. Whilst parent reports linked gaming-related social connection to higher loneliness, children's own accounts suggested that a sense of community belonging was protective and associated with higher wellbeing. Regarding AI use, feeling connected and forming strong bonds with AI companions were linked to higher loneliness, higher social anxiety,

and eating disorder risks, and experiencing abuse or unwanted sexual content via AI showed the most consistent associations with poor mental health across all domains.

Among adolescents aged 13 to 17, mechanisms involving identity emerged as dominant predictors of wellbeing. In the context of social media, identity acceptance emerged as the most favourable mechanism among adolescents, strongly associated with higher wellbeing and lower depression. Conversely, experiencing bullying and feeling left out were the most recurrent predictors of loneliness and social anxiety, and social comparison and worry about being judged were key drivers of moderate-to-high eating disorder risk. Within gaming, negative social experiences were particularly harmful in this cohort. Experiencing bullying through gaming was associated with lower wellbeing, and higher loneliness, generalised and social anxiety, eating disorder risk, and depression. Witnessing attacks on others whilst gaming was similarly associated with higher loneliness, generalised and social anxiety, eating disorder risk, and depression. For AI use among adolescents, using an AI companion for relaxation was associated with higher loneliness and eating disorder risk, and lower body esteem. Exposure to dangerous ideas was also detrimental, associated with lower wellbeing and higher social anxiety, whilst trusting AI information showed a more mixed but relatively favourable pattern for self-concept clarity.

Among young adults aged 18 to 25, correlational patterns across social media, gaming, and AI use mechanisms revealed a consistent theme: the motivation and manner of engagement, rather than the technology itself, was most strongly associated with mental health outcomes. Across all three domains (i.e., social media, gaming and AI), escapism emerged as a key correlate of poorer mental health. Similarly, social evaluation concerns, such as worrying about being judged or feeling pressured to present oneself in a particular way on social media, further compounded these negative associations. In contrast, engagement driven by connection, identity, and growth was broadly associated with better mental health outcomes across all three technologies; social connection and positive support on social media, identity affirmation and community within gaming, and using AI to access information and develop skills were all correlated with higher wellbeing and lower loneliness. Overall, these correlational patterns suggest that how and why young adults engage with digital technologies may matter more for their mental health than the specific platforms they use.

Gender differences were evident across several mechanisms. Among adolescents aged 13 to 17, online bullying on social media showed a significantly stronger negative association with body esteem for males than for females. Among young adults, compulsive checking and feeling left out were more strongly correlated with depressive symptoms for males and gender-diverse young adults than for females. Subgroup analyses also indicated that these patterns often differed for neurodivergent and LGBTQA+ young people. Among neurodivergent adolescents, the association between identity acceptance and lower generalised anxiety was significantly stronger than among their non-neurodivergent peers, and teamwork-based gaming showed stronger links with lower social anxiety, loneliness, and generalised anxiety, as well as higher perceived social support. Among neurodivergent young adults, feeling connected to an AI companion was more strongly associated with social anxiety than among non-neurodivergent peers. For LGBTQA+ young people, identity freedom and acceptance in both gaming and social

media contexts were uniquely associated with lower eating disorder risk and lower loneliness among young adults. However, among LGBTQA+ adolescents, escapism on social media showed a stronger association with lower wellbeing than among their non-LGBTQA+ peers, and exposure to dangerous ideas through AI companions was more strongly associated with lower wellbeing and reduced self-concept clarity in this group.

4.4.4 Limitations

This chapter's finding should be interpreted in light of several limitations. First, the data are correlational and cross-sectional, so no causal conclusions can be drawn about the relationships between digital technology use and mental health. In particular, it is not possible to determine whether specific patterns of use contribute to poorer mental health, whether young people with existing difficulties are more likely to engage in certain ways, or whether other unmeasured factors underlie both digital behaviours and mental health outcomes.

Second, the measures of digital technology use relied primarily on self-report or parent-report, including estimates of time spent, the frequency of specific behaviours, and motivations for use. These reports are vulnerable to recall bias and social desirability effects and may not fully reflect actual usage patterns or exposure to particular types of content. Moreover, some constructs (e.g., escapism, identity affirmation, emotional reliance on AI) were assessed using relatively brief scales, which are unlikely to capture the full complexity and nuance of these experiences.

Finally, the digital environment is rapidly evolving, particularly in relation to AI tools and platform features and affordances (e.g., algorithms, autoplay, recommendation systems). As a result, the specific features, affordances, and mechanisms examined in this chapter may not fully generalise to future technological contexts or to platforms and features that emerged after data collection.

4.4.5 Conclusion

In conclusion, the relationship between digital technology and mental health among children, adolescents, and young adults is highly complex, shaped by what young people do online, why they do it, and the social and developmental contexts in which this use occurs. The same platforms and features can be associated with both risk and protection, particularly for neurodivergent and LGBTQA+ young people, making simple "good" or "bad" narratives about screen time or specific technologies inadequate. This complexity needs to be explored in greater depth in future research, and intervention and policy efforts that move beyond one-size-fits-all solutions to more targeted and more nuanced responses.

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4.6 Appendices

Appendix A: DigiT Project Nationally Representative Survey 18-25-year-olds

Instructions:

As you complete the survey, please answer as honestly as possible.

We ask that you don't use any Artificial Intelligence tools (like ChatGPT) or copy any text from elsewhere into the survey (spelling mistakes are fine!). It would also be helpful to have your most used device (phone or tablet)/your child's most used device (phone or tablet) with you while you do the survey.

The survey might also ask you questions to check that you are paying attention; these are not trick questions, don't worry! The survey will take around 20 minutes to complete.

Demographics

What is your age?

▼ 5 ... 70

[for parents of 5-12-year-old children only]

For the following questions, if you have more than one child aged between 5-12, please choose ***one child*** as the subject of this survey.

How old is your child?

▼ 5 ... 40

Skip To: End of Survey

If Please select How old is your Child? =!5-12 (not within 5-12)

Thank you for your interest in our survey.

Display if between 13–17:

You indicated that your child is aged 13–17. For this age range we request that the young person completes the survey themselves.

Please use the following link to pass on to your young person so they can complete the Expression of Interest Form: [Insert link here].

Display if less than 5:

At this time, the survey is not designed to assess children under the age of 5. Thank you for your interest.

Display if 18 or older:

As your child is 18 or older, we request that they complete the survey themselves.

Please use the following link to pass on to your young person so they can complete the Expression of Interest Form: [Insert link here].

If you have any questions or need assistance, please feel free to contact us at digitchyp@latrobe.edu.au

What is the postcode where you live?

_____

What is your genders?

- Man
- Woman
- Trans man
- Trans woman
- Non-binary
- Prefer not to say
- Prefer to specify _____

What is your country of birth?

_____

What is your cultural background?

- Australian - non-Aboriginal or Torres Strait Islander
- Aboriginal but not Torres Strait Islander
- Torres Strait Islander but not Aboriginal origin
- Both Aboriginal and Torres Strait Islander origin
- New Zealand Māori origin
- New Zealand non-Māori origin
- Melanesian and Papuan
- Micronesian

- Polynesian
- North-West European
- Southern / Eastern European
- North African / Middle-Eastern
- South-East Asian
- North-East Asian
- Southern and Central Asian
- North American
- South American
- Central American
- Caribbean Islander
- Sub-Saharan African

[for 18-25-year-olds only]

What is your sexuality or sexual orientation?

- Asexual
- Bisexual
- Gay
- Lesbian
- Pansexual
- Queer
- Straight or heterosexual
- Don't know
- Something else (please specify) _____
- Prefer not to answer

Do you identify as neurodivergent?

- Yes
- No
- Unsure

- [for self-report] Currently looking into getting a diagnosis

[Display if yes, identifies as neurodivergent]

Please share if you identify with any of the following (select all that apply):

- Autism
- ADHD
- Dyslexia
- Dyscalculia
- Developmental coordination disorder (DCD) – also known as dyspraxia

Digital Technology Use

Construct: Devices

Which devices do you regularly use?

For this survey, '**regular use'** means using a device **most days** in a typical week. If you are /your child is unable to use devices on some days because the device is unavailable or because of parental restrictions, please consider if use is regular on the days the device can be used

Device	**Select all devices used regularly**
Smart phone (e.g., Apple iPhone, Samsung Galaxy, Google Pixel)	○
Mobile phone – not a smart phone	○
Tablet (e.g., iPad, Samsung Galaxy Tab, Microsoft Surface Pro)	○
Laptop/computer	○
Gaming console (portable or fixed)	○
Television (broadcast or streaming)	○

Construct: platforms/technologies

Which types of platforms or technologies do you regularly use.

For this survey, '**regular use**' means using the platforms/technologies **most days** in a typical week.

Platform/Technology	**Select if used regularly**
Social media	○
[If yes to social media use]	
Instagram	○
TikTok	○
Snapchat	○
Facebook	○
YouTube	○
X (Twitter)	○
Messenger systems/apps, e.g., WhatsApp, Signal, Facebook Messenger	○
Gaming	○
	○
	○
	○
Artificial intelligence – chatbots for interacting with AI characters or companions (e.g., Replika, Character.ai, Grok)	○
Artificial intelligence – to generate text, images, and other content (e.g., ChatGPT, Claude, Gemini, Microsoft Copilot)	○
Interest-based forums, e.g., Reddit, Discord, for communities	○

IF YES Smart Phone OR social media– any type OR social media– image based OR short form video, or Messenger systems/apps

We would like to ask you to tell us about how much time you spend on your device and which apps you use.

To help with this, can you tell us which type of phone/tablet you have– this is your main personal device? (select one)

Type	**Yes**
iPhone	○
iPad	○
Android phone	○
Android tablet	○

	Yes	**No**
Do you have access to this device right now?	○	○

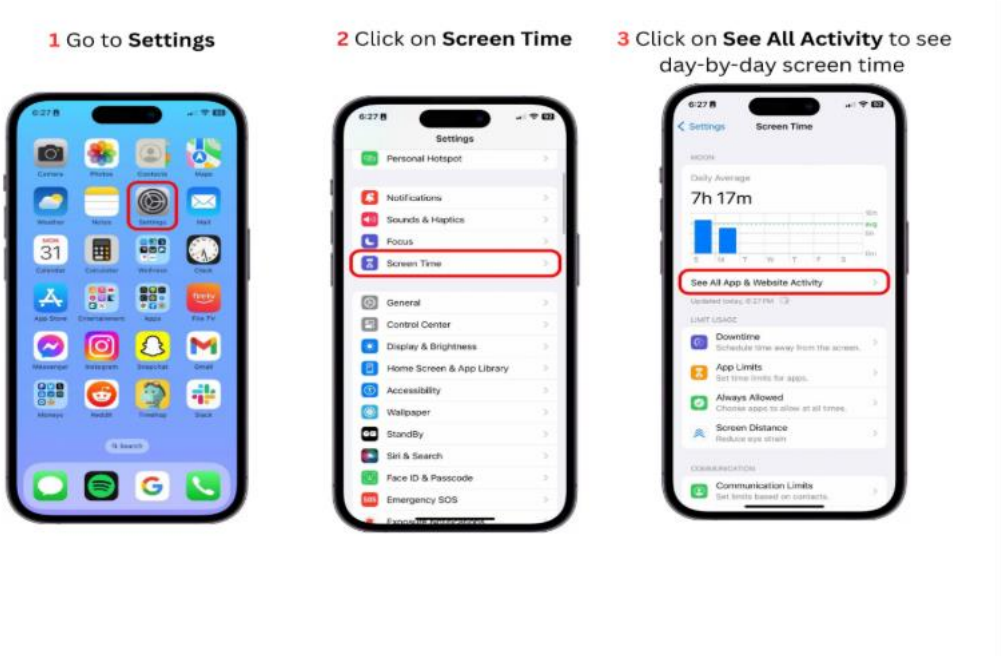
	Yes	**No**
Do you / does your child share this device with someone else, like a sibling or a partner?	○	○

[Display logic] For Apple iPhone/iPad

Please open your phone's Screen Time settings. To do this,

1. Open the Settings app
2. Tap Screen Time
3. Tap See All App & Website Activity
4. Tap Week (at the top of the screen) to show your weekly activity

The pictures below show how to access these settings.



[Display logic] For Android phones

Please open your phone's Digital Wellbeing settings. To do this,

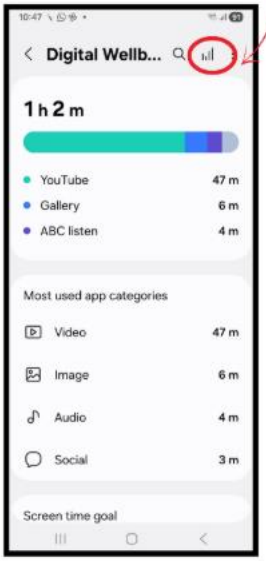
1. Open the Settings app
2. Tap Digital Wellbeing and parental controls
3. Tap the graph symbol to open your weekly report
4. Next, find your daily average screen time over the past week

The pictures below show how to access these settings.

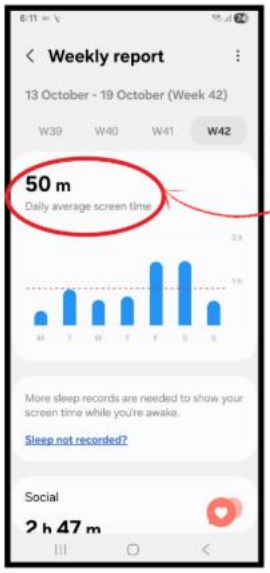
1 Open your device's **Settings**

2 Tap **Digital Wellbeing & parental controls.**

3 Tap the graph symbol to open your weekly report

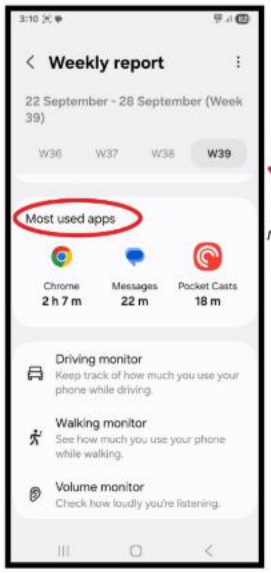


4. Next you can see your daily average screen time **over the past week**



This is your daily average screen time over the past week

5 Scroll down to see the **3 most used apps**



Here are the 5 most used apps.

Time spent on each app in hours and minutes

For both iPhone and Android phones and tablets

The next section is about your digital technology use. You can answer this section in two ways. Please select your preferred option:

☐ Manual entry only: I will type my answers manually

☐ Manual entry and screenshots: I will type my answers and also upload a screenshot.

What is your daily average screen time over the past week?

Hours _____

Minutes _____

Find the Most Used Apps. Please tell us the top 5 apps that you/your child spends time on and how many hours and minutes they were used in total over the last full week (past 7 days).

First: App name _____ Time (hours and minutes) _____

Second: App name _____ Time (hours and minutes) _____

Third: App name _____ Time (hours and minutes) _____

Fourth: App name _____ Time (hours and minutes) _____

Fifth: App name _____ Time (hours and minutes) _____

IF participant selects Both:

Please upload you phone screenshots. We need screenshots that show:

- Your daily average screen time over the past week
- The top 5 apps used, and total time spent on each over the past week
- **UPLOAD YOUR SCREENSHOTS HERE**

For manual recall [display if "don't have access to my / my child's device]

Please list the top 5 apps that you spend time on with your / your child spends time on with their personal device. For each app, estimate your/their average daily usage in hours and minutes for a typical week. Just do your best to estimate this as we know it is hard to be exact.

First: App name _____ Time (hours and minutes) _____

Second: App name _____ Time (hours and minutes) _____

Third: App name _____ Time (hours and minutes) _____

Fourth: App name _____ Time (hours and minutes) _____

Fifth: App name _____ Time (hours and minutes) _____

Construct: Type of content engaged with

IF YES social media use

When you are on social media, how much of your is spent...	None of the time	A little of the time	Some of the time	About half of the time	Quite a bit of the time	A lot of the time	All of the time
Viewing other people's content?	1	2	3	4	5	6	7
Actively posting content you created?	1	2	3	4	5	6	7
Publicly sharing content posted by someone else?	1	2	3	4	5	6	7
Messaging or chatting?	1	2	3	4	5	6	7

When you use social media...	None of the content	Very little	Some	About half	Quite a bit	A lot	All of the content
How much of the content you see is from people you follow (like your friends or favourite creators)?	1	2	3	4	5	6	7
How much of the content you see is recommended by the app? (e.g. trending videos or	1	2	3	4	5	6	7

suggested posts, rather than content from people you follow or are friends with)

When you are / your child is on social media...	Never	Rarely	Sometimes	About half the time	Often	A lot	Always
How often do you tap "Like" or use reactions on posts or videos?	1	2	3	4	5	6	7
How often do you comment on content?	1	2	3	4	5	6	7

When you post photos or videos of yourself on social media... ...	Not applicable, do not post photos	Never	Rarely	Some-times	About half the time	Often	A lot	Always
How often do you use beauty filters before posting the photo or video? (beauty filters are used to enhance attractiveness)		1	2	3	4	5	6	7
How often do you use special effects filters before posting the photo or video? (filters used for decoration or fun)		1	2	3	4	5	6	7

[Branching logic based on answers to question "Which types of platforms or technologies do you / does your child regularly use."]

On a typical weekday (Monday to Friday), how much time do you spend spend...	About half an hour or less	About 1 hour	About 2 hours	About 3 hours	About 4 hours	About 5 hours	About 6 hours	About 7 hours	About 8 hours or more

IF YES gaming (single-player/multi/educational/livestream or chat)

Gaming	○	○	○	○	○	○	○	○	○
IF YES long-form videos									
Watching long videos on YouTube or Streaming	○	○	○	○	○	○	○	○	○
IF YES Artificial Intelligence chatbots									
Talking with artificial intelligence chatbots/ companions for conversation or chatting?	○	○	○	○	○	○	○	○	○
IF YES Artificial Intelligence generative									
Using artificial intelligence (e.g., ChatGTP) to generate text, images, and other content (including for school, work, or other reasons)	○	○	○	○	○	○	○	○	○
IF YES internet forums for communities									
On interest-based forums like Reddit or Discord for communities	○	○	○	○	○	○	○	○	○

On a typical weekend day (Saturday to Sunday), how much time do you spend spend...	About half an hour or less	About 1 hour	About 2 hours	About 3 hours	About 4 hours	About 5 hours	About 6 hours	About 7 hours	About 8 hours or more
IF YES gaming (single-player/multi/educational/livestream or chat)									
Gaming	○	○	○	○	○	○	○	○	○
IF YES long-form videos									
Watching long videos on YouTube or Streaming	○	○	○	○	○	○	○	○	○

IF YES Artificial Intelligence chatbots									
Talking with artificial intelligence chatbots/ companions for conversation or chatting?	○	○	○	○	○	○	○	○	○

IF YES Artificial Intelligence generative									
Using artificial intelligence (e.g., ChatGPT) to generate text, images, and other content (including for school, work, or other reasons)	○	○	○	○	○	○	○	○	○

IF YES internet forums for communities									
On interest-based forums like Reddit or Discord for communities	○	○	○	○	○	○	○	○	○

IF YES gaming (single-player/multi/educational/livestream or chat)

When gaming, how much of your time is spent...	None of the time	A little of the time	Some of the time	About half of the time	Quite a bit of the time	A lot of the time	All of the time
Gaming by yourself (e.g., single-player games)	1	2	3	4	5	6	7
Gaming with other people (e.g., multiplayer games)	1	2	3	4	5	6	7
Playing educational games?	1	2	3	4	5	6	7
Gaming via live streaming and chat platforms, e.g., Twitch and Discord	1	2	3	4	5	6	7

Positive Mental Health

Wellbeing

Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS) (Stewart-Brown et al., 2009)

Below are some statements about feelings and thoughts. Please select the response that best describes your experience of each over the last two weeks.

	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

Identity

Identity Affirmation subscale of the Lesbian, Gay, and Bisexual Identity Scale (LGBIS) (Mohr & Kendra, 2011)

Original items

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
I am glad to be an LGB person	1	2	3	4	5	6
I am proud to be LGB	1	2	3	4	5	6
I'm proud to be part of the LBG community	1	2	3	4	5	6

Adaptations for this study

If responses to 'What gender do you identity as/What is your sexuality or sexual orientation' indicates participant is LGBTQA+
18-25-year-old participants

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
I am glad to be an LGBTQA+ person	1	2	3	4	5	6
I am proud to be LGBTQA+	1	2	3	4	5	6
I'm proud to be part of the LBGTQA+ community	1	2	3	4	5	6

Self-concept clarity

Single-item assessment (Schwartz et al., 2011) adapted from the Self- Concept Clarity Scale (Campbell et al., 1996)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
In general, I have a clear sense of who I am and what I am	1	2	3	4	5

Negative Mental Health

Loneliness

UCLA 3-item Loneliness Scale (Hughes et al., 2004)

Please select the response that best fits for you.

	Hardly ever	Some of the time	Often
How often do you feel that you lack companionship?	1	2	3
How often do you feel left out?	1	2	3

How often do you feel isolated from others?	1	2	3

Depressive Symptoms/Suicidality/Hopelessness

Patient Health Questionnaire {Kroenke, 2001 #15233}{Spitzer, 1999 #15234}

How often have you been bothered by the following problems over the **past two weeks**?

	Not at all	**Several days**	**More than half the days**	**Nearly every day**
Feeling down, depressed or hopeless	0	1	2	3
Little interest or pleasure in doing things	0	1	2	3
Trouble falling asleep, staying asleep, or sleeping too much	0	1	2	3
Poor appetite or overeating	0	1	2	3
Feeling tired or having little energy	0	1	2	3
Feeling bad about yourself - or that you are a failure, or have you let yourself or your family down?	0	1	2	3
Trouble concentrating on things like reading the newspaper or watching TV?	0	1	2	3
Moving or speaking so slowly that other people could have noticed?	0	1	2	3
Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?				
Thoughts that you would be better off dead, or of hurting yourself in some way?	0	1	2	3

Anxiety – general

Generalized Anxiety Disorder 2-item (GAD-2) (Kroenke et al., 2007)

Over the last 2-weeks, how often have you been bothered by the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious or on edge	0	1	2	3
Not being able to stop or control worrying	0	1	2	3

Anxiety – Social

Mini-SPIN (Social Phobia Inventory) (Connor et al., 2001)

Please read each statement and select the response that indicates how much the statement applied to you over the past week.

	Not at all	A little bit	Somewhat	Very much	Extremely
Fear of embarrassment causes me to avoid doing things or speaking to people	0	1	2	3	4
I avoid activities in which I am the centre of attention	0	1	2	3	4
Being embarrassed or looking stupid are among my worst fears	0	1	2	3	4

Disordered Eating

Screener for Eating Disorders (Bryant et al., 2024)

Please read each statement and select the response that indicates how much the statement applies to you

	Worry and stress free	**A bit problematic**	**Moderately problematic**	**Very problematic**	**Full of worry and stress**
How is your relationship with food?	1	2	3	4	5

For example: is food and eating worry free, or is it full of worry and stress.

	Never	**A little bit**	**Sometimes**	**Quite a bit**	**All the time**
Does your weight, body or shape make you feel bad about yourself? *For example: the number on the scale, the shape or your body or a part of your body.*	1	2	3	4	5
Do you feel like food, weight or your body shape dominates your life? *For example: experiencing constant thoughts about food, weight or your body.*	1	2	3	4	5
Do you feel anxious or distressed when you are not in control of your food? *For example: when others cook or prepare food or when you are eating out.*	1	2	3	4	5
Do you ever feel like you will not be able to stop eating or have lost control around food? *For example: feeling that you have no control around food, that you binge eat or fear that you will binge eat.*	1	2	3	4	5
When you think you have eaten too much, do you do anything to make up for it? *For example: skipping the next meal, going light on the next meal, working it off with exercise, purging via vomiting or taking laxatives, diuretics or diet pills.*	1	2	3	4	5

Body Dissatisfaction

Body dissatisfaction, overvaluation, and preoccupation items from the Eating Disorders Examination Questionnaire – Short (EDE-QS) {Gideon, 2016 #12277}{Prnjak, 2020 #14432}

On how many of the past 7 days...	**0 days**	**1-2 days**	**3-5 days**	**6-7 days**
Has thinking about your weight or shape made it very difficult to concentrate on things you are interested in (such as working, following a conversation or reading)?	0	1	2	3
Over the past 7 days...	**Not at all**	**Slightly**	**Moderately**	**Markedly**
Has your weight or shape influenced how you think about (judge) yourself as a person?	0	1	2	3
How dissatisfied have you been with your weight or shape?	0	1	2	3

Body Image

Items from the Appearance subscale of the Body Esteem Scale for Adolescents and Adults {Mendelson, 2001 #1862}

Please indicate how often you agree with the following statements

	Never	**Seldom**	**Sometimes**	**Often**	**Always**
I like what I see when I look in the mirror	0	1	2	3	4
I'm pretty happy about the way I look	0	1	2	3	4
I like what I look like in pictures	0	1	2	3	4

Aggression/Anger

PROMIS (Irwin et al., 2012; Pilkonis et al., 2011)

Self-report items

Over the past 7 days...	Never	Almost never	Sometimes	Often	Almost always
I felt mad	0	1	2	3	4
I was so angry I felt like yelling at somebody	0	1	2	3	4
When I got mad, I stayed mad	0	1	2	3	4
I felt fed up	0	1	2	3	4
I was so angry I felt like throwing something	0	1	2	3	4
I felt upset	0	1	2	3	4

Mechanisms

Please answer the following about your experiences and feelings when using digital technologies. Respond based on how true each of the following statements is for you.

Social media-related

IF YES to social media use

How true is each statement for you...	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much so**
I can be who I want to be on social media	1	2	3	4	5
I feel accepted for who I am on social media	1	2	3	4	5
I can access important information and resources through social media	1	2	3	4	5
I find it hard to take a break from social media	1	2	3	4	5
When I can't use social media, I feel anxious	1	2	3	4	5
I have been bullied on social media.	1	2	3	4	5

I have felt left out or ignored on social media.	1	2	3	4	5
I lose track of time scrolling social media	1	2	3	4	5
I use social media to relax or take a break when I feel stressed.	1	2	3	4	5
Social media offers me an "escape" from my life.	1	2	3	4	5
Using social media distracts me from doing other things in my life	1	2	3	4	5
Using social media interferes with my sleep	1	2	3	4	5
When using social media I have come across diverse content – like different ideas, people, or experiences	1	2	3	4	5
I worry about how others might judge me based on what I post on social media.	1	2	3	4	5
I worry about missing out on things if I don't stay active on social media.	1	2	3	4	5
I find social media entertaining	1	2	3	4	5
I have seen people being mean or attacking others in comments or videos on social media.	1	2	3	4	5
I have seen extreme social media challenges or dangerous trends.	1	2	3	4	5
It seems to me that people on social media are living amazing or perfect lives	1	2	3	4	5
Seeing how people look and act on social media helps shape how I want to be	1	2	3	4	5
I try to show the best version of myself when I post and interact on social media	1	2	3	4	5
I trust the information I see on social media	1	2	3	4	5
It seems to me that social media is full of divided or extreme opinions	1	2	3	4	5
I feel like I have to check social media often to keep up with what's going on.	1	2	3	4	5

I feel pressure to present myself in a certain kind of way on social media	1	2	3	4	5
I post things on social media (like my thoughts, interests, or creative work) to show who I am	1	2	3	4	5
I feel pressured to present myself in a sexualised way on social media.	1	2	3	4	5
I receive unwanted messages, comments, images, or videos that are sexual in nature on social media.	1	2	3	4	5
I have learned a lot from social media	1	2	3	4	5
I compare myself to others on social media	1	2	3	4	5
I learn about what is popular from social media	1	2	3	4	5
I have friends and social connections on social media	1	2	3	4	5
I have a positive support network on social media.	1	2	3	4	5
I can access support for my mental health and or wellbeing through social media	1	2	3	4	5

Gaming-related

IF YES gaming (single-player/multi/educational/livestream or chat)

How true is each statement for you...	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much so**
I can be who I want to be when gaming	1	2	3	4	5
I feel accepted for who I am when gaming	1	2	3	4	5
Through gaming, I have found a community where I belong	1	2	3	4	5
I find it hard to take a break from gaming	1	2	3	4	5
When I can't spend time gaming, I feel upset	1	2	3	4	5
I have been bullied while gaming.	1	2	3	4	5

I have felt left out or ignored while gaming.	1	2	3	4	5
I use gaming to relax or take a break when I feel stressed	1	2	3	4	5
Gaming offers me an "escape" from my life	1	2	3	4	5
Gaming distracts me from doing other things in my life	1	2	3	4	5
Gaming disrupts my sleep	1	2	3	4	5
Gaming is a fun way for me to relax or have a good time	1	2	3	4	5
I like pretending to be different characters when I play games (role-playing)	1	2	3	4	5
While gaming, I have seen people being mean or attacking others in chats or via messages.	1	2	3	4	5
I have learned new skills through gaming	1	2	3	4	5
I use teamwork when gaming with other people	1	2	3	4	5
Playing games makes me feel confident and in control	1	2	3	4	5
Gaming helps me feel connected with other people	1	2	3	4	5
I have a positive support network through gaming.	1	2	3	4	5

Artificial Intelligence Chatbot Companion-related

IF YES Artificial Intelligence chatbots companion

The next questions are about how you talk with AI chatbots/ companions for conversation or chatting, like you would with a friend. Here we are not talking about using AI for help with assignments or work, which we will do in the next section.

Please respond based on how true each of the following statements is for you.

How true is each statement for you...	Not at all	A little	Somewhat	Quite a bit	Very much so
I chat with an AI companion to relax or take a break when I feel stressed.	1	2	3	4	5
Chatting with an AI companion offers me an "escape" from my life.	1	2	3	4	5
Talking with an AI companion provides me with positive support	1	2	3	4	5
I feel connected with my AI companion	1	2	3	4	5
I have a strong bond with my AI companion	1	2	3	4	5
Talking with an AI companion has introduced me to diverse ideas or experiences	1	2	3	4	5
I trust the information I receive in chats with an AI companion	1	2	3	4	5
I share personal things with an AI companion (like my thoughts, interests, or creative work) to express who I am	1	2	3	4	5
I have felt pressured to talk in a sexualised way with AI companions.	1	2	3	4	5

How true is each statement for you...	Not at all	A little	Somewhat	Quite a bit	Very much so
While chatting with an AI companion...	1	2	3	4	5
I can be who I want to be	1	2	3	4	5
I feel accepted for who I am	1	2	3	4	5
I lose track of time	1	2	3	4	5
I have received mean or abusive comments from an AI companion.	1	2	3	4	5
I have come across extreme or dangerous ideas.	1	2	3	4	5
I have come across unhealthy behaviours (like extreme dieting or fighting), presented as being normal or cool.					

I have come across unwanted messages or comments that were sexual in nature

Generative Artificial Intelligence-related

IF YES Artificial Intelligence generative

The next questions are about your use of generative AI as a resource for help with assignments or work, or to generate text, images, or other content.

Please respond based on how true each of the following statements is for you.

How true is each statement for you...	**Not at all**	**A little**	**Somewhat**	**Quite a bit**	**Very much so**	**Don't know**
I can access important information and resources through generative AI	1	2	3	4	5	6
I have been introduced to diverse ideas, content, or experiences through generative AI	1	2	3	4	5	6
I trust the information I see on generative AI	1	2	3	4	5	6
Using generative AI helps me to develop skills	1	2	3	4	5	6

Parent report on 5-12-year-old children

IF YES Artificial Intelligence generative

The next questions are about your use of generative AI as a resource for help with assignments or work, or to generate text, images, or other content.

Please respond based on how true each of the following statements is for you.

How true is each statement for you...	Not at all	A little	Somewhat	Quite a bit	Very much so	Don't know
I can access important information and resources through generative AI	1	2	3	4	5	6
I have been introduced to diverse ideas, content, or experiences through generative AI	1	2	3	4	5	6
I trust the information I see on generative AI	1	2	3	4	5	6
Using generative AI helps me to develop skills	1	2	3	4	5	6

Open-ended Comments

18-25-year-old participants and Parent report on 5-12-year-old children

Please feel free to add any further comments about your use of digital technologies

Please feel free to add any additional comments on how using digital technologies impacts your mental health and wellbeing, either positively or negatively

Appendix B: Interview Protocol (Children aged 5-12 years)

Master Interview Protocol (Children aged 5-12 years)

In the interview, emojis and images will be used to facilitate children's understanding of concepts and to collect responses.

Confirm Child's Details and Assent

Interviewer introduces self: *Hi, I'm [name], I'm from La Trobe University*

Name: *What is your name? What do you like to be called?*

Age: *How old are you?*

Parent Present: *Who is there with you? Is it Mum, Dad, someone else? What do you call them?*

Assent: *Your [Mum/Dad/other] said it's okay for us to talk a bit about some of the things you like to play with (for younger children) / the digital technologies you use (for older children) and how you feel about yourself. There's no wrong answers to the questions; I just want to know what you think about games and apps and other technology*

Assent: *Is that okay with you?*

Yes ○ Proceed with interview

No ○ Terminate interview

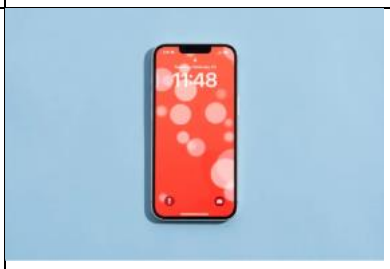
Digital Technology Use

Construct: Devices

I'm going to show you some things on the screen and name what they are. I'd like you to tell me if you use them or not.

[For each item] Do you know what this is? Do you use this (or something like this)? You can tell me or point to them and [Mum/Dad/Other] can tell me.

[Show images on zoom screen, say what they are and record 'Yes' to those devices/technologies child indicates using regularly (i.e., most days of week). If child's use is restricted on weekdays, record yes for regular use if technologies are used on both weekend days]

			Yes uses regularly	Not used regularly
Smart phone			○	○
Mobile Phone			○	○
Tablet			○	○
Laptop/ computer			○	○
Gaming consoles			○	○

TV			○	○

Construct: Platforms/technologies

I'm interested to know which you like the best. You can tell me or point to the picture and [Mum/Dad/Other] can tell me.

Which is your favourite? Which is your next favourite? Next...?

[presented as above, with images and researcher recording the following for those the child indicated they use regularly:]

Device	**Favourite: Rank order 1-...**
Smart phone	○
Mobile phone	○
Tablet	○
Laptop/computer	○
Gaming consoles	○
Television	○

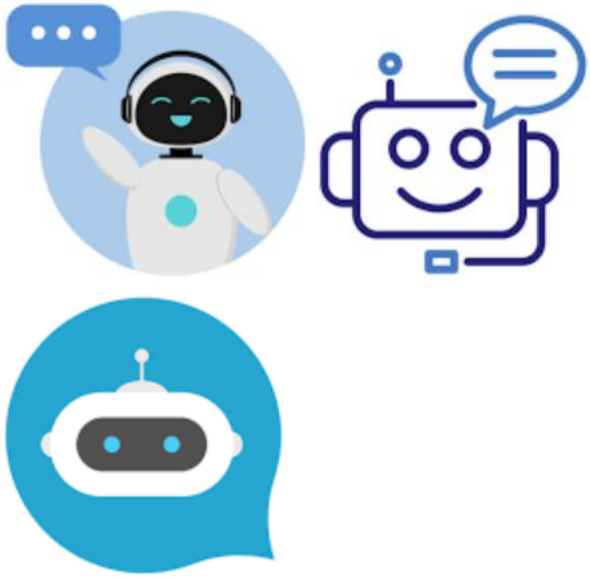
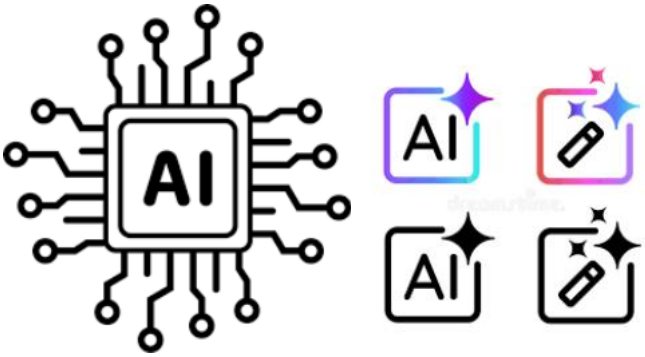
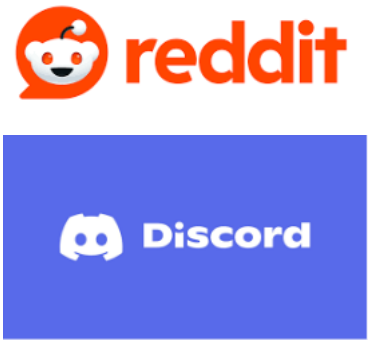
I'm going to show you some things. Do you know what these are?

Do you use them (or something like them)? You can tell me, or point to the ones you use and [Mum/Dad/Other] can tell me.

[presented similarly to above, with images, and with researcher recording whether or not the child uses regularly:]

Platform/Technology		Yes, uses regularly	Not used regularly
Social media – that's technology to create and share things or look at things other people post like photos and videos.		○	○
Long videos (like on YouTube, other streaming)		○	○

Messenger systems/apps (like WhatsApp, Signal, Facebook Messenger)		○	○
Gaming – playing by yourself or with other people for fun or to learn something(		○	○
Gaming you play which include chats with other people (like Twitch; Discord)		○	○

Artificial intelligence like chatbots for talking with AI characters/friends – like Replika, ChatGPT, Gemini, or Tal kiei [for interviewers, also Character.AI; Linky; DeepSeek, Meta AI; Muah.AI)		○	○
Artificial intelligence to create words, pictures, or other things – like ChatGPT, Claude, Co-Pilot, School Hack, Gemini		○	○
Forums or chat about things you're interested in (like Reddit, Discord for communities)		○	○

Construct: Type of content engaged with

IF YES Social Media use

I'm interested to know what you do with social media and how much time you spend doing different things. You can tell me or point to the picture and [Mum/Dad/Other] can tell me.

	Never	A little bit	A fair bit	Lots!

When you use social media, how much do you look at what other people put there, like other people's photos or videos?

○ ○ ○ ○

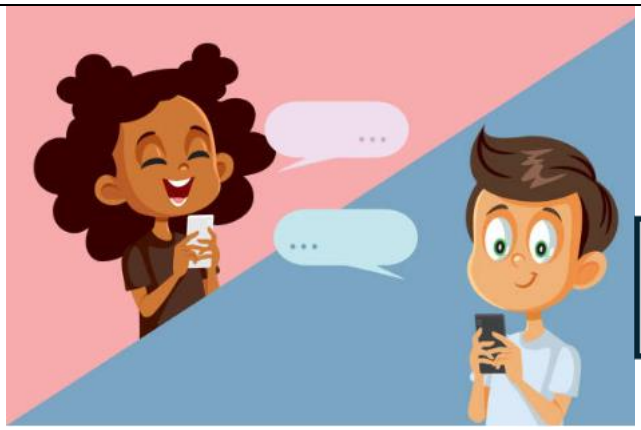
When you use social media, how much do you share things other people put there?

○ ○ ○ ○

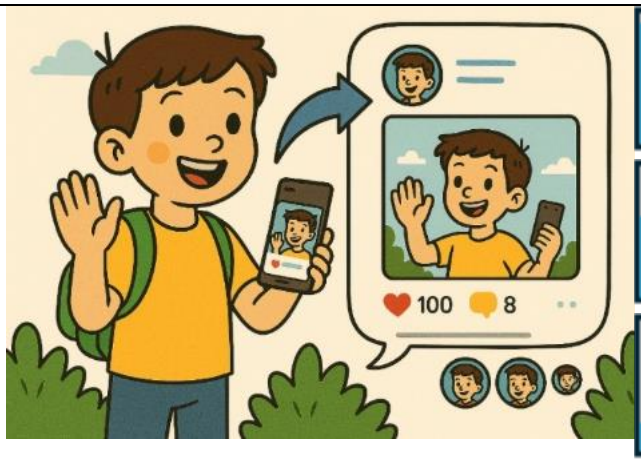
How much do you make things and put them on social media yourself? [prompt, like photos or videos]

○ ○ ○ ○

How much do you message or chat with other people on social media?



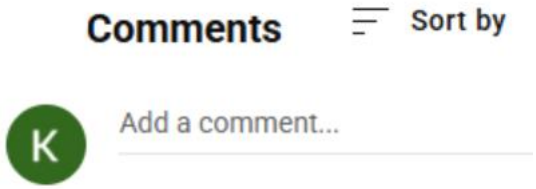
How much do you post photos or videos ***of yourself***?

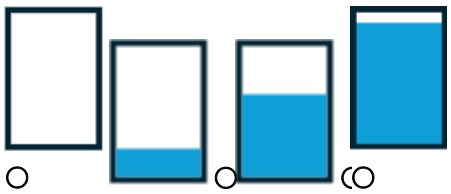


When you look at things on social media, do you:

	Never	A little bit	A fair bit	Lots!
Use reactions or "Likes"				

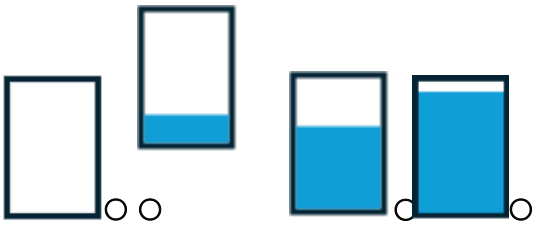
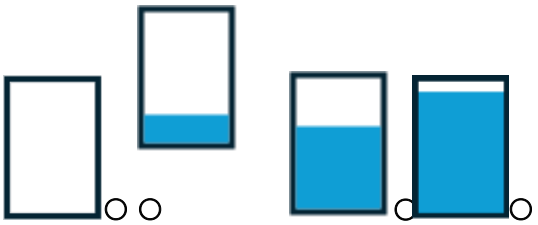
Write a comment about it





IF YES photo/video posting on social media When you post photos or videos of yourself (on social media), do you:

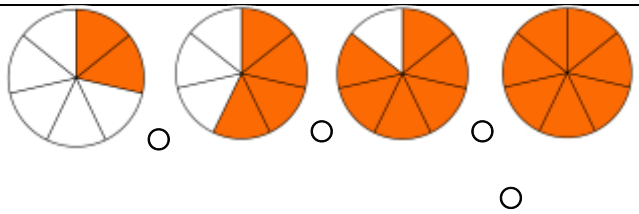
[presented similarly to above, with images, and with researcher recording child's response:]

	Never	A little bit	A fair bit	Lots!
Take a photo/video and post it like it is [Prompt] I mean post it without using any filters or edits				
Take a photo/video and edit it or add a filter before posting it				

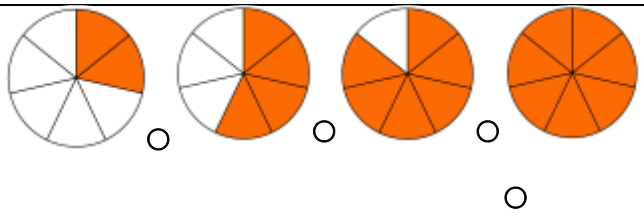
How do you edit or filter? (free text; or image examples)

For those platforms/technologies child indicated they do use, follow-up with each of...

If YES, long form videos. Can you think about when you watch longer videos (like full YouTube videos, TV shows, or movies)

How many days a week would you watch videos?	1-2 days	3-4 days	5-6 days	Everyday
PROMPT. Would you watch videos on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?				
STILL UNSURE. *Are you not sure? That's OK we can go to the next part*				

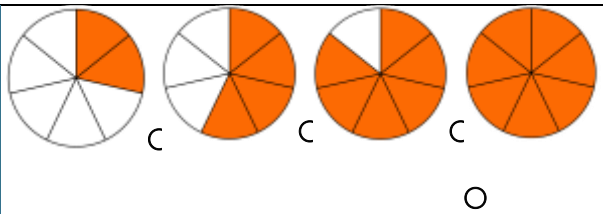
If YES using AI chatbots. Think about when you talk with AI chatbots or virtual friends (like a robot that chats with you online)

How many days a week would you talk with AI chatbots or virtual friends?	1-2 days	3-4 days	5-6 days	Everyday
PROMPT. Would you talk to chatbots on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?				
STILL UNSURE. *Are you not sure? That's OK we can go to the next part*				

If YES to using generative AI Think about when you use AI tools to create things (like making stories, pictures or videos)

How many days a week would you use AI tools to create things?	1-2 days	3-4 days	5-6 days	Everyday

PROMPT. Would you use generative AI on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?

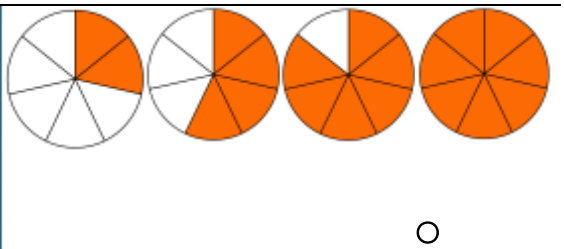


STILL UNSURE. *Are you not sure? That's OK we can go to the next part*

If YES to using online chat groups or communities. Think about when you visit online groups or communities (like Reddit or Discord) where people share and talk about their interests

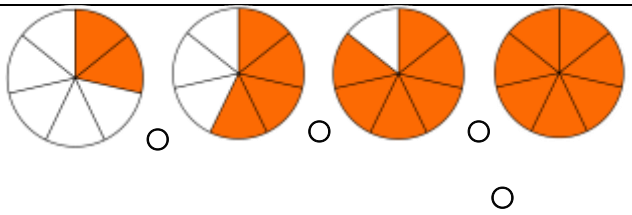
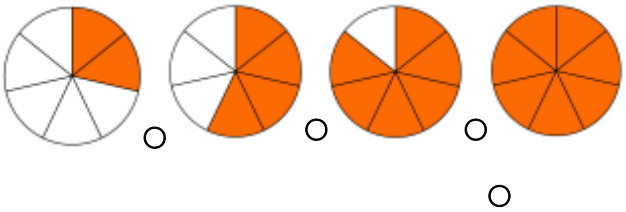
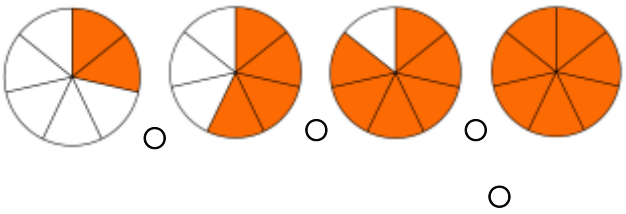
How many days a week would you go on these online chat groups or communities?	1-2 days	3-4 days	5-6 days	Everyday

PROMPT. Would you use generative AI on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?

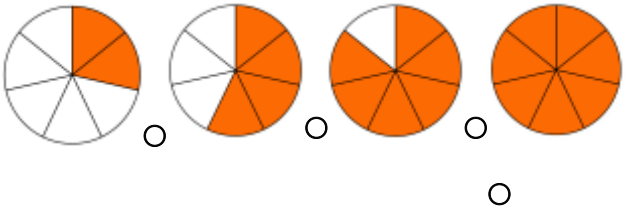


STILL UNSURE. *Are you not sure? That's OK we can go to the next part*

If YES to gaming (any form). Think about when you play video games.

How many days a week would you play video games...	1-2 days	3-4 days	5-6 days	Everyday
By yourself *PROMPT*. Would you play video games by yourself on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?				
With other people (like friends, siblings, adults) *PROMPT*. Would you play video games with other people on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?				
To learn something (educational) *PROMPT*. Would you play video games to learn something on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?				

Playing or watching games on live streaming platforms (like Twitch) or chatting about games on apps (like Twitch and Discord)?



PROMPT. Would you play or watch video games or chat about gaming on live streaming platforms on 1 or 2 days a week, 3 or 4 days a week, 5 or 6 days a week, or every day of the week?

Positive Mental Health

Wellbeing

Personal Wellbeing Index-School Children (PWI-SC) (Cummins & Lau, 2005)

You are doing a great job answering these questions. Thank you!

I'm interested to know how you feel about some things and whether you feel not at all happy, or very very happy, or somewhere in between. Can you answer the questions I ask by looking at these pictures/emojis and telling me the number that fits for you, or point to the picture and [Mum/Dad/Other] can tell me the number.

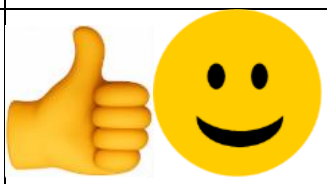
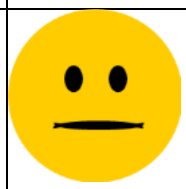
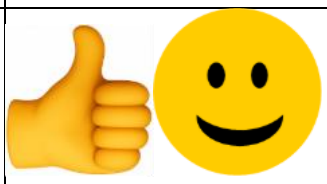
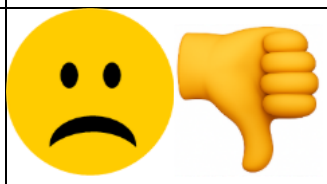
[same response option images from negative to positive for child to choose from with numbers beneath if child points and parent verbalises the answer. If children are unsure about these questions or their answer, interviewer will say *"Are you unsure, that's okay, let's move to the next one"*]

	Not at all Happy				Very very Happy
	1	2	3		5
How happy are you with your life as a whole?					
	0	1	2	3	4
How happy are you about the things you have?					
[Prompt] Like the money you have and the things you own?	0	1	2	3	4
How happy are you with your health?					
	0	1	2	3	4
How happy are you with the things you want to be good at?					
	0	1	2	3	4
How happy are you about getting on with the people you know?					
	0	1	2	3	4
How happy are you about how safe you feel?					
	0	1	2	3	4
How happy are you doing things away from your home?					
	0	1	2	3	4
How happy are you about how your life will be when you get older?					
	0	1	2	3	4

Negative Mental Health

Loneliness

I am interested in how you feel with your friends and family. Can you answer the questions I ask by looking at these emojis and telling me the number that fits for you, or point to the picture and [Mum/Dad/Other] can tell me the number

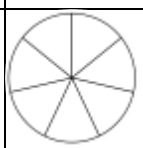
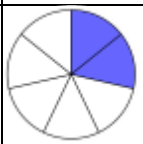
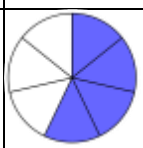
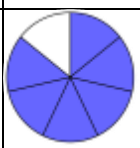
	No	Sometimes	A lot of the time
Do you ever feel left out of things with your friends or family?	 1	 2	3
Do you ever feel like you're all alone/by yourself, even when you are around your friends or family?	 1	2	 3

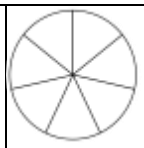
Depressive Symptoms/Hopelessness

2-item PHQ and The General Hopelessness Scale (one item; reverse coded)

I am interested in how you feel in yourself and how often you feel that way.

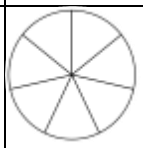
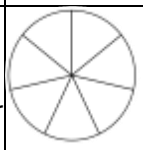
the following problems, recently?

	Not at all	Several days	More than half the days	Nearly every day
Have you had little interest or fun in doing things [If yes] How often have you felt like that?	 0	 1	 2	 3

Have you felt sad/down, depressed [If yes] How often have you felt like that?	 0	 1	 2	 3

Anxiety – general

Generalized Anxiety Disorder 2-item (GAD-2) (Kroenke et al., 2007)

	Not at all	Several days	More than half the days	Nearly every day
Recently, how often have you felt nervous, anxious, or worried	 0	 1	 2	 3
Recently, how often have you had trouble stopping or controlling your worrying	 0	 1	 2	 3

Anxiety – Social

Mini-SPIN (Social Phobia Inventory) (Connor et al., 2001)

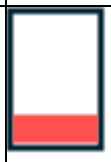
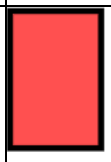
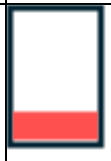
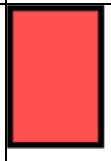
These next questions are about how you have been feeling over the past week.

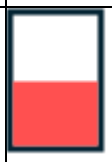
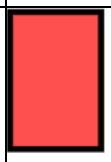
	Not at all	A little bit	Somewhat	Very much	Extremely
How much has worry about what other people think of you, or about looking silly to others made you avoid doing thing or talking to people					

	0	1	2	3	4
How much have you avoided doing things where you are the centre of attention [Prompt] like when everyone is watching you	 0	 1	 2	 3	 4

Aggression/Anger

PROMIS (Irwin et al., 2012; Pilkonis et al., 2011) (Kaman et al., 2022)

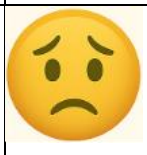
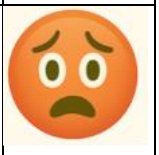
	Never	Almost never	Sometimes	Often	Almost always
Over the past week, have you felt mad [Prompt] or felt angry	 0	 1	 2	 3	 4
Over the past week, have you been so angry that you felt like yelling at someone					

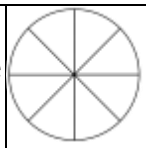
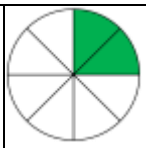
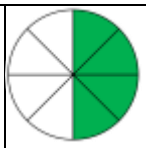
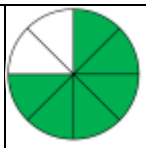
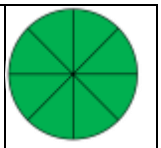
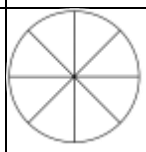
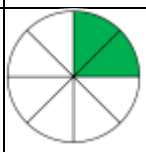
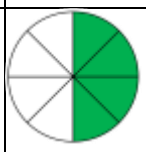
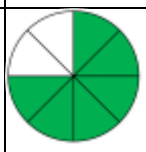
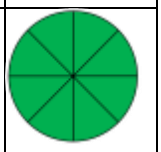
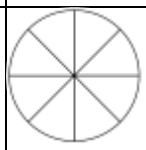
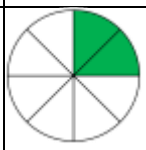
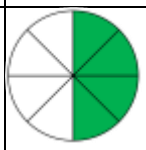
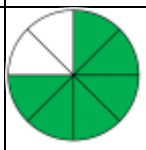
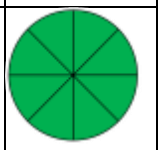
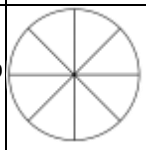
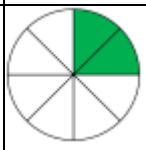
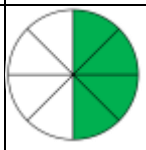
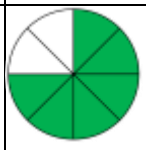
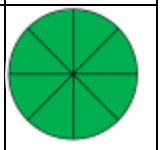
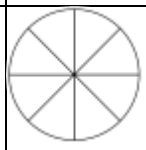
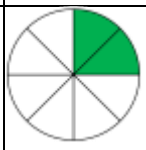
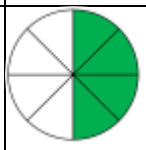
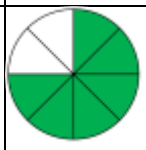
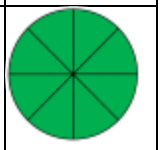
	0	1	2	3	4
Have you been so angry you felt like throwing something	0	1	 2	3	 4

Disordered Eating

Screener for Eating Disorders (Bryant et al., 2024)

The next questions ask about your eating

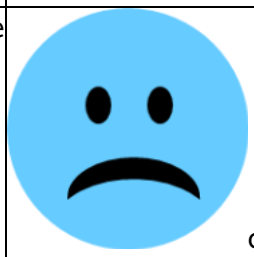
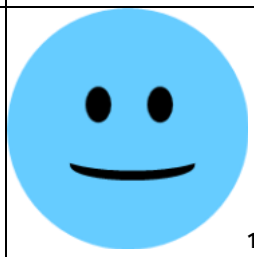
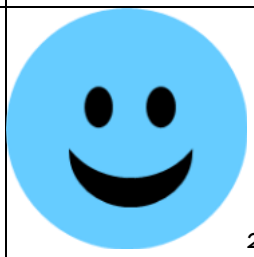
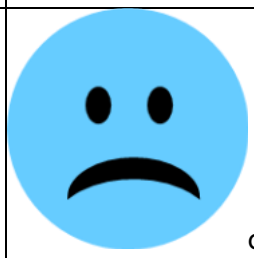
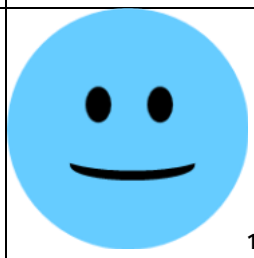
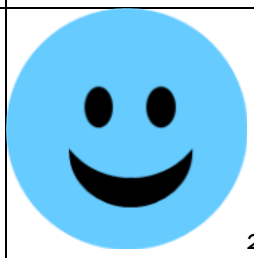
	Worry and stress free **1**	**A bit worried** **2**	**Quite worried** **3**	**Very worried c** **4**	**Full of worry and stress** **5**
I want to ask about how you feel about food and eating. Do you worry about food and eating or do you feel relaxed and comfortable about food and eating.					
	Never	**A little bit**	**Sometimes**	**Quite a bit**	**All the time**

Does your body size or shape or how much you weigh make you feel bad about yourself? *[Prompt] For example: the shape or your body or a part of your body.*	 1	 2	 3	 4	 5
Do you think a lot about eating or about how you look? *[Prompt] For example: having lots of thoughts about food, or your body or a part of your body.*	 1	 2	 3	 4	 5
Do you feel worried or upset when you can't choose what you get to eat or how much you can eat? *[Prompt] For example: when someone different cooks or prepares food for you or when you eat at a restaurant or someone elses house.*	 1	 2	 3	 4	 5
Do you ever feel like you eat lots of food and you can't stop eating?	 1	 2	 3	 4	 5
If you ever feel like you have eaten too much, do you stay away from food after that?	 1	 2	 3	 4	 5

Body Image

Items from the Appearance subscale of the Body Esteem Scale for Adolescents and Adults {Mendelson, 2001 #1862}

I am interested in how you feel about how you look

	No	**Sometimes**	**Yes**
How happy are you with the way you look	 0	 1	 2
Do you like what you look like in pictures	 0	 1	 2

Mechanisms

Thanks so much for answering all of those questions. I want to ask you now about how you use different digital technologies and how they make you feel or what you do with them. Is it okay if we keep going for a bit?

[Interview to proceed if the child assents and still appears to be engaged and attentive. If not, interview to cease at this point]

Item responses will be collected on a three-point Likert-type scale with emojis/icons to facilitate responding.

1 = not at all true

2 = a bit true;

3 = very true

Social Media Use Questions

IF YES to social media use

I am going to ask about how you use social media –thinks like TikTok, YouTube, Instagram and Snapchat – and can you please tell me how true those things are for you. You can tell me if the things I say are not at all true, a bit true, or very true for you.

	Not at all true (1)	A bit true (2)	Very true (3)
Do other people accept you for who you are on social media? [Alternate if the first question is not understood] Can you be yourself on social media?			
If you can't use social media, do you feel anxious? [Alternate if the first question is not understood] When you use social media, do you find it hard to stop and take a break?			
Have you been bullied on social media?			
Have you felt left out or ignored on social media?			
When you use social media do you lose track of time?			
Do you use social media to as an "escape" from other things in your life? [Alternate if the first question is not understood] Do you use social media to relax if you feel upset or stressed?			
Does social media distract you from doing other things (like being with friends, doing school work, or doing other activities?			

Does using social media disrupt your sleep?			
Is using social media fun for you?			
How much do you see new and different stuff on social media, like different ideas or different people?			
How much do you worry that you will miss out on things if you don't stay active on social media?			
Have you seen people being mean to other people on social media?			
Do you want to look and act like people you see on social media?			
Do you feel like you have to check social media often to keep up with what's going on?			
Do you compare yourself to others on social media?			
Do you have friends on social media?			

Gaming questions

IF YES to using gaming

I am going to ask you some things about gaming and would like you to tell me how true those things are for you.

Can you please tell me if the things I say are not at all true, a bit true, or very true for you:

	Not at all true (1)	A bit true (2)	Very true (3)
Do other people accept you for who you are when you are gaming? [Alternate if the first question is not understood] Can you be yourself when you are gaming?			
Do you feel like you belong with your gaming friends?			
When you are gaming, do you find it hard to stop and take a break?			
When you can't spend time gaming, do you feel upset?			
Have you been bullied while gaming?			
Have you felt left out or ignored while gaming?			
How much does gaming offer you an escape from other things? [Alternate if the first question is not understood] Do you use gaming to relax if you feel upset or stressed?			
How much does gaming get in the way of doing other things (like being with family, doing school work, or doing other activities)?			
Does gaming disrupt your sleep?			

How much is gaming a fun way to relax or have a good time?			
How much do you like pretending to be different characters when you play games (role-playing)?			
How much does gaming help you feel connected with other people?			
How much does playing games makes you feel confident about yourself?			

Artificial Intelligence Companion Questions

IF YES to using Artificial Intelligence chatbot/companion

I would like to ask you some questions about when you talk to an AI chatbot companion. Can you please tell me if the things I say are not at all true, a bit true, or very true for you

	Not at all true (1)	A bit true (2)	Very true (3)
Do you feel accepted for who you are when you are talking with an AI companion? [Alternate if the first question is not understood] How much can you be who you want to be when talking with an AI companion?			
How much do you lose track of time when talking with an AI companion?			
Does chatting with an AI companion offer you an escape from other things?			

[Alternate if the first question is not understood] Do you chat with an AI companion to relax if you feel upset or stressed?			
Does talking with an AI companion help you feel supported?			
Do you feel connected with your AI companion?			
Have you had mean comments from an AI companion?			
Have you felt pressured to talk with an AI companion in a way that makes you feel uncomfortable?			

Close

Thank you for talking with me about all the different ways you use digital technology. Is there anything else you want to tell me that I haven't asked?

Thanks again, you have been so helpful today and I really appreciate all the different information you shared about the way you use technology and how you feel about yourself.

Appendix C: Percentage of Children, Adolescents, and Young Adults for Whom Mechanisms were Endorsed as 'Not at all true for me'

	Percent of participants endorsing the mechanism as 'not at all true for me'		
Mechanism	**Children**	**Adolescents**	**Young adults**
Positive Social Media Mechanisms			
Freedom to express oneself on social media	21.8		12.0
Acceptance of identity on social media	16.9	2.6	9.9
Using social media to access information	7.6	7.8	5.2
Using social media for relaxation	9.0	4.2	5.8
Using social media to escape from life	34.2	18.3	16.9
Exposure to diverse content on social media	5.1	3.9	3.9
Using social media for entertainment	1.3	1.6	2.5
Using social media for general learning	7.6	—	5.2
Using social media to learn about what is popular	3.8	5.2	4.9
Social connections on social media	21.5	6.2	6.4
Positive support on social media	23.1	10.1	14.0
Mental health support on social media	45.6	22.0	23.0
Posting to express oneself on social media	62.0	46.6	41.6
Negative Social Media Mechanisms			
Anxiety from not accessing social media	41.8	47.4	51.5

Experiencing bullying on social media	69.6	65.9	70.3
Feeling left out on social media	60.8	57.2	53.2
Loss of time scrolling on social media	11.4	8.8	8.0
Social media being a distraction from other tasks	16.5	16.3	13.2
Social media interfering with sleep	48.1	30.4	24.8
Worrying about being judged on social media	53.8	31.0	21.3
FOMO from social media	41.8	30.4	29.3
Seeing people attack others on social media	21.8	6.9	2.9
Seeing extreme trends on social media	30.4	16.0	14.8
Perception of the perfect life on social media	21.5	25.9	20.4
Social media influencing self-image	22.8	22.9	22.9
Showing one's best version on social media	46.8	—	15.5
Trusting information from social media	11.5	17.3	20.0
Exposure to extreme opinions on social media	28.2	6.5	2.9
Compulsive checking of social media	41.8	16.7	18.8
Pressure to present oneself in a certain way on social media	57.0	—	33.8
Pressure to present oneself in a sexualised way on social media		—	76.1
Difficulty taking breaks from social media	25.3	—	19.2
Receiving unwanted sexual content on social media	75.6	58.2	61.0

Comparing to others on social media	46.8	26.1	18.1
Gaming Mechanisms	**Percent endorsing (5-12)**	**Percent endorsing 1 (13-17)**	**Percent endorsing 1 (18-25)**
Freedom to express oneself when gaming	12.4	—	8.3
Feeling accepted when gaming	11.3	4.2	6.4
Sense of community belonging through gaming	37.2	18.4	23.4
Using gaming for relaxation when feeling stressed	17.0	5.8	3.0
Using gaming to escape from life	28.2	15.8	7.2
Gaming as a fun way to relax	2.3	2.2	1.5
Using gaming to learn new skills	6.2	6.2	7.5
Using teamwork while gaming	15.5	5.8	10.2
Feeling confident and in control from gaming	11.6	8.0	11.7
Feeling socially connected with others from gaming	20.9	8.5	17.7
Positive support through gaming	25.2	12.3	21.5
Role-playing when gaming	28.5	35.7	29.8
Difficult to take breaks from gaming	24.5	34.7	41.5
Feeling upset when unable to game	28.6	42.8	52.1
Experiencing bullying when gaming	77.9	60.3	63.4
Feeling left out when gaming	68.2	57.8	57.4
Gaming being a distraction from other tasks	18.1	21.0	12.1
Gaming disrupting sleep	65.6	47.1	38.5
Seeing people attack others when gaming	60.2	22.3	22.3
AI Companion Mechanisms	**Percent endorsing 1 (5-12)**	**Percent endorsing 1 (13-17)**	**Percent endorsing 1 (18-25)**

Freedom to express oneself with AI companion	20.0	—	29
Feeling accepted by AI companion	24.0	52.1	28
Using AI companion for relaxation	60.0	64.9	57
Using AI companion to escape from life	60.0	67.6	60
Positive support from AI companion	50.0	45.8	41
Trusting information from AI companion	22.2	38.9	28
Exposure to diverse perspectives through AI companion	34.6	56.2	41
Self-expression with AI companion	54.2	63.5	44
Forming a strong bond with AI companion	76.0	73.2	66
Feeling connected to AI companion	60.0	69.0	65
Loss of time when using AI companion	51.9	69.0	63
Experiencing unhealthy behaviour from AI companion	83.3	—	84
Experiencing dangerous ideas from AI companion	80.0	82.2	79
Experiencing abuse from AI companion	91.7	87.5	87
Receiving unwanted sexual content from AI companion	95.7	80.6	88
AI Generative Mechanisms	**Percent endorsing 1 (5-12)**	**Percent endorsing 1 (13-17)**	**Percent endorsing 1 (18-25)**
Accessing information through generative AI	14.3	—	5.3
Trusting information from generative AI	13.8	—	14.7
Exposure to diverse perspectives through generative AI	6.9	—	13.3

Skill development through generative AI	14.3	—	10.7

Chapter 5.

Legislative and Policy Review

Chapter 5. Legislative and Policy Review

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5.1 Purpose and Scope of the Legislative and Policy Review

This chapter presents a legislative and policy review examining regulatory responses to children and young people's digital technology use, with a particular focus on mental health and wellbeing outcomes. The review forms Component 2 of the broader project, *Digital Technology Experiences of Children and Young People*.

The review addresses the following core research question:

> What policy or legislative responses are being used internationally to promote the positive effects of digital technology use, and to mitigate its negative effects, on the mental health and wellbeing of children and young people?

Two sub-questions are also addressed:

1. What are the outcomes of policy or legislative responses in changing practices or supporting mental health and wellbeing?
2. Have any unintended – positive or negative – consequences arisen from policy/legislation implementation?

To answer these questions, the chapter draws together findings from a staged comparative socio-legal analysis (Parts 1 and 2) and a rapid review of evaluative evidence (Part 3). While Parts 1 and 2 focus on mapping and comparing regulatory frameworks, Part 3 critically examines the extent to which these legislative and policy interventions have been empirically evaluated, and what is currently known about their impacts – both intended and unintended – on children and young people's mental health and wellbeing.

5.1.1 Jurisdictional Focus

The chapter focuses on Australia, the United Kingdom (UK), Canada, and New Zealand, with reference to notable developments in other jurisdictions, including the European Union (EU) and selected states within the United States of America (USA). The primary countries considered share common law legal traditions and high-income status which make them appropriate comparators.

The analysis focuses on national-level legal and policy regimes (though considers state- and territory-level frameworks where relevant), including institutional design and governance arrangements. The analysis considers how responsibilities are allocated across relevant regulatory bodies, without seeking to map all institutional interactions exhaustively.

5.1.2 Refining the focus of the review

Given the breadth of digital technologies and the diversity of government responses, this chapter does not attempt to catalogue or evaluate all measures that may affect children and young people's digital experiences.

Part 1 of the chapter maps the broader landscape of law and policy relevant to children and young people's digital technology use and develops an analytical framework for comparison. This includes identifying different domains of government action, distinguishing between 'soft' and 'hard' regulatory approaches, and adopting a harms-and-benefits lens to interpret regulatory objectives.

Building on this framework, Parts 2 and 3 refine the focus of the review to remain within the project scope while addressing the most legally and policy-significant forms of intervention. In particular, the chapter concentrates on regulatory approaches that are grounded in formal legal frameworks, involve clearly defined institutional responsibilities, and represent the principal mechanisms through which governments seek to shape digital technologies (particularly online platforms) and children's access to them. This sequencing reflects the structure of the available literature: while legal and institutional frameworks lend themselves to comparative analysis, the empirical evidence evaluating their effects is uneven, fragmented, and frequently indirect, as demonstrate in Part 3.

5.1.3 Structure of the chapter

Part 1 establishes the conceptual and methodological foundations of the review. It sets out the main domains of government action and explains the analytical choices that shape the comparative analysis.

Part 2 applies this framework through a comparative socio-legal analysis of platform regulation, regulatory powers, and age-based restrictions across selected jurisdictions.

Part 3 presents a rapid review of empirical and evaluative literature examining what is currently known about the effects of these interventions on children and young people's mental health and wellbeing.

Together, these parts provide a structured account of how governments are seeking to regulate digital technologies in ways that mitigate risks and preserve benefits for children and young people, while also highlighting the current evidence (including its limits) and the challenges inherent in regulating rapidly evolving digital environments.

Part 1

5.2 Framing the Review: What is Being Examined and Why

In Part 1 of the chapter, detailed here, we clarify how governments intervene in children and young people's engagement with digital technologies, and how those interventions can be meaningfully compared across jurisdictions.

Governments do not regulate digital technology through a single legal regime. Instead, they deploy a mix of legal, regulatory, and policy tools across various laws and institutions.

The analysis is structured around:

- Three core domains of government action: platform regulation, age-based restrictions, and education and information-sharing.
- A spectrum of 'soft' to 'hard' regulatory approaches.
- A harms-and-benefits lens for interpreting regulatory objectives.

These lenses provide a *functional* framework for organising the comparative and evaluative analysis that follows.

5.3 Methods

Part 1 involved a 'mapping' and analysis of existing and proposed laws, regulations, statutory instruments, regulatory codes, and authoritative policy documents relevant to children and young people's digital technology use. This includes examining major government inquiries into children and young people's use of digital technology (e.g. Australian Competition and Consumer Commission, 2025; Fraser, 2024; Woodhouse, 2025). Empirical and evaluative evidence relevant to these regulatory approaches is examined separately in Part 3.

This approach can be characterised as socio-legal research, which considers law in its social, institutional, and policy context (Banakar & Travers, 2005). It also includes doctrinal legal research, which analyses existing laws and seeks to clarify what the law is (Hutchinson & Duncan, 2012).

Analysis involved 1) refining the scope by identifying the principal areas of government action most directly relevant to children and young people's mental health and wellbeing regarding digital technology, 2) prioritising relevant legal and policy frameworks for comparison, and 3) synthesising key regulatory approaches and emerging trends.

This mapping and comparative analysis provides the legal and institutional context necessary for interpreting evaluative findings. These methods allow the chapter to distinguish between regulatory intent, formal design, and what can (and cannot) currently be demonstrated about regulatory outcomes in practice.

5.4 'Soft' and 'Hard' Regulatory Approaches

Government policy instruments can be categorised as sitting on a spectrum of 'soft' to 'hard' regulation depending on the level of authoritative force they have (Blomqvist, 2022; Hagemann, Huddleston, & Thierer, 2018). Soft approaches include education, guidance, voluntary codes, and information campaigns. Hard approaches include enforceable legal duties, penalties, mandatory age restrictions, and content takedown powers.

In practice, governments employ combinations of soft and hard measures rather than relying on a single regulatory tool.

5.5 Focus on Harms and Benefits

To compare law and policy meaningfully, there must be some shared understanding of the harms to be prevented and the benefits to be promoted. Law is generally designed to address 'mischief' or harm, though it can also be developed to maximise broader social benefits. In the present review, regulatory responses are therefore analysed with regard to:

- Harms such as bullying, exploitation, exposure to harmful content, and excessive or compulsive use.
- Benefits such as social connection, learning, creativity, self-expression, and access to support.

Analysing regulation through a harms-and-benefits lens also directs attention to possible unintended consequences, including the displacement of risk, over-restriction, or impacts on

autonomy and access to support. The extent to which such consequences have been identified – or overlooked – in empirical studies is examined in Part 3.

5.5.1 Harms

Law and policy frameworks tend to focus more on preventing harm than on actively promoting benefits. This reflects the problem-oriented nature of law.

Governments do not always frame their interventions explicitly in mental health terms. Instead, policy responses tend to focus on more concrete or socially legible categories of online harm, such as preventing cyberbullying or the curtailing distressing content. Such measures tend to indirectly address mental health consequences such as anxiety, distress, or self-harm that can result from cyberbullying or viewing harmful content, even though such negative consequences are not explicitly articulated as targets of the legislative or policy response (e.g. Strickland & Dent, 2017; Fraser, 2024; Parliament of the Commonwealth of Australia, 2024). However, promoting mental wellbeing and preventing mental ill-health are increasingly forming part of the rationale for legal and policy responses to regulating digital technologies for young people (House of Commons Education Committee, 2024, pp.11-13; Joint Select Committee on Social Media and Australian Society, 2024, paras. 3.120-3.202).

Canadian and New Zealand law and policy reform efforts have explicitly drawn on a typology of harm when designing their law and policy response to children and young people engaging with online technologies, which was developed by the "Children Online: Research and Evidence (CO:RE)" or CO:RE consortium. The consortium comprises of more than 30 experts from 10 partnering institutions in 9 European countries. The CO:RE typology refers to 'the 4 C's'.

The new CO:RE 4Cs classification recognises that online risks arise when a child:

- Engages with and/or is exposed to potentially harmful **content.**
- Experiences and/or is targeted by potentially harmful **contact.**
- Witnesses, participates in and/or is a victim of potentially harmful **conduct.**
- Is party to and/or exploited by a potentially harmful **contract**.

This classification also distinguishes between aggressive, sexual and value risks, creating a matrix of harms (see Figure 5.1), which as noted above, has been influential in at least two of the jurisdictions considered in this report (Canada and New Zealand).

Figure 5.1. *CO:RE 4Cs classification and harms matrix.*

CO:RE	Content Child engages with or is exposed to potentially harmful content	Contact Child experiences or is targeted by potentially harmful *adult* contact	Conduct Child witnesses, participates in or is a victim of potentially harmful *peer* conduct	Contract Child is party to or exploited by potentially harmful contract
Aggressive	Violent, gory, graphic, racist, hateful or extremist information and communication	Harassment, stalking, hateful behaviour, unwanted or excessive surveillance	Bullying, hateful or hostile communication or peer activity e.g. trolling, exclusion, shaming	Identity theft, fraud, phishing, scams, hacking, blackmail, security risks
Sexual	Pornography (harmful or illegal), sexualization of culture, oppressive body image norms	Sexual harassment, sexual grooming, sextortion, the generation and sharing of child sexual abuse material	Sexual harassment, non-consensual sexual messaging, adverse sexual pressures	Trafficking for purposes of sexual exploitation, streaming (paid-for) child sexual abuse
Values	Mis/disinformation, age-inappropriate marketing or user-generated content	Ideological persuasion or manipulation, radicalisation and extremist recruitment	Potentially harmful user communities e.g. self-harm, anti-vaccine, adverse peer pressures	Gambling, filter bubbles, micro-targeting, dark patterns shaping persuasion or purchase
Cross-cutting	**Privacy violations** (interpersonal, institutional, commercial) **Physical and mental health risks** (e.g., sedentary lifestyle, excessive screen use, isolation, anxiety) **Inequalities and discrimination** (in/exclusion, exploiting vulnerability, algorithmic bias/predictive analytics)			

Notably, mental health risks are characterised as cross-cutting risks that can potentially result from engagement or exposure to harms from any of the 4 Cs.

This perspective of cross-cutting risks has relevance for regulatory responses. For example, many regulatory measures are justified by reference to risks that have mental health consequences, including anxiety, distress, self-injury, and social isolation.

5.5.2 Benefits

Notwithstanding the tendency of law and policy to focus on harm prevention, benefits remain relevant to children and young people's engagement with digital technology. Law can promote or preserve benefits, but in more limited ways, such as by safeguarding rights or directly empowering or requiring bodies to undertake certain policies, such as education or research.

Automotive regulation illustrates this balance: early laws targeted harms such as road safety and drink driving, while later policies promoted benefits like interstate freeway development (promoting freedom of movement) and electric vehicle incentives (promoting cleaner energy). Legal frameworks also evolved to protect consumers and set safety standards, building public confidence while acknowledging the inherent risks of car use. Overall, law and policy, though often reactive to harm, can also enable the safe and equitable distribution of technological benefits.

5.6 The Three Core Domains of Government Action

For the purposes of this review, three domains are treated as analytically central: platform regulation, age-based restrictions, and education and information-sharing.

These domains are not mutually exclusive and frequently overlap. Platform regulation, for instance, may require legislative change that establishes age-based restrictions and authorises statutory bodies to undertake education and awareness activities. However, grouping them

under these domains allows for clearer analysis, including as a reference point for the assessment of empirical evidence about the success or otherwise of these areas of action, in Part 3 of the report.

5.6.1 Domain 1: Platform regulation

Platform regulation refers to the laws, standards, and codes that place obligations on digital platforms and online services. These measures seek to mitigate harms by requiring platforms to assess and manage risks to children, moderate harmful content, provide reporting and complaints mechanisms, and comply with transparency and accountability requirements.

Regulations within this domain occupy varied positions along the soft–hard spectrum. They may involve:

- Statutory duties and enforceable legal obligations.
- Mandatory compliance with regulator-approved standards.
- Co-regulatory industry codes.
- Voluntary codes of practice.

Common regulatory mechanisms include obligations on platforms to:

- Assess whether children are likely to access their services and identify associated risks.
- Implement systems for content moderation and reporting.
- Remove or restrict access to harmful material.
- Provide accessible complaints mechanisms.
- Protect children's privacy and data rights.
- Have regard to children's rights and best interests.
- Report on compliance and risk management practices.

Some jurisdictions are also moving towards system-level duties of care, requiring platforms to design services with children's safety and wellbeing in mind.

Platform regulation primarily seeks to reduce exposure to harmful content and conduct, while preserving the benefits of participation, communication, and access to information.

5.6.2 Domain 2: Age-based Restrictions and Prohibitions

Age-based restrictions and prohibitions are measures that restrict access to platforms, devices, services, or content based on age. These are generally 'hard' regulatory measures, although their level of enforceability varies.

Age-based restrictions may apply to access to platforms, content, devices, or specific settings such as schools. Examples include:

- Age-based bans:
    - Age verification, e.g., for pornography sites (France, Canada – proposed, UK – "steps" required).
    - Digital age of consent laws (UK, EU).

    - Age-restrictions for access to social media accounts (Australia - under-16 social media account restrictions, UK - proposed).
- Location-based bans:
    - Bans of smartphones in schools (UK).
    - Statutory standards for schools (UK – includes content filtering; Australia – e.g., Vic).
- Technological restrictions:
    - "Minor-mode" (China; also see "children's phones" proposal in UK).
    - Proposed installation of child 'flags' at point-of-sale (UK).

When applied to social media, age-based restrictions are a form of platform regulation, but one that is child-specific: they draw on child welfare and rights rationales, rather than notions of competition, speech, or market power that otherwise tend to guide platform regulation.

These measures aim to reduce children's exposure to developmentally inappropriate material and environments, particularly where there is concern about addictive design features, harmful social dynamics, or exposure to distressing or harmful content.

Age-based restrictions are among the most prominent and contested regulatory responses internationally. Despite their visibility and political salience, Part 3 demonstrates that relatively few such measures have been subjected to direct empirical evaluation, and that findings to date are limited and mixed.

5.6.3 Domain 3: Education and Information-sharing

Information and education measures are a key 'soft' regulatory strategy across all jurisdictions reviewed. They primarily operate through public education, guidance, and curriculum-based initiatives, and typically address privacy and information access rights, online safety and harm prevention, the use of safety technologies and parental controls, and the responsible and age-appropriate use of digital services.

Such initiatives may also be embedded in broader strategies like national media literacy frameworks, educational technology readiness programs, and device renewal strategies in schools. Overall, they tend to promote informed participation, help-seeking, and resilience while reducing exposure to foreseeable risks.

5.7 Contextual Domains of Government Action

In addition to the three core domains, governments deploy a range of contextual measures - such as research initiatives, certification schemes, media classification frameworks, and inter-agency coordination – that shape the broader regulatory environment. These measures are not examined in detail here because they are highly context-specific, unevenly evaluated, or do not constitute primary mechanisms for regulating children's digital technology use. While a brief summary is provided below, readers seeking further detail on these schemes can refer to Appendix A.

5.7.1. Adjacent areas of law

Reforms in broad areas of law, such as privacy law, consumer protection, criminal law and competition law, can affect digital environments in ways that may influence children's online experiences. They include:

- Criminal laws:
    - Hate crimes including hate propaganda and advocating/promoting genocide (Australia).
    - False and threatening communications, cyberflashing, encouraging/assisting serious self-harm, intimate image abuse, and "epilepsy trolling" (UK).
    - Proposed inclusion of deepfakes under existing criminal laws (Canada).
    - Proof of age duties for uploaders of online pornography (Canada – proposed).
- Tort law:
    - Serious invasion of privacy (Australia).
- Privacy laws:
    - Proposed updates from the *Privacy Act Review* (Australia).
    - Proposed updates from the *Online Privacy Review* (New Zealand).
- Competition and consumer laws, including advertising laws:
    - Proposed updates from the *Digital platforms and services review* (Australian Competition & Consumer Commission [ACCC], Australia). Some critics have argued that inadequate competition in the technology sector has incentivised companies to exacerbate the mental health crisis (Day, 2021; Rosenquist, Morton, Weinstein, 2021).
- National security laws:
    - *Senate Select Committee on Foreign Interference through Social Media* (Australia).

For this report, these laws are considered 'contextual' as they are not primary regulatory mechanisms governing children's digital technology use. They are not examined in detail here, as doing so would substantially expand the scope and complexity of the comparative analysis beyond its central focus.

5.8 Institutional Implementation and the Key Role of Regulatory Bodies

All domains of government action are implemented through institutional arrangements, typically involving statutory regulators and government agencies with responsibility for:

- Standard-setting and code development.
- Oversight and compliance monitoring.
- Complaints handling and enforcement.
- Content moderation and takedown powers.
- Public education and guidance.

Across jurisdictions, online safety and communications regulators play a central role, often working alongside privacy regulators, consumer protection bodies, gambling regulators, and children's commissioners. Prominent examples discussed in Part 2 include:

- Online safety guidance (eSafety Commission, Australia)
- Educational technologies guidance (Office of Communications ['Ofcom'], UK)
- Media literacy (Ofcom, UK)

These bodies may be afforded further powers to implement regulatory measures across the continuum including:

- Developing or overseeing regulatory codes and standards that will apply to platforms, such as:
    - Platform codes and standards (eSafety Commission, Australia; Ofcom, UK).
    - Children's Online Privacy Code (Office of the Australian Information Commissioner ('AIC'), Australia).
    - Advertising codes (Advertising Standards Authority, UK).
- Monitoring online platforms/services and ensuring they comply with standards and codes, and/or direct legal obligations (see below).
- Content monitoring and or moderation, including powers to require certain content to be removed or restricted, including
    - eSafety Commission (Australia – includes the power to directly address end-users under cyber-bullying complaints mechanism).
    - New Zealand Government
    - Project Arachnid (Canada – may refer content for removal).
    - Ofcom's "small but risky" taskforce (UK).

As a brief point on terminology, 'codes', whether government- or industry-authored, generally refer to a set of rules or requirements that give practical effect to legislation by specifying how regulated actors must behave in a particular sector. Typically, they deal with a range of matters that are too detailed to be included in legislation, allowing for flexibility to the regulatory scheme while meeting underlying policy goals (Australian Law Reform Commission [ALRC], 2012, p 302 [13.2]). For example, the eSafety Commissioner is responsible for overseeing Online Safety Codes and Standards for managing illegal and restricted online content, which is discussed in Part 2.

'Guidelines' are another term used throughout this report. 'Guidelines' are non-binding instruments issued by a regulator or government body to explain how legislation or enforceable rules are intended to operate in practice. For example, the eSafety Commission is responsible for formulating and promoting written guidelines for the taking of reasonable steps to prevent age-restricted users having accounts with age-restricted social media platforms (*Online Safety Act 2021 (Cth)*, Section 27(1)(qa)-(qb)). Guidelines form part of a broader range of *guidance* provided by regulatory bodies like the eSafety Commission. Guidance includes the much broader range of education and information-sharing described in Part 1 of this chapter.

Part 2

5.9 Comparative Analysis of Platform Regulation, Executive Powers, and Age-Based Restrictions

Part 2 applies the analytical framework outlined in Part 1 to a comparative socio-legal analysis of regulatory approaches in Australia, the United Kingdom, Canada, and New Zealand, with brief reference to selected developments in other jurisdictions where relevant. It focuses on platform regulation, regulatory powers, and age-based restrictions as the most legally structured and comparable interventions through which governments seek to shape children and young people's digital environments. Although information and education initiatives are important, they are not amenable to cross-national comparison given they are highly diverse, decentralised, and rarely subject to consistent monitoring or evaluation—as such, information and education initiatives are not discussed in Part 2.

The analysis draws on legislation, regulatory instruments, policy documents, regulator guidance, and authoritative government reviews, and examines how these domains are operationalised across jurisdictions, highlighting key similarities, differences, and emerging policy trends. Consideration of the availability of evaluative material is limited to signposting, with a systematic assessment of empirical evidence reserved for Part 3.

5.10 Summary of Regulatory Priorities and Emerging Approaches

Across jurisdictions, three regulatory approaches dominate: content moderation, age-based access restrictions, and emerging forms of design- or systems-focused regulation. These approaches recur despite significant variation in legislative form and enforcement structure.

Content moderation has attracted the greatest attention, with jurisdictions differing in how harmful content is defined, which services are regulated, and the stringency of obligations applied—particularly in relation to content such as self-harm or sexual material. Age-based restrictions have also become increasingly prominent, using age verification or estimation to limit children's access to developmentally inappropriate content, services, or features. A smaller but growing set of interventions targets platform design itself, including recommender systems, engagement-maximising features, and other practices sometimes described as 'dark patterns'.

5.11 Duties on platform services and the powers of regulators

Regulation is typically pursued two ways: by imposing duties on platform services and giving powers to regulatory authorities. Duties on platforms raise recurring questions about technological feasibility, content classification and moderation, and the appropriate balance between self-regulation and statutory oversight. Granting regulatory powers, in turn, raises questions about the scope of state intervention, regulatory capacity, and the ability of national authorities to oversee globally operating platforms. These issues are often described in terms of 'light-touch' versus 'heavy-handed' regulation—a simplified but useful way of characterising different degrees of government intervention.

5.12 Structure of Part 2

Part 2 is organised into three sections reviewing platform regulation, regulatory powers, and age-based restrictions across jurisdictions. Section and paragraph numbering will be used throughout these three sections, due to the technical nature of the comparison.

5.13 Platform Regulations

This subsection provides a focused account of the laws and regulatory frameworks that govern online platforms in Australia, the UK, New Zealand, and Canada. Although the jurisdictions differ in legislative form, enforcement architecture, and scope, they share a common shift towards imposing affirmative duties on platform services and strengthening regulatory oversight in relation to child safety and wellbeing.

5.13.1 Australia

5.13.1.1 Current Legislative Framework: Overview

5.13.1.2 The *Online Safety Act 2021* (Cth) (OSA Cth) established a regulatory regime to improve and promote online safety.[1] In addition to platform regulations, OSA (Cth) established the **eSafety Commissioner** ("eSafety") as the online safety regulator (discussed below) and imposed age restrictions.

OSA (Cth) regulates online industry service providers through a **co-regulatory model** overseen by eSafety. Online industries are 'expected' to develop and follow their own **industry codes** [o]. eSafety can mandate compliance with industry codes, [5.14.1.11] or develop prevailing industry standards that require direct compliance, [5.14.1.11].

OSA (Cth) largely focuses on content moderation, empowering eSafety to require service providers to remove **harmful online content** including cyberbullying and material rated R/18+. Different procedures and powers apply for different kinds of content [5.14.1.7].

OSA (Cth) largely applies the same regulations across different user age groups. However, it specifically mitigates online **harms for children** by:

- requiring services to prohibit holding social media accounts for under-16 users;
- allowing services to **limit access to 'high-impact' class 2 material** through age restriction controls as an alternative to removing it on notice from eSafety;
- providing eSafety with **stronger powers to address cyber-bullying against children** [5.14.1.7].

5.13.1.2 Platforms regulated

Online industry service providers are:[2]

- social media services[3]
- direct messaging and multiplayer gaming services[4]

[1] OSA Cth s3.
[2] OSA Cth s135.
[3] OSA Cth s13: electronic services that enable online social interaction between end-users, and allow end-users to post material and link to, or interact with, other end users.
[4] OSA Cth s13A: electronic services that enable end-users to communicate by email, instant messaging, SMS, MMS or chat, or to play online games with other end-users ('relevant electronic services').

- content delivery/access services[5]
- internet search engine services
- app distribution services
- hosting services
- some equipment manufacture, supply, maintenance or installation services.[6]

Social media, direct messaging, multiplayer gaming and content delivery/access services are subject to additional expectations [0]–[0].

5.13.1.3 Content moderated

Harmful online content is categorised as:

- **cyberbullying material**
- **intimate images posted without consent.**
- Material that promotes, incites, instructs or depicts **abhorrent violent conduct.**
- **Class 1** and **Class 2 material** (generally material that is or would be rated R/X18+).

Instruction or promotion of harmful practices such as self-harm/suicide and disordered eating are not currently included, although a Statutory Review has suggested they should be [0].

Abhorrent violent conduct is criminal material that depicts a person engaging in a terrorist act, or torturing, raping, kidnapping, murdering, or attempting to murder another person.[7]

Class 1 material is material that is effectively banned in Australia[8] under the classification system,[9] such as sexual abuse material or extreme violent material.

Class 2 material is material that has been **rated unsuitable for children**.[10] Class 2 material may be either pornographic (generally X18+)[11] or 'high-impact' (generally R18+).[12]

OSA (Cth) directly prohibits posting intimate **images without consent**.[13]

5.13.1.4 Co-regulation for online industry service providers

Under the co-regulatory model, **online industry service providers** must comply with **eSafety notices and rules** and are *expected* to develop and comply with their own **industry codes**. *Some* online industry service providers are also expected to comply with **basic online safety expectations**.[14] Age restriction laws are discussed in [3.1.2].

Sections of online industry are expected to develop their own **industry codes**.[15] Service providers that contravene eSafety-registered industry codes may be directed to comply [5.14.1.1.11].[16] Industry codes may address a non-exhaustive list of matters that include:

[5] OSA Cth s14: services that deliver material to end-users, or allows end-users to access material by means of an internet carriage service ('designated internet services').
[6] When the equipment is for use by end-users of social media, direct messaging, multiplayer gaming, content delivery/access or internet carriage services.
[7] OSA Cth s9; *Criminal Code Act 1995* (Cth) s474.32.
[8] Australian Classification, What are the ratings?.
[9] OSA Cth s106; *Classification (Publications, Films and Computer Games) Act 1995* (Cth) s7.
[10] OSA Cth s107; *Classification (Publications, Films and Computer Games) Act 1995* (Cth) s7.
[11] OSA Cth s107(1)(a)–(e); Australian Classification, What are the ratings?.
[12] OSA Cth s107(1) (f)–(l) ; Australian Classification, What are the ratings?.
[13] OSA Cth s75.
[14] OSA (Cth) 45; Online Safety (Basic Online Safety Expectations) Determination 2022 (OSA Determination).
[15] OSA Cth s137(1).
[16] OSA (Cth) s143.

- dealing with different kinds of harmful content.
- supporting parental supervision and control and access to content filtering technologies.
- promoting awareness of online safety issues.
- informing eSafety of child safety risks posed by new online services.[17]

Online industry service providers must comply with **eSafety notices** to:

- remove harmful online content [2.1.2.7]–[2.1.2.8].
- support eSafety investigations [2.1.2.5].
- report to eSafety on their compliance with **basic online safety expectations** [2.1.2.16].

Online industry service providers must also comply with **eSafety rules** contained within industry standards (that prevail over industry codes)[18] [5.14.1.11][19] and service provider determinations [2.1.2.14], [2.1.2.16].

Social media, direct messaging, multiplayer gaming and content delivery/access services are expected to comply with **basic online safety expectations**[20] which include **core expectations** (determined under statute) and **additional expectations** (set by determination).

Core expectations include:[21]

- ensuring end-users can use the service in a safe manner.
- consulting the eSafety Commissioner in determining what reasonable steps can be taken.
- preventing children from accessing class 2 material and minimising provision of other harmful material.
- enabling end-users to report and make complaints about harmful material.
- complying with requests from eSafety for certain information.[22]

Additional expectations that apply to services likely to be accessed by children include:[23]

- primarily considering the best interests of children in service design and operation;[24]
- undertaking child safety risk assessments, appropriately mitigating identified risks, and implementing safety review processes;[25]
- ensuring robust default privacy and safety settings set to the most restrictive level;[26]
- complying with eSafety requests for information about service usage by child users.[27]

5.13.1.5 Evaluations and proposals

In October 2024, a Statutory Review of the OSA (Cth) (the OSA (Cth) Review) proposed 67 changes, recommending a **duty-of-care model** underpinned by a list of prominent harms including **harms to young people**, harms to **mental health and wellbeing**, and **harms arising due to** instruction or promotion of practices such as self-harm/suicide and disordered eating.[28]

[17] OSA Cth s138.
[18] OSA (Cth) s150.
[19] OSA (Cth) s146.
[20] OSA (Cth) 45; Online Safety (Basic Online Safety Expectations) Determination 2022 (OSA Determination).
[21] OSA (Cth) s46; also see OSA Determination (Cth).
[22] OSA (Cth) s46(1)(g)–(i): Number of complaints made, time taken to comply with removal notices, and measures taken to ensure end-users can use the service in a safe manner.
[23] Made by determination under OSA (Cth) s45.
[24] OSA Determination r6(2A).
[25] OSA Determination r6(3)(e).
[26] OSA Determination r6(3)(b).
[27] OSA Determination r20(5).
[28] OSA (Cth) Review, Recommendation 5; Jarman, H., & Reset Tech Australia. (2024). *Not just algorithms: Assuring user safety online with systemic regulatory frameworks* (Australia). Reset Tech Australia. https://apo.org.au/node/326122

OSA (Cth) Review suggested a duty-of-care approach would be **more consistent** with other jurisdictions (e.g., UK, EU) and areas of law (e.g., OHS), and in line with the original UK online safety proposal.[29]

OSA (Cth) Review further suggested a "singular and overarching duty of care" approach to ensure platform duties would be broad enough to capture issues like '**dark patterns**', which might otherwise be missed by a specific duty approach.[30] OSA (Cth) Review noted such matters had been supported/discussed by civil bodies including Reset.Tech Australia, The Victorian Bar, and the Law Society of NSW (in the Law Council of Australia submission).[31]

Other OSA (Cth) Review proposals include:

- mandatory service responsibilities, including complaints handling,[32] record-keeping[33] and risk assessments for larger entities[34] – mirroring the UK approach.[35]
- the best interests of the child as a primary consideration for online service providers in assessing and mitigating risks.[36]
- decoupling of content harm categories from the National Classification Scheme,[37] with new Class 2 definitions and thresholds to include instruction or promotion of harmful practices such as self-harm/suicide, disordered eating, or dares that result in harm.[38]
- definition of online hate material.[39]
- prohibiting search engines from displaying certain harmful apps.[40]
- clearer definitions of the online industry sections.[41]

Further proposals may be found in the following reports and websites:

- Joint Select Committee on Social Media and Australian Society. (2024). *Social media: The good, the bad, and the ugly* (Final report). Commonwealth of Australia. https://parlinfo.aph.gov.au/parlInfo/download/committees/reportjnt/RB000524/toc_pdf/Socialmediathegood,thebad,andtheugly%e2%80%93Finalreport.pdf
- House of Representatives Standing Committee on Employment, Education and Training. (2024). *Study buddy or influencer? Inquiry into the use of generative artificial intelligence in the Australian education system*. Commonwealth of Australia. https://parlinfo.aph.gov.au/parlInfo/download/committees/reportrep/RB000333/toc_pdf/StudyBuddyorInfluencer.pdf
- Parliament of Australia. (2023). *Final report of the Select Committee on Foreign Interference through Social Media: A quick guide* (Research Paper Series 2023–24, 8 November). Parliamentary Library, Foreign Affairs, Defence and Security. https://parlinfo.aph.gov.au/parlInfo/download/library/prspub/9458869/upload_binary/9458869.pdf
- Several anti-hate initiatives contain material relevant to digital platform-related rules and legislation, such as the National Anti-Racism Framework (Australian Human

[29] See 2019 Online Harms White paper.
[30] OSA (Cth) Review, p53.
[31] Statutory Review of the Online Safety Act (Review), Recommendation 4.
[32] OSA (Cth) Review, Recommendation 25.
[33] OSA (Cth) Review, Recommendation 52.
[34] OSA (Cth) Review, Recommendations 6 & 7.
[35] OSA (Cth) Review, Recommendations 6 & 7.
[36] OSA (Cth) Review, Recommendation 8.
[37] OSA (Cth) Review, Recommendation 29. NB: ALRC paper recommending reduced variation and complexity n how content is defined/rated across different media: Content Regulation and Convergent Media (Report 118), Chapter 9.
[38] OSA (Cth) Review, Recommendation 32.
[39] OSA (Cth) Review, Recommendation 21.
[40] OSA (Cth) Review, Recommendation 27.
[41] OSA (Cth) Review, Recommendation 2.

Rights Commission, 2024, Recs. 12 and 49), and the recent government activity on anti-Semitism (Australian Government, 2025, Rec. 6).

- There are several civil society organisations prominent in the field, such as Reset Tech Australia (<https://au.reset.tech/>).

5.13.2 United Kingdom

5.13.2.1 Current legislative framework: Overview

5.13.2.1 The *Online Safety Act 2023* (OSA [UK]) establishes a regulatory regime to improve the safety of internet services,[42] by imposing **duties on specific internet service providers** and conferring **regulatory functions** on the Office of Communications (Ofcom),[43] among related provisions. It received Royal Assent and commenced on 26 October 2023.[44]

5.13.2.2 **Duties on regulated internet service providers** generally require identifying, mitigating and managing risks of harm arising from content and activity that is illegal or harmful to children.[45] These duties are intended to ensure that regulated services are safe by design,[46] transparent and accountable,[47] and protect users' rights to freedom of expression and privacy.[48]

5.13.2.3 There are **higher standards of protection for children**[49] through specific duties to assess child access to services, and assess and respond to identified content risks.

5.13.2.4 Some harmful content categories are expressly relevant to **mental health and wellbeing** including content that promotes suicide/self-harm, eating disorders, harmful substance use, depression and body (appearance/weight) stigma included across different priority categories [5.13.2.11]–[5.13.2.14].[50]

5.13.2.5 Regulated service providers can achieve compliance by taking measures specified in codes of practice prepared by Ofcom [5.14.2.7][51] or taking other suitable alternatives.[52]

5.13.2.2 Platforms regulated

5.13.2.6 **Regulated services** include '**Part 3 services'** (defined above) and internet services that publish or display pornographic content.[53] The latter services have **age restriction** obligations; they are not included in this section of our report.

5.13.2.7 Duties are imposed on **Part 3 services** which are:

- user-to-user services that allow users to encounter content generated, uploaded or shared by other users[54]
- search engines that enable users to search multiple websites and databases.[55]

[42] *Online Safety Act 2023* (OSA UK) s1(1).
[43] OSA UK s1(2)(b).
[44] OSA UK s240. Some sections came into force later as per regulations by the Secretary of State: see sub-s (1).
[45] OSA UK s1(2)(a).
[46] OSA UK s1(3)(a).
[47] OSA UK s1(3)(b)(iii).
[48] OSA UK s1(3)(b)(ii).
[49] OSA UK s1(3)(b)(i).
[50] Suicide/self-harm and eating disorder content are among the 'primary priorities'; harmful substance use is among the 'priorities' (along with cyber-bullying); depression and body stigma are 'non-designated' harms.
[51] OSA (UK) s49(1)–(4).
[52] OSA (UK) s49(5)-(6). Failure to act in accordance with a code of practice does not necessarily mean a service will be liable to legal proceedings: OSA (UK) s50(1).
[53] OSA UK ss4(4)(c); 80(2).
[54] OSA UK ss3(1); 4(4)(a).
[55] OSA UK ss4(4)(b); 3(4); 229(1).

5.13.2.8 Part 3 services that are **likely to be accessed by children** must comply with additional **children's safety duties**. Some larger Part 3 services have additional statutory obligations [5.13.2.31].[56]

5.13.2.3 Content moderated

5.13.2.9 OSA (UK) provides only **limited regulatory content moderation powers**, and can only compel the removal of online terrorist and child sexual exploitation and abuse (CSEA) content. Rather, OSA (UK) imposes **content moderation duties on regulated services**.

5.13.2.10 Duties are imposed vis-à-vis **illegal content** and **content that is harmful to children**.

5.13.2.11 **Content that is harmful to children** includes '**primary priority**' **content** and '**priority**' **content.** It also includes **non-designated content** that 'presents a material risk of significant harm to an appreciable number of children'. [57]

5.13.2.12 **Primary priority content** is content that is pornographic or that encourages, promotes or provides instructions for suicide, deliberate self-injury or eating disorders.[58]

5.13.2.13 **Priority content** is content that:

- is bullying.[59]
- is abusive or incites hatred (based on protected categories).
- encourages, promotes or provides instructions for serious violence against a person.
- depicts real/realistic serious violence or serious injury in graphic detail.
- encourages, promotes or provides instructions for a dangerous challenge or stunt.
- encourages harmful use of substances.[60]

5.13.2.14 Ofcom has established [5.14.2.6] two types **of non-designated harmful content**:

- 'depression content' (content promoting "depression, hopelessness and despair").[61]
- 'body stigma content' (content "that shames or otherwise stigmatises body types or physical features").[62]

5.13.2.15 Part 3 services must separately assess and address risks of each subcategory of **primary priority content** and **priority content** in risk assessments [5.13.2.245.13.2.24][63] and provide transparent accounts of safety measures taken [5.13.2.265.13.2.26].[64] Non-designated content categories may be assessed and addressed together.[65]

5.13.2.16 Part 3 search engines must *minimise* the risks of children encountering **primary priority content**.[66] User-to-user services must *prevent* children encountering **primary priority content** [5.15.2.3].[67]

[56] Generally, public search engines with more than 7 million active monthly users; and user-to-user services depending on monthly active users and available functions like content recommending algorithms, forwardable/shareable user-generated content, direct messaging options: The Online Safety Act 2023 (Category 1, Category 2A and Category 2B Threshold Conditions) Regulations 2025 r3–5.
[57] OSA UK s60: Other harmful content 'presents a material risk of significant harm to an appreciable number of children'.
[58] OSA UK s61. Behaviours associated with eating disorders is included. Text-only pornography is not.
[59] Further defined as content that conveys a serious threat, is humiliating or degrading, or forms part of a campaign of mistreatment: OSA UK s62(12).
[60] OSA UK s62.
[61] OFCOM, Children's Register of Risks (2025) Ch 10.
[62] OFCOM, Children's Register of Risks (2025) Ch 11.
[63] OSA UK ss11(6), 28(5).
[64] OSA UK ss12(9), 29(5).
[65] OSA UK ss11(6), 12(9), 28(5), 29(5).
[66] OSA UK s29(3)(a).
[67] OSA UK s12(3)(a).

5.13.2.17 When **children in certain age groups** are **judged to be at risk from other harmful content**, search engines must *minimise* the risks of them encountering that content,[68] while user-to-user services must *protect* them from encountering it.[69]

5.13.2.18 These laws have provoked **public controversies** with claims that internet service providers are effectively **censoring the internet and limiting free speech** through heavy-handed age verification, or ineffective age estimation measures (broadly required as per [5.13.2.21]), as well as overzealous identification of harmful content (broadly defined as per [5.13.2.11]) that can now be restricted to adult users whose age has not been verified or estimated. Restricted content laws have reportedly been applied to news footage, rights debates, and information about reproductive and public health.[70] Others raise concerns about age-verification technologies **undermining the privacy of children and adults** by requiring platform providers to gather more personal information about British citizens than they already have.[71]

5.13.2.4 Services likely to be accessed by children

5.13.2.19 Children's safety duties apply to **services likely to be accessed by children**.[72]

5.13.2.20 A **service likely to be accessed by children** is one that *can* be accessed by children,[73] and that either has, or is likely to attract, a significant number of child users.[74]

5.13.2.21 Part 3 services must conduct **children's access assessments**[75] to determine whether they are likely to be accessed by children. Services that do not do so are treated as if they are likely to be accessed by children.[76]

5.13.2.22 **Age verification or estimation** is required for a service to conclude that it cannot be accessed by children.[77] Ofcom advises: "We think most services without highly effective age assurance will be in scope of the children's safety duties."[78]

5.13.2.23 Services that are not likely to be accessed by children must regularly review their status by conducting **children's access assessments** annually,[79] and upon relevant changes to the service[80] or its use by children[81], or evidence of reduced effectiveness of the age verification or estimation used.[82] Services that do not conduct children's access assessments as required may be determined by Ofcom as a service that should be treated as if they are likely to be accessed by children.[83]

5.13.2.5 Children's safety duties

5.13.2.24 Services likely to be accessed by children must conduct **children's risk assessments** within 3 months[84] and take **proportionate measures** in response.

[68] OSA UK s29(3)(b).
[69] OSA UK s12(3)(b).
[70] See, eg, Usermag, The UK's censorship catastrophe is just the beginning (2025) and Spiked Online, Five things we can't post about thanks to the Online Safety Act (2025).
[71] See, eg, Open Rights Group, Regulating Age Verification (2025).
[72] OSA UK s12.
[73] OSA UK ss37(2)(a).
[74] OSA UK s37(2)(b), 35(3).
[75] OSA UK ss35–37.
[76] OSA UK s37(4)–(5).
[77] OSA UK s35(2).
[78] OFCOM, Quick Guide to Children's Risk Assessments (2024).
[79] OSA UK s36(3).
[80] OSA UK s36(4)(a).
[81] OSA UK s36(4)(c).
[82] OSA UK s36(4)(b).
[83] OSA UK ss37(6)–(7), 135.
[84] OSA UK ss11(2), 28(2); Schedule 3 s5.

5.13.2.25 **Children's risk assessments** must assess levels of risk regarding content that is harmful to children, and the nature and severity of related harms.[85] **Children's risk assessments** must be kept up-to-date,[86] and must:[87]

- consider children in different age groups, and as members of certain groups.
- consider how relevant designs, usages, functionalities and operations affect risks, including by influencing service usage.[88]
- take the relevant Ofcom **risk profiles** [5.14.2.6] into account.

5.13.2.26 **Proportionate measures** must effectively mitigate and manage identified risks, and mitigate impacts of harms for children in different age groups.[89] Age verification and estimation are expressly permitted as proportionate measures for user-to-user services, but not required.[90] Proportionate measures must be transparent, consistently applied, and taken across all areas of the service.[91]

5.13.2.27 Part 3 services must provide transparent accounts of measures taken that are publicly available.[92] **Additional reporting obligations** apply to user-to-user services which must notify Ofcom of the kinds of harmful content identified, and their incidence on the service,[93] and some larger services[94] must provide full risk assessment records to Ofcom.[95]

5.13.2.28 Part 3 services must also **facilitate reporting** of content that is harmful to children.[96]

5.13.2.29 Some larger Part 3 services [5.13.2.8] must develop policies to handle requests from parents to access **information of deceased children** regarding service usage. Policies must be transparent and accessible, including request procedures, and guidance on what information will be disclosed, and how. Complaints procedures and timely responses are also required.[97]

5.13.2.6 General duties

5.13.2.30 Part 3 services must comply with **other duties** to:

- conduct risk assessments about illegal content,[98] take appropriate responses,[99] and facilitate reporting of illegal content.[100]
- directly report CSEA content to the National Crime Agency.[101]
- operate a complaints procedure that is easily accessible (including by children).[102]
- have particular regard to the importance of freedom of expression and privacy.[103]

[85] OSA UK ss11(6)-(7), 28(5)-(6).
[86] OSA UK ss11(3)-(4), 28(3)-(4).
[87] OSA UK ss11, 28.
[88] Examples include enabling adults to search for and contact children and automatic play (for user-to-user services) and predictive search functionality (for search engines): OSA UK ss11(6)(e)–(f); 12(5)(c).
[89] OSA UK ss12(2), 29(2).
[90] OSA UK s12(7).
[91] OSA UK ss12(9)–(13), 29(5)–(8): including user controls and supports, functional designs and content moderation/prioritisation (for user-to-user services/search engines).
[92] OSA UK ss12(9), 29(5).
[93] OSA UK s11(5).
[94] OSA UK ss12(14), 29(9): only Category 1 & 2A [5.13.2.8]. The same duties apply for illegal risk assessments: OSA UK ss10(9), 27(9).
[95] OSA UK ss12(14), 29(9).
[96] OSA UK ss20, 31: Excluding parts of user-to-user services that a child cannot access: 20(4).
[97] OSA UK s75.
[98] OSA UK ss9, 26.
[99] OSA UK ss10(2)–(8), 27(2)–(8). Proportionate measures must be transparent, consistently applied, and taken across all areas of the service including user controls and supports, functional designs and content moderation/prioritisation (for user-to-user services/search engines).
[100] OSA UK ss20, 31: search engines. Excluding parts of user-to-user services that a child cannot access: 20(4).
[101] OSA UK s66.
[102] OSA UK ss21, 32. Includes a requirement that the appropriate actions be taken in response.
[103] OSA UK ss22(2)–(3), 33.

- review measures taken to comply with duties and keep written records.[104]
- pay applicable fees to Ofcom.[105]

5.13.2.31 OSA UK also imposes duties that apply broadly to relevant persons (not only Part 3 services) to cooperate with **Ofcom investigations** for certain compliance matters[106] and to comply with **notified requirements** [5.14.2.13].[107] Failure to comply with certain duties associated with illegal CSEA content, and children's online safety duties (risk management measures) [see 1.2.12] may result in imprisonment.[108]

5.13.2.32 Some larger Part 3 services [5.13.2.8] must provide transparency reports to Ofcom [5.14.2.9].[109] Some larger services[110] must also:

- provide all illegal risk assessment records to Ofcom[111]
- ensure summaries of their most recent illegal risk assessments are publicly available[112]
- comply with duties to minimise fraudulent advertising.[113]

5.13.2.33 Some larger user-to-user services[114] must also:

- comply with duties to empower adult users.[115]
- offer adult users identity verification options.[116]
- comply with additional transparency, accountability and freedom of expression duties.[117]
- protect news publisher, journalistic[118] and democratically important content.[119]

5.13.2.7 Evaluations and proposals

5.13.2.34 A Statutory Review of the Act is required within 2–5 years of all provisions coming into force.[120] Some provisions only came into force 25 July 2025.[121]

5.13.2.35 A public e-petition with 126,033 signatures called for **parental access rights to children's social media accounts**. After Parliamentary discussion, the government reiterated its work to implement OSA UK in its response.[122]

5.13.2.36 In 2024, the Education Committee recommended the government:

- "launch a consultation… on whether 13 is a reasonable age of digital consent… [and] recommend 16 as a more appropriate age".[123]

[104] OSA UK ss23(2)–(6), 34(2)-(6).
[105] OSA UK Pt 6. Applies to all regulated services.
[106] OSA UK s105. Non-compliance may constitute an offence, with potential penalties and liabilities for senior manager: ss109–113.
[107] OSA UK s133(8).
[108] OSA UK s138.
[109] OSA UK s77.
[110] Only Category 1 & 2A services: [5.13.2.8].
[111] OSA UK ss34(9), 23(10).
[112] OSA UK ss10(9), 27(9).
[113] OSA UK ss38–39: Including preventing encountering, minimising time online, and taking down content.
[114] Only Category 1 services: [5.13.2.8].
[115] OSA UK ss14–16: including assessment and empowerment (15); also see record-keeping: s23(9).
[116] OSA UK s64.
[117] OSA UK ss22(4)–(7), 72.
[118] OSA UK ss18–19.
[119] OSA UK s17.
[120] OSA UK s178.
[121] OFCOM Online age checks now in force (2025).
[122] E-petition 661407. UK Government and Parliament, Give parents/guardians a right to access social media accounts of their children (2025).
[123] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [106].

- "produce guidance for parents on how to best manage and understand the impact of screen time on their children".[124]
- "draw up legislation in the first year of the new Parliament on regulating AI or risk the technology developing faster than legislation can be drawn up to control it, ultimately causing additional harm to children".[125]

5.13.3 New Zealand

5.13.3.1 Current legislative framework

5.13.3.1 In New Zealand, **online content is largely industry-regulated with no direct oversight**.[126] Existing regulations are compartmentalised for media segments, such as broadcasting,[127] and films, videos and publications.[128] Social media and other online platforms are not required under New Zealand law to meet safety standards on their services.[129]

5.13.3.2 The Aotearoa New Zealand Code of Practice for Online Safety and Harms is a voluntary code to reduce content risk on online platforms.[130]

5.13.3.3 The *Harmful Digital Communications Act 2015* (NZ) provides remedies for certain online behaviours, including threats, harassment, false allegations, inciting/encouraging suicide,[131] and posting intimate visual recordings without consent.[132] Online content hosts are protected from liability if, after receiving a complaint, they communicate notices between the complainant and poster, and remove the content if the poster does not respond.[133]

5.13.3.2 Proposals

5.13.3.4 New Zealand proposed an online regulatory framework in its Safer Online Services and Media Platforms review (2021–2024). The review sought a "simple regulatory system able to cover all major media platforms, including social media".[134]

5.13.3.5 The **proposed framework** largely follows the Australia co-regulatory model, proposing to:

- establish a regulator "to promote safety on online and media platforms".[135]
- set out "high-level safety objectives" for codes of practice to meet.[136]
- require industry groups to develop codes with regulator input and approval.[137]
- require platforms to "have operating policies in place to meet [code] requirements but [with] flexibility to decide how to achieve them."[138]

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[124] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [55].
[125] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [120].
[126] Te Tari Taiwhenua (Internal Affairs), Safer Online Services and Media Platforms: discussion document (2023) (Safer Services), pp14, 79–80.
[127] The *Broadcasting Act 1989* (NZ) sets standards for broadcasters, including consumer advisory information, and sets up a complaints process to deal with breaches: Safer Services, p79.
[128] The *Films, Videos, and Publications Classification Act 1993* (NZ) specified what publications are illegal ('objectionable') and has a bespoke consumer advisory system for age suitability and warnings for content in films: Safer Services, p79.
[129] Safer Services, p5.
[130] Safer Services, p81.
[131] *Harmful Digital Communications Act 2015* (NZ) s6.
[132] *Harmful Digital Communications Act 2015* (NZ) s22A.
[133] *Harmful Digital Communications Act 2015* (NZ) s24.
[134] https://www.dia.govt.nz/media-and-online-content-regulation
[135] Safer Services, p 6.
[136] Safer Services, p 24.
[137] Safer Services, p 7.
[138] Safer Services, p 7.

5.13.3.6 The New Zealand Government considered (but ultimately rejected) proposed **regulatory powers** that would bring New Zealand closer to the UK model, and the Australian model, with powers to:

- "require larger or high-risk platforms to comply with codes of practice".[139]
- "check information from platforms to make sure they follow the codes".[140]
- "issue penalties for serious failures of compliance".[141]
- "require illegal material to be removed quickly".[142]

5.13.3.7 In April 2024, New Zealand Government published a summary of submissions before 'scrapping' the proposal.[143]

5.13.3.8 In 2025, New Zealand commenced a new Parliamentary Inquiry into the harm young New Zealanders encounter online, and the roles that Government, business, and society should play in addressing those harms. The Inquiry is under way at the time of writing. No specific framework was proposed.

5.13.4 Canada

5.13.4.1 Current legislative framework

5.13.4.1 Canada regulates broadcasted content through the *Broadcasting Act 1991*. Social media is generally excluded.[144] There is no equivalent government regulation of the printed press.[145]

5.13.4.2 *An Act respecting the mandatory reporting of Internet child pornography by persons who provide an Internet service* (or C-22[146]) received royal assent in March 2011. C-22 requires services providing Internet access, Internet content hosting or electronic mail[147] to report child pornography content[148] and use[149] to relevant authorities.

5.13.4.3 *An Act respecting online communications platforms that make news content available to persons in Canada* (or C-18) received royal assent in June 2023.[150] It regulates digital platforms with regard to competition issues in Canada's news media ecosystem.[151]

[139] Safer Services, p 6.
[140] Safer Services, p 7.
[141] Safer Services, p 7.
[142] Safer Services, p 7. The discussion document notes that only illegal content would be removable, including 'objectionable content' which can already be removed under the *Films, Videos, and Publications Classification Act 1993* (NZ), and "material that is illegal for other reasons, such as harassment or threats to kill". The document sought feedback on "what other kinds of illegal material the regulator should have powers to deal with." Cf Australian regulatory powers to remove cyber-bullying content and unrestricted high-impact Class 2 material: [5.14.1.7]–[🔒].
[143] Newsroom, NZ has no clear direction on online safety regulation (2025). This newspaper article reports: "Public consultation revealed broad support for the regulation of social media platforms, especially among relevant organisations and community groups. However, the proposal received pushback from individual submitters, citing concerns about freedom of expression."
[144] *Broadcasting Act 1991* ss4.1, 2(1) (Meaning of other means of telecommunication, (2.1) Exclusion — carrying on broadcasting undertaking; Exclusion — social media service and programming control).
[145] NZ DIA, International Regulatory Frameworks for Online Content (2021), p. 61.
[146] Parliament of Canada, C-22 (2021).
[147] C-22 s1(1) (definition of 'internet service').
[148] C-22 s2.
[149] C-22 s3.
[150] Parliament of Canada, C-18 (2025).
[151] Minister of Justice, Charter Statement: Bill C-18 (2023).

5.13.4.1 Proposals

5.13.4.4 In July 2021, the Canadian government **proposed a regulatory model** to confront harmful content online for consultation.[152] New legislation was developed in Bill C-63[153] which was introduced to Parliament in February 2024 ("first reading")[154] and formally tabled in May 2024.[155] In January 2025, Prime Minister Justin Trudeau resigned, effectively ending the proposal's progress.[156]

5.13.4.5 Bill C-63 largely follows the UK model with direct **duties imposed on social media services** with a significant number of users,[157] supported by powers granted to regulators to pursue compliance, complaints-handling, 'contributing' to standards, and issuing guidelines and codes of practice, and so on. The Bill's primary purpose was to "promote… online safety"[158] with the second purpose to "protect children's physical and mental health".[159]

5.13.4.6 **Duties imposed on social media services** in the proposed Bill are to:

- **act responsibly**[160] by:
    - implementing adequate measures to **mitigate risks of harmful content.**[161]
    - making accessible and easy-to-use user guidelines with a standard of conduct for users with respect to harmful content, and a description of measures taken.[162]
    - making service tools available to block other users.[163]
    - implementing tools and processes to flag harmful content.[164]
    - labelling harmful content as such, unless duties to remove the content apply.[165]
    - hearing user concerns about harmful content or measures taken to comply.[166]
    - submitting a publicly available[167] digital safety plan to the Digital Safety Commission with information on many matters including (but not limited to):
        - risk assessments regarding harmful content, measures taken, and self-assessed effectiveness of the measures (including indicators used).[168]

[152] Government of Canada. Have your say: The Government's proposed approach to address harmful content online (2021). Including a discussion guide and more legalistic technical paper. Also see submission summary.
[153] Bill C-63: An Act to enact the Online Harms Act, to amend the Criminal Code, the Canadian Human Rights Act and An Act respecting the mandatory reporting of Internet child pornography by persons who provide an Internet service and to make consequential and related amendments to other Acts.
[154] Parliament of Canada, C-63 (2025)
[155] Minister of Justice, Charter Statement: Bill C-63 (2024).
[156] Tech Policy, Canada's Online Harms Bill is Dead (Again): Three Questions to Consider for the Next Round (2025).
[157] Bill C-63 s3(1)(a). Or prescribed by regulations: 3(1)(b). Social media services are defined as websites or applications "the primary purpose of which is to facilitate interprovincial or international online communication among users… enabling them to access and share content": 2(1) (definition of 'social media service'). Including adult content services and live streaming services: 2(2).
[158] Bill C-63 s9(a).
[159] Bill C-63 s9(b).
[160] Bill C-63 ss54–59.
[161] Bill C-63 s55(1). Including any measures provided for by regulations: s56. Not including measures that unreasonably or disproportionately limit users' expression: s55(3).
[162] Bill C-63 s57.
[163] Bill C-63 s58.
[164] Bill C-63 s59(1).
[165] Bill C-63 s60.
[166] Bill C-63 s61.
[167] Bill C-63 s62(1)(a).
[168] Bill C-63 s62(1)(b).

        - manner of compliance with other duties to act responsibly[169] and to protect children.[170]
        - the volume and type of harmful content accessible on the service.[171]
        - volume and responses to user-flagged content.[172]
        - other moderated content that posed a risk of significant psychological or physical harm.[173]
    - preserving (for a year) and then destroying content that incites violence or content that incites violent extremism or terrorism.[174]
- **protect children**[175] by:
    - integrating **age-appropriate design features** as per regulations.[176]
    - using guidelines made by regulation for information purposes only.[177]
    - make content that sexually victimises a child or revictimises a survivor or intimate content communicated without consent inaccessible.[178]
    - keep all records necessary to determine compliance.[179]

Services would also have a duty to provide the Commission with information to determine whether the service has a significant number of users.[180]

5.13.4.7 **Harmful content** is:[181]

- intimate content communicated without consent.
- content that sexually victimizes a child or revictimizes a survivor.[182]
- content that induces a child to harm themselves.[183]
- content used to bully a child.[184]
- content that foments hatred.[185]
- content that incites violence.[186]
- content that incites violent extremism or terrorism.[187]

5.13.4.7 The Digital Safety Commission would also have complaints-handling responsibilities, and content removal powers, regarding content that sexually victimizes a child or revictimizes a survivor, and intimate content communicated without consent.[188]

[169] Bill C-63 s62(1)(c)–(d).
[170] Bill C-63 s62(4).
[171] Bill C-63 s62(1)(f).
[172] Bill C-63 s62(1)(g).
[173] Bill C-63 s62(1)(h).
[174] Bill C-63 s63(1).
[175] Bill C-63 s64.
[176] Bill C-63 s65.
[177] Bill C-63 s66.
[178] Bill C-63 ss67–71.
[179] Bill C-63 s72.
[180] Bill C-63 s 4.
[181] Bill C-63 s2(1) (definition of 'harmful content').
[182] Bill C-63 s2(1) (definition of 'content that sexually victimizes a child or revictimizes a survivor'): essentially child pornography or material that perpetuates harms against an adult who was a victim of child pornography.
[183] Bill C-63 s2(1) (definition of 'content that induces a child to harm themselves'): includes content that advocates self-harm, disordered eating or dying by suicide.
[184] Bill C-63 s2(1) (definition of 'content used to bully a child'): it must be 'reasonable to suspect [it] is communicated for the purpose of threatening, intimidating or humiliating. Includes 'an aggregate of content'.
[185] Bill C-63 s2(1) (definition of 'content that foments hatred'): detestation or vilification on the basis of a prohibited ground of discrimination, within the meaning of the *Canadian Human Rights Act*.
[186] Bill C-63 s2(1) (definition of 'content that incites violence'): active encouragement, or threats, of physical violence or property damage resulting in (a) serious bodily harm; (b) life endangerment; or (c) serious interference/disruption of an essential service, facility or system.
[187] Bill C-63 s2(1) (definition of 'content that incites violent extremism or terrorism'): active encouragement, or threats, of physical violence or property damage for a political, religious or ideological purpose, with the intention of intimidating/denouncing/compelling resulting in (a) serious bodily harm; (b) life endangerment; or (c) serious risk to the public health/safety.
[188] Bill C-63 ss81–85.

5.13.4.8 Bill C-63 would have established 5 new regulatory bodies (or 4 and an Advisory Board, when taking a narrower definition of 'regulatory body'):

- the **Digital Safety Commission** to administer and enforce the Act, contribute to the development of standards and ensure that social media services are transparent and accountable with respect to statutory duties.
- **Digital Safety Ombudsperson** to provide users with support and advocate for the public interest in relation to online safety.
- **Digital Safety Office** to support the Digital Safety Commission and Ombudsperson.[189]
- The original proposal included a **Digital Recourse Council** to enforce stronger content moderation laws permitting the removal of harmful content that 'should be made inaccessible'.[190]
- An **Advisory Board** to advise the Commissioner and Recourse Council on industry trends, technologies, and content moderation systems, with membership from civil society, legal experts, equity deserving communities, Indigenous peoples, civil liberties groups, victim advocacy groups, industry, and academia.[191]

5.13.4.9 A second 'module' of Bill C-63 proposed changes to Canadian criminal and human rights laws, including criminalising 'deepfake' pornography.

5.13.4.10 In September 2024, a Private Members' Bill C-412,[192] was introduced as an alternative.[193] This Bill was reportedly 'more limited to children's digital safety and leverages the courts instead of creating a new regulatory body'.[194] However, the Bill did not progress to enactment before Parliament was dissolved in early 2025. As a private member's bill without government support or passage through later stages, it remains unpassed and not law.

5.13.5 Notable legal and policy approaches from other Jurisdictions

5.13.5.1 European Union

5.13.5.1 From Component 2, Document 1: "The Digital Services Act (DSA) establishes rules for online platforms operating in the EU. It includes specific measures to protect minors, such as limiting targeted advertising and requiring platforms to assess and mitigate systemic risks to children's rights and wellbeing. By setting these binding obligations and offering a broad, European-level regulatory framework, the DSA offers a benchmark against which to assess and contrast other national initiatives (or regional ones, if they emerge)."

5.13.5.2 From OSA (Cth) Review: "The European Union's Digital Services Act, which establishes a due diligence framework to be adopted by all member states. In reality this is very similar to a duty of care [as recommended following the Statutory Review of the OSA (Cth) in October 2024]. It requires very large online platforms or very large search engines to undertake risk assessments of systemic risks arising from the design or functioning of their services, including algorithmic systems, or from the use of their services. Assessments must include consideration of illegal content, risks to fundamental rights, civic discourse and electoral processes and public security, risks of gender-based

[189] Bill C-63 'summary'.
[190] Discussion guide, 'Establishment of new regulators'.
[191] Discussion guide, 'Establishment of new regulators'.
[192] Bill C-412: An Act to enact the Protection of Minors in the Digital Age Act and to amend the Criminal Code.
[193] Parliament of Canada, C-412 (2025)
[194] Tech Policy, Canada's Online Harms Bill is Dead (Again) (2025).

violence, to public health, children's wellbeing and serious negative consequences to peoples' physical and mental wellbeing."

5.13.5.3 The New Zealand Online Safety Harms Review [5.13.3.4] also mentioned:

- EU Code of Practice on Disinformation
- EU Code of Conduct on Countering Illegal Hate Speech Online

5.13.5.2 United States

5.13.5.4 US regulation of digital platforms remains fragmented, relying primarily on existing sector-specific laws and agency powers rather than a comprehensive federal law. There is growing regulatory activity by agencies and states, alongside congressional proposals, but there is continuing uncertainty and inconsistency compared with more unified approaches such as in the EU (see eg, Schettenhelm, 2025).

5.13.5.5 At the national level, the Kids Online Safety Act (KOSA) proposal, the Children's Online Privacy Protection Act (COPPA) proposal, and a second iteration of COPPA seek to address different elements of children's safety online. KOSA would impose a duty of care on social media services to protect children, requiring platforms to take steps to prevent and reduce harms such as violence and harassment, sexual exploitation and abuse, the promotion of drugs, alcohol, tobacco or gambling, encouragement of dangerous behaviours that risk serious injury or death, and features that foster compulsive use (Blumenthal, Blackburn, Thune, & Schumer, 2025). COPPA would mandate age verification.[195] However, lawmakers have been unable to enact these proposals, as they were unable to reconcile the proposals with constitutional limits, privacy risks, and the US's decentralised regulatory model (Ledger, 2026).

5.13.5.6 In the absence of comprehensive federal platform legislation, US digital platform governance has increasingly been articulated through executive orders, agency enforcement announcements, and state-level initiatives.

5.13.5.7 For example, in the state of New York, Democratic Governor Kathy Hochul of New York signed in two laws to mandate age verification.

- Legislation S.07695B/A.08149A was introduced to enable the *New York Child Data Protection Act* to prohibit online sites from collecting, using, sharing or selling personal data of anyone under the age of 18, unless they receive informed consent or unless doing so is strictly necessary for the purpose of the website.
- Legislation S.07694A/A.08148A establishes the Stop Addictive Feeds Exploitation (SAFE) For Kids Act, which seeks to require social media companies to restrict addictive feeds on their platforms for users under the age of 18.

However, these laws have not been enacted and are not currently in force. Governor Hochul provided some insight into the rationale for the laws, when she publicly stated in a comment to technology companies that, 'You're not going to profit off the mental health of children in the state of New York (Office of the Governor of New York, 2024).

5.13.5.8 The California Age-Appropriate Design Code Act (CA-ADC) (AB-2273 The California Age-Appropriate Design Code Act (2021-2022)), aimed to impose a duty on all services 'likely to be accessed by children' to operate in the 'best interests of the child'. However, it appears that a federal court has paused enforcement on First-Amendment grounds ("AB-2273: The California Age-Appropriate Design Code Act," California Legislative Information, November 18, 2022; "NetChoice v. Rob Bonta, Attorney General of the State of California,

[195] H.R. 7890, 118th Cong. (2023). A bill to amend the Children's Online Privacy Protection Act of 1998 to improve protections for children, and for other purposes. United States Congress. https://www.congress.gov/bill/118th-congress/house-bill/7890

D.C. No. 5:22-cv-08861- BLF," US Court of Appeals for the Ninth Circuit, August 16, 2024, https://cdn.ca9.uscourts.gov/data).

5.13.5.2 Ireland

5.13.5.9 In December 2022, Ireland introduced the *Online Safety and Media Regulation Act 2022*[196] which includes the purpose "to provide for the regulation of content available on relevant online services and harmful online content available on designated online services".[197] The Irish Act appears to be similar to the OSA UK in that a regulator is empowered to develop codes and require compliance.[198] Harmful content includes cyber-bullying as well as instruction or promotion of harmful practices such as self-harm/suicide and disordered eating.[199] Age-inappropriate content is defined as pornography and realistic representations of, or of the effects of, gross or gratuitous violence or acts of cruelty.[200]

5.13.5.10 Additionally, it aims to align regulations for television and on-demand video platforms.[201] Online safety codes apply to designated online services which must include video sharing platforms, and may include other services or service types,[202] with earlier discussions noting social media services, public boards/forums, online gaming services, search engines and internet service providers.[203]

5.13.5.11 A New Zealand government review of international regulatory frameworks for online content, characterised Ireland's *Online Safety and Media Regulation Act 2022* as a 'positive' approach to disinformation by promoting 'audiovisual media services with public service characteristics... to ensure that the public has continued access to accurate, trustworthy and reliable information' rather than a 'negative' mode focused on blocking or removing content.[204]

5.14 Executive Powers and Responsibilities

This section examines the executive and regulatory bodies in Australia, Canada, New Zealand, and the UK that have been delegated powers and responsibilities under platform regulatory frameworks, or that exercise substantially similar functions in areas such as media monitoring, platform compliance, and the provision and dissemination of public information. It also considers bodies with relevant roles in media classification and product or service certification, accreditation, or grading where these functions bear on the mental health and wellbeing of children and young people.

The analysis focuses on the legal basis of these powers, the institutional design of the bodies that exercise them, and the mechanisms through which regulatory responsibilities are discharged, including standard-setting, oversight, enforcement, complaints handling, and public education. Attention is given to the subsidiary objectives that guide regulatory action, as set out in enabling legislation, policy frameworks and strategic instruments.

[196] Department of Culture, Communications and Sport, Online Safety and Media Regulation Act 2022 (2025). Link includes background and overview. Also see NZ DIA, International Regulatory Frameworks for Online Content (2021) for an overview.
[197] Online Safety and Media Regulation Act 2022.
[198] NZ DIA, International Regulatory Frameworks for Online Content (2021), Section III.
[199] Online Safety and Media Regulation Act 2022 (Ireland) s139A.
[200] Online Safety and Media Regulation Act 2022 (Ireland) s139D.
[201] NZ DIA, International Regulatory Frameworks for Online Content (2021), p. 92.
[202] Online Safety and Media Regulation Act 2022 (Ireland) Ch 2.
[203] NZ DIA, International Regulatory Frameworks for Online Content (2021), p. 110–111.
[204] NZ DIA, International Regulatory Frameworks for Online Content (2021), p. 131.

5.14.1 Australia

Overview

5.14.1.1 Relevant bodies exercise the following regulatory powers and responsibilities:

- **content moderation** vis-à-vis online safety and other media [5.14.1.25], [5.14.1.35].
- **making rules/standards** vis-à-vis online safety, education [5.14.1.26], privacy [5.14.1.27], and advertising [5.14.1.33].
- **handling complaints** vis-à-vis online safety, privacy [5.14.1.27], and advertising [5.14.1.33].
- **compliance functions** vis-à-vis online safety, privacy [5.14.1.27], education [5.14.1.26, 5.14.1.29], mis/disinformation [5.14.1.30]; consumer protections [5.14.1.31]; and advertising [5.14.1.33].
- **informing/educating** vis-à-vis online safety, communications [5.14.1.25], education [5.14.1.26], [5.14.1.28], privacy [5.14.1.27], online gambling [5.14.1.30], [5.14.1.37], mis/disinformation [5.14.1.30]; children's rights [5.14.1.32], and product/service certification [5.14.1.34], [5.14.1.36].

eSafety Commission

5.14.1.2 The eSafety Commissioner ("eSafety") was established under the OSA (Cth)[205] to promote online safety.[206] Its main functions include:

- **handling complaints** from the public [5.14.1.4]–[5.14.1.5].
- **moderating harmful content** online [5.14.1.7].
- **making rules/standards** for online industry service providers.
- **promoting, monitoring and enforcing compliance**.
- **informing and educating** the public.

5.14.1.3 eSafety has additional functions to:

- grant financial assistance.
- support, encourage, conduct, and evaluate research.
- coordinate related Department, authority, and agency activities.
- consult and cooperate with persons, organisations and governments,[207] with specific powers to establish advisory committees[208] and
- responsibilities and duties to invite consultation before making or varying industry standards.[209]

Handling complaints

5.14.1.4 eSafety **handles complaints** from the public about:

- **harmful content.**[210]

[205] OSA (Cth) s26.
[206] OSA (Cth) s27(1)(b).
[207] OSA (Cth) s27.
[208] OSA (Cth) s183A.
[209] OSA (Cth) s148.
[210] OSA (Cth) s30, 32, 33 (objections), 36, 38(1)(a), 38(1)(b), 38(2).

- **online service provider breaches** of registered codes and industry standards.[211] service provider rules,[212] non-compliance with class 1 and class 2 content moderation powers[213] and directions to comply with industry codes.[214]

5.14.1.5 Receiving a complaint empowers eSafety to **commence an investigation** [5.14.1.5][215] or exercise a broader range of **content moderation powers** [see 0].

5.14.1.6 eSafety may **investigate complaints**, with specific powers to make inquiries and obtain information for the purposes of such investigations,[216] including:

- compelling appearance for examinations.[217]
- compelling document production for inspection.[218]
- obtaining end-user identity information or contact details.[219]

Content moderation

5.14.1.7 eSafety can exercise **content moderation powers** [5.14.1.7] if it receives a complaint about **cyber-bullying material and non-consensual intimate images** [5.14.1.4]–[5.14.1.5]. eSafety may exercise content moderation powers in relation to **Class 1 material, Class 2 material** and **Abhorrent violent conduct** without receiving a complaint.

5.14.1.8 eSafety can respond to **cyberbullying material directed at a child** by:

- requiring social media, direct messaging, multiplayer gaming and content delivery/access (or hosting) services to **remove (or cease hosting)** the material.[220]
- requiring end-users to **ensure the removal of** cyberbullying material they have posted,[221] apologise to the child,[222] and refrain from cyberbullying them further.[223]

5.14.1.9 eSafety can respond to other kinds of harmful content by:

- requiring social media, direct messaging, multiplayer gaming and content delivery/access (or hosting) services to:
  - **remove (or cease hosting) or restrict access to** 'high-impact' class 2 material.[224]
  - **ensure the removal of / cease hosting** cyberbullying material,[225] intimate images posted without consent,[226] class 1 material,[227] and pornographic class 2 material.[228]
- **requiring end-users to:**

[211] OSA (Cth) s40: also see ss39, 146.
[212] OSA (Cth) s39; also see ss153–154.
[213] OSA (Cth) s39; also see ss111, 116, 121, 125, 129.
[214] OSA (Cth) ss39, 143.
[215] OSA (Cth) ss31, 34, 37.
[216] OSA (Cth) ss31, 34, 37, 42
[217] OSA (Cth) s199.
[218] OSA (Cth) s203.
[219] OSA (Cth) s194. These powers are available for all regulatory functions, not just investigations.
[220] OSA (Cth) s65 –66.
[221] OSA (Cth) s701)(e).
[222] OSA (Cth) s 70(1)(g).
[223] OSA (Cth) s70(1)(f).
[224] OSA (Cth) ss119–120.
[225] OSA (Cth) ss88, 90.
[226] OSA (Cth) ss77, 79.
[227] OSA (Cth) ss109, 110.
[228] OSA (Cth) ss114–115.

    - **ensure the removal of** cyberbullying material[229] and non-consensual intimate images they have posted.[230]
    - refrain from posting further intimate images without consent.[231]
- requiring internet search engine services and app distribution services to **cease facilitating access** to class 1 material.[232]
- requesting or requiring internet service providers to **disable access** to material that promotes, incites, instructs or depicts abhorrent violent conduct, and is likely to cause significant harm to the Australian community.[233]

5.14.1.10 In *Baumgarten v eSafety Commissioner*, eSafety reported that, over a 12-month period, it had issued "three or four" removal notices (the predominant mechanism for requiring services to prevent/minimise access to identified harmful content). In that period, it also provided "a few hundred" informal '**complaint alerts**'. A Federal Tribunal found that one such 'alert' amounted to a removal notice.

Justice Kyrou noted that complaints alerts are "the [eSafety] Commissioner's predominant regulatory mechanism" despite "no express statutory basis". The relative lack of transparency and accountability is associated with "the risk of the rights and interests of end users or persons who are the subject of online material being affected by inconsistent action based on the subjective and potentially undocumented views of individual investigators". Furthermore, "the Commissioner does not give to the end user who made the post any notice of a right of merits review" which could deprive end-users of free speech protections.[234]

Making rules/standards

5.14.1.11 eSafety can **make rules/standards** by:

- directing a service to comply with registered[235] **industry codes** [o][236]
- making **industry standards** that prevail over industry codes,[237] when codes are insufficient or do not exist[238]
- making **service provider determinations**.[239]

5.14.1.12 eSafety has registered **15 industry codes** and developed **two industry standards** covering Class 1 and Class 2 material [1.1.3.3]–[1.1.3.4].[240]

[229] OSA (Cth) s89.
[230] OSA (Cth) s78.
[231] OSA (Cth) s83.
[232] OSA (Cth) ss124, 128.
[233] OSA (Cth) ss95, 99. Exemptions apply, eg law enforcement, judicial proceedings, journalism, advocacy: s104.
[234] Baumgarten v eSafety Commissioner (Guidance and Appeals Panel) [2025] ARTA 59; Administration Power and the Law – Training Series, eSafety Commissioner news – When is a non-notice a notice? (2025).
[235] OSA (Cth) s140: industry codes must contain appropriate community safeguards to be registered.
[236] OSA (Cth) s143. eSafety can also request sections of online industry to develop industry codes: ss141, 141A.
[237] OSA (Cth) s150.
[238] OSA (Cth) s145.
[239] OSA (Cth) s151. These are additional rules regarding class 1 and class 2 that apply to social media, direct messaging, multiplayer gaming, content delivery/access, hosting and/or internet carriage services. Exemptions apply: s152.
[240] eSafety, Register of industry codes and industry standards for online safety (2025).

5.14.1.13 Of these, six codes and two standards are currently in effect,[241] covering most[242] Class 1 material. They apply to social media, app distribution, hosting, internet carriage and equipment services.[243]

5.14.1.14 The remaining nine codes cover other Class 1 and all Class 2 material.[244] These codes have been registered and will come into effect by 27 December 2025 or 9 March 2026.[245] They cover **material that promotes self-harm**[246] as well as:

- simulated gambling.[247]
- high-impact sexually explicit material.[248]
- high-impact violence material.[249]
- violence instruction material.[250]
- online pornography, encompassing Class 1C,[251] Class 2A[252] and Class 2B[253] material.[8]

5.14.1.15 The **objectives** of these codes are to protect and prevent children from accessing or being exposed to, and to provide end-users with effective information, tools and options to limit access and exposure to the relevant content.[254]

5.14.1.16 The codes contain different compliance measures for the following **service types**:

- social media services.[255]
- social media messaging services.[256]
- direct messaging and multiplayer gaming services.[257]
- content access/delivery services.[258]
- hosting services.[259]
- internet carriage services.[260]
- internet search engines.[261]

[241] eSafety, Register of industry codes and industry standards for online safety (2025).
[242] Class 1A iss child sexual exploitation, pro-terror material, and extreme crime and violence material; Class 1B is drug-related and other crime and violence material: eSafety, Consolidated Industry Codes of Practice for the Online Industry (Class 1A and Class 1B Material) Head Terms (2023), 2.1.
[243] eSafety, Register of industry codes and industry standards for online safety (2025). The last of these came into effect on 22 December 2024.
[244] eSafety, Consolidated Industry Codes of Practice for the Online Industry (Class 1C and 2 Material) Head Term (2025), 2.1.
[245] eSafety, Register of industry codes and industry standards for online safety (2025). Codes for hosting, internet carriage and internet search engines come into effect on 27 December 2025.
[246] Material that encourages, promotes or provides instruction for suicide, deliberate self-injury, and/or eating disorder or associated behaviours: eSafety, Consolidated Industry Codes of Practice for the Online Industry (Class 1C and 2 Material) Head Term (2025), 2.1.
[247] Computer games that contain simulated gambling that are, or would be, rated R 18+.
[248] Descriptions of sexual activity in a high impact manner.
[249] Depictions of shocking, gratuitous or exploitative images of violence against people or animals and/or gore that are real images, or images that are presented as if they are real.
[250] Material that encourages, promotes or provides instruction for physical violence that is intended to cause grievous bodily harm to, or kill another person.
[251] Descriptions or depictions of specific fetish practices or fantasies that are not Class 1A material [1.7.1.2].
[252] Material that is or would be classified as X18+ because it depicts actual (not simulated) sexual activity between consenting adults, including deepfakes and images.
[253] High-impact sexually explicit images, including high-impact nudity and deepfakes, that is not Class 2A material.
[254] eSafety, Consolidated Industry Codes of Practice for the Online Industry (Class 1C and 2 Material) Head Term (2025), 4.
[255] eSafety, Schedule 4 – Social Media Services (Core Features) Online Safety Code (Class 1C and Class 2 Material) (2025). Compliance measures further vary according to whether terms of service allow certain content: s6(a).
[256] eSafety, Schedule 4A – Social Media Services (Messaging Features) Online Safety Code (Class 1C and Class 2 Material) (2025).
[257] eSafety, Schedule 5 – Relevant Electronic Services Online Safety Code (Class 1C and Class 2 Material) (2025).
[258] eSafety, Schedule 6 – Designated Internet Services Online Safety Code (Class 1C and Class 2 Material) (2025).
[259] eSafety, Schedule 1 – Hosting Services Online Safety Code (Class 1C and Class 2 Material) (2025).
[260] eSafety, Schedule 2 – Internet Carriage Services Online Safety Code (Class 1C and Class 2 Material) (2025).
[261] eSafety, Schedule 3 – Internet Search Engine Services Online Safety Code (Class 1C and Class 2 Material) (2025).

- app distribution.[262]
- equipment provision services.[263]

5.14.1.17 **Compliance measures** vary according to the service [5.14.1.15], level of assessed risk,[264] and content category. Compliance measures include:

- risk assessments, including the likelihood of children accessing or being exposed to certain content, and AI bots generating certain content.[265]
- age assurance and access control.[266]
- content detection and removal.[267]
- safety tools, settings and supports.[268]
- provision of information to end-users.[269]
- specific requirements vis-à-vis AI bots.[270]
- engagement with safety and community organisations.[271]
- communications with eSafety, including compliance reporting.[272]
- reporting and complaints mechanisms.[273]
- review requirements.[274]

Compliance

5.14.1.18 eSafety **promotes and monitors compliance** through its investigative powers [5.14.1.5] as well as powers to:

- advise and assist persons with obligations under the OSA Cth.
- write and promote guidelines on age restriction controls and dispute resolution best practices.[275]
- request information under the basic online safety expectations [0]–[0].

[262] eSafety, Schedule 7 – App Distribution Services Online Safety Code (Class 1C and Class 2 Material) (2025).
[263] eSafety, Schedule 8 – Equipment Online Safety Code (Class 1C and Class 2 Material) (2025).
[264] For example, social media services must assess the risk of the chatbot generating relevant material or children accessing or being exposed to the material is to be assessed as high (Tier 1), moderate (Tier 2) or low (Tier 3): s4.
[265] Children 4.2(b): online pornography, self-harm material or high-impact violence material; AI 4.1, Generative AI restricted categories are self-harm-material, online pornography, high-impact sexually explicit material, high-impact violence material, and violence instruction material: Head Terms 2.1.
[266] For example, age assurance and access control measures must be implemented and monitored before providing access to online pornography and self-harm material for social media services that allow the posting of such material: Schedule 4, s7.1.
[267] For social media services that do now allow posting of self-harm, violent or pornographic material: Sch4, s8.
[268] For example, appropriate safety tools must be provided for end-users to limit their access or exposure to online pornography, self-harm material and high impact violence, such as age gates, filtering, blocking, blurring, halting, notices, and algorithm controls. Appropriate default settings must be provided for child users (for violence only: Schedule 4, 7.2. Also personnel requirements: 9.2, 9.7
[269] For example, information about tools and settings: 7.3, clear terms and conditions: 9.1, reporting and complaints mechanisms: 9.6; eSafety roles, functions and complaints mechanisms: 9.12; the code and access to counselling and supports: 9.13; and service actions: 9.14
[270] For example, social media services may impolement safety by design default as alternatives to age assurance measures for generative AI bots: 10.2.
[271] For example, social media services must engage safety and community organisations to protect prevent children accessing or being exposed to all Class 1C and Class 2 material: Sch4, s9.11.
[272] For example, annual reporting: 7.4 or upon request: 8.4, timely referral of unresolved complaints: 9.9, relevant technology updates: 9.10
[273] For example, social media services must provide options for end-users to report and complain about online pornography, self harm, high impact violence and simulated gambling: 9.3-9.5
[274] For example, social media services must annually review effectiveness of report and complaints systems: 9.8
[275] OSA (Cth) s27.

- publish statements regarding compliance or contraventions with basic online safety expectations[276] and related reporting obligations,[277] as well as content moderation notices[278] and platform-based age restrictions.[279]
- issue formal warnings for non-compliance.[280]

eSafety has issued **32 'transparency notices'** including reporting obligations and requests for information.[281]

5.14.1.19 The OSA (Cth) Review [0] proposed additional/expanded regulator powers similar to Ofcom powers including business disruption powers [cf 5.14.2.14][282] and industry code writing powers [cf 5.14.2.7].[283] Additional recommendations were included.[284]

5.14.1.20 eSafety can **compel compliance** through its investigation powers [5.14.1.5] by requiring services to report on their compliance with basic online safety expectations,[285] or to take specified actions to remedy contraventions of service provider determinations.[286]

5.14.1.21 eSafety can **enforce compliance** by applying to a relevant federal court for orders to:

- enforce civil penalty provisions.[287]
- issue infringement notices,[288] enforcement undertakings[289] and injunctions[290] for non-compliance with certain provisions.[291]
- require certain services to cease operations.[292]

eSafety has commenced **three Federal Court proceedings**.[293]

Informing/educating

5.14.1.22 eSafety **informs/educates** the public by:

- collecting, analysing, interpreting and disseminating information.
- supporting, encouraging, conducting, accrediting and evaluating educational, promotional and community awareness programs.

[276] OSA (Cth) s48.
[277] OSA (Cth) ss55, 62.
[278] OSA (Cth) ss 73(2), 85(2), 93(2), 113A, 125A: for repeated contraventions.
[279] OSA (Cth) ss63J–63K.
[280] OSA (Cth) ss68, 81, 92, 112, 117, 122, 126, 130 (removal notices); 51, 54, 58, 61 (reporting obligations); 147 (industry standards); 155 (service provider determinations); 76 (end-user prohibitions against posting intimate images without consent).
[281] eSafety, Responses to transparency notices (2025).
[282] OSA (Cth) Review, Recommendation 42.
[283] OSA (Cth) Review, Recommendation 9.
[284] OSA (Cth) Review, Recommendations 46–49, 52–63.
[285] OSA (Cth) ss49, 52, 56, 59.
[286] OSA (Cth) s154.
[287] OSA (Cth) s162: eg, see, ss 50, 53, 57, 60, 63H, 67, 80, 83, 91, 103, 111, 116, 121, 125, 129, 154, 205.
[288] OSA (Cth) s163.
[289] OSA (Cth) s164.
[290] OSA (Cth) s165.
[291] OSA (Cth) ss50, 53, 57, 60 (reporting notices); ss63D, 63DA, 63DB, 63H (platform-based age restrictions); ss67, 80, 91, 111, 116 (removal notices); ss71 (injunctions only), 75, 83 (end-user notices/directions); s103 (blocking notice – enforcement undertakings and injunctions only); ss121, 125, 129 (other content moderation notices); ss143, 146 (industry codes and standards duties); s195 (requests for user details – injunctions only).
[292] OSA (Cth) ss156–159. Social media, direct messaging, multiplayer gaming and content delivery/access services may be ordered to cease service provision upon repeated contraventions relating to class 1/2 material where continued operation represents a significant community safety risk.
[293] eSafety, Federal Court proceedings involving eSafety (2025).

- publishing reports and papers.
- advising and reporting to the Minister,[294] and preparing annual reports.[295]

5.14.1.23 eSafety has published a wide range of **educational resources** online including toolkits, tip sheets, webinars and referral lists for:

- Specific age groups, including eSafetykids and eSafetyyoung people.
- educators including training resources[296] and classroom resources.[297]
- Parents and carers.[298]
- Australian community.[299]

5.14.1.24 eSafety has published some **mental health and wellbeing resources**, although this does not appear to be a prioritised area: it is absent from many topic lists, and resources are not easy to find. Available resources include How to look after your mental health and wellbeing online, Mental wellbeing resources for families, Counselling and support services, Counselling and mental wellbeing support for young people. In the past, mental health-specific webinars have been provided.

Government departments and agencies

5.14.1.25 The **Department of Infrastructure, Transport, Regional Development, Communications, Sports and the Arts** has relevant communications functions. Relevant activities include:

- Government response to the Roadmap for Age Verification,[300] committing to undertake research into potential age-limits to be imposed on social media.[301]
- **making rules/standards**, including new classifications to video games that contain gambling like content.[302]
- **informing/educating** the public through the News Media Assistance Program, funding the first National Media Literacy Strategy,[303] and development of student media literacy resources for schools.[304]

5.14.1.26 The Commonwealth **Department of Education** supports the social and emotional development of students through:

- **making rules/standards** for National Student Wellbeing Program which requires officers to undertake eSafety's cyberbullying Professional Learning Package [5.14.1.23].
- **informing/educating** the public Student Wellbeing Hub with some resources relevant to digital technology harms.

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[294] OSA (Cth) s27.
[295] OSA (Cth) s183.
[296] Including Best Practice Framework for Online Safety Education, eSafety Early Years professional learning, Professional learning for teachers, and eSafety training for National Student Wellbeing Program
[297] Including eSafety schools' hub, Webinars and Toolkit for Schools
[298] Including webinars and the Online safety book;
[299] Including Social media self-defence and Working with children and young people; eSafety Guide with app-specific advice; Trusted eSafety Provider program endorsing esafety providers.
[300] Government response to the Roadmap for Age Verification (2023).
[301] https://parlinfo.aph.gov.au/parlInfo/download/library/prspub/9901268/upload_binary/9901268.pdf [r69] ; Senate Environment and Communications Legislation Committee, Estimates, Official Committee Hansard, 30 May 2024, 38.
[302] New classifications for gambling-like content in video games (2024).
[303] https://www.infrastructure.gov.au/media-communications-arts/news-map
[304] include eSmart Media Literacy Lab (12-16); eSmart Digital Licence+ (10-14); eSmart Junior Digital Licence+ (4-9): New media literacy resources for all secondary schools (2023).

Statutory bodies

5.14.1.27 The **Office of the Australian Information Commissioner** is an independent agency responsible for regulating privacy, freedom of information and government information policy matters.[305] Its functions include:

- **making rules/standards** including the Children's Online Privacy Code (currently in development) specifying how online services accessed by children must comply with the Australian Privacy Principles.[306]
- **monitoring/promoting compliance** including through privacy assessments[307] and in relation to platform-based age restrictions [5.15.1.5].[308]
- **handling complaints** including powers of investigation.
- **informing/educating** the public[309] including on online privacy matters.[310]

5.14.1.28 The **Australian Curriculum, Assessment and Reporting Authority** is an independent statutory responsible for developing the national school curriculum.[311] Recent updates include new privacy and security content in the Digital Technologies learning area, including links to eSafety resources [5.14.1.23].[312]

5.14.1.29 The **Tertiary Education Quality and Standards Agency** is an independent agency with relevant compliance, investigative, research, accreditation, and registration powers.[313] Notably, the *Higher Education Standards Framework (Threshold Standards) 2015* includes minimum standards for higher education providers, encompassing online safety matters.[314]

5.14.1.30 The **Australian Communications and Media Authority** is the independent authority that regulates communications and media services in Australia. While its remit does not generally include online services, it does have powers under the *Interactive Gambling Act 2001*[315] which prohibits gambling providers from offering some online services.[316] It also oversees the voluntary Australian Code of Practice on Disinformation and Misinformation.[317] It provides information about online gambling[318] and dis/misinformation.[319]

5.14.1.31 The **Australian Competition and Consumer Commission** is the independent authority with compliance powers under consumer law.[320] It regulates Digital ID, accrediting and

[305] Established under the *Australian Information Commissioner Act 2010* (Cth) s5; also see ss7–9.
[306] *Privacy and Other Legislation Amendment Act* (Cth) 2024.
[307] OAIC, Privacy assessments (2025).
[308] OSA (Cth) s63K.
[309] https://www.oaic.gov.au/about-the-OAIC
[310] https://www.oaic.gov.au/privacy/your-privacy-rights/social-media-and-online-privacy
[311] *Australian Curriculum, Assessment and Reporting Authority Act 2008* (Cth).
[312] Celebrate World Teachers' Day 2024 (2024).
[313] Established under the *Tertiary Education Quality and Standards Agency Act 2011* (Cth).
[314] https://www.teqsa.gov.au/guides-resources/resources/guidance-notes/guidance-note-wellbeing-and-safety
[315] https://www.acma.gov.au/our-role-compliance-and-enforcement
[316] https://www.acma.gov.au/about-interactive-gambling-act
[317] https://www.acma.gov.au/online-misinformation
[318] https://www.acma.gov.au/online-gambling-services
[319] https://www.acma.gov.au/online-misinformation
[320] *Competition and Consumer Act 2010*

approving organisations that provide services for people to verify their identity online.[321] It has also recently completed a broad range of reviews into online matters.[322]

5.14.1.32 The **National Children's Commissioner** has functions relating to children's human rights.[323] It does not appear to focus on digital technology benefits or risks. It ran a cyber-bullying campaign in 2012–13 with a video competition for students. It offered privacy teaching resources but the link is broken, and it is unclear whether it addressed online privacy.

Self-regulation bodies

5.14.1.33 Advertising regulation operates through a self-regulatory model where industry regulates itself through two independent bodies. The **Australian Association of National Advertisers** (AANA) is responsible for **making rules/standards** including the Children's Advertising Code.[324] It also provides training resources to industry.[325] **Ad Standards** is responsible for **promoting/monitoring compliance** with the Advertising Codes, and **handling complaints**.[326]

5.14.1.34 The **Australian Telecommunications Alliance** is the peak body of the Australian telecommunications industry. It is responsible for the Family Friendly Filter program which certifies internet filtering products for effectiveness, ease of use, configurability and availability of support, aligning with national Classification Guidelines.

Classification and certification bodies

5.14.1.35 The **Classification and Classification Review Boards** determine the classification of publications, films and computer games in Australia.[327] These classifications are used in the OSA (Cth).

5.14.1.36 **Standards Australia** is an independent body that develops and adopts internationally-aligned standards in Australia. It represents the International Organization for Standardization (ISO) and shares a memorandum of understanding with the Australian Government.[328]

Proposed bodies

5.14.1.37 In 2023, the Standing Committee on Social Policy and Legal Affairs recommended the establishment of a **national online gambling regulator** to focus on harm reduction, with licensing and regulatory functions, and a mandate to run public awareness campaigns.[329]

5.14.1.38 In 2024, the Joint Select Committee on Social Media and Australian Society recommended the establishment of a **Centre of Digital Educational Excellence**

[321] https://www.accc.gov.au/by-industry/digital-platforms-and-services/digital-id-regulation
[322] Competition and Consumer (Price Inquiry— Digital Advertising Services) Direction 2020.
[323] was established in the *Australian Human Rights Commission Act 1986* (Cth) 46MB
[324] https://aana.com.au/self-regulation/codes-guidelines/aana-code-for-advertising-marketing-communications-to-children/
[325] https://aana.com.au/self-regulation/codes-guidelines/aana-code-for-advertising-marketing-communications-to-children/
[326] https://adstandards.com.au/about/ad-standards/
[327] https://www.classification.gov.au/about-us/legislation; *Classification (Publications, Films and Computer Games) Act 1995*
[328] https://www.industry.gov.au/sites/default/files/2018-12/standards-australia-memorandum-of-understanding-13-november-2018.pdf
[329] You win some, you lose more

modelled on existing co-operative research centres to act as a thought leader in relation to communication technology, media and digital literacy skills in children and students.[330]

5.14.2 United Kingdom

Overview

5.14.2.1 Relevant bodies exercise the following regulatory powers and responsibilities:

- **content moderation** vis-à-vis online safety [00] and general media [5.15.2.29].
- **making rules/standards** vis-à-vis education [5.14.2.20], [5.14.2.22], privacy [5.14.2.25], gambling [5.15.2.26], and advertising [5.15.2.28].
- **handling complaints** vis-à-vis online safety [00], education [5.14.2.24], privacy [5.14.2.25], and advertising [5.15.2.28].
- **compliance functions** vis-à-vis online safety [00], education [5.14.2.22], consumer protections [5.14.2.23], privacy [5.14.2.25], gambling [5.15.2.26], children's rights [5.15.2.27], advertising [5.15.2.28], and product/service certification [5.15.2.30].
- **informing/educating** the public vis-à-vis online safety [00], education [5.14.2.20], consumer protections [5.14.2.23], privacy [5.14.2.25], gambling [5.15.2.26], and children's rights [5.15.2.27].

Ofcom

5.14.2.2 Ofcom was established under the *Office of Communications Act 2002* (UK)[331] to support the regulation of communications,[332] and was granted additional powers and responsibilities for online safety in the OSA (UK). Its main functions include:

- **compliance functions** [5.14.2.5]–[5.14.2.14].
- **informing/educating** the public [5.14.2.15]–[5.14.2.17].
- **moderating harmful content** online [5.14.2.18].
- **handling complaints** [5.14.2.19].

5.14.2.3 Ofcom also has certain **reporting duties** regarding its own functions, including:

- compatibility with freedoms of expression and privacy protections.[333]
- regulatory impacts on news publisher and journalistic content.[334]
- issuance of 'section 121 notices', which is an enforceable direction issued by Ofcom requiring an online service to use accredited technical measures to detect, remove, or prevent access to terrorism content and/or child sexual exploitation and abuse (CSEA) content.[335]
- media literacy statements with actions taken and progress made towards strategic objectives and priorities.[336]
- reports in connection with investigations into deaths.[337]

[330] Social media: the good, the bad, and the ugly; Study Buddy or Influencer
[331] OSA (UK) s1(1).
[332] OSA (UK) s2(1).
[333] OSA (UK) s156.
[334] OSA (UK) s158.
[335] OSA (UK) s121.
[336] OSA (UK) s166(6)–(8).
[337] OSA (UK) s163.

- online safety matters.[338]

5.14.2.4 Ofcom has additional functions to:

- have regard to strategic priorities from the Secretary of State,[339]
- consult with relevant persons, including general obligations[340] and specific duties for disinformation and misinformation[341] and when preparing codes of practice [5.14.2.7],[342]
- research and development[343] including general duties to encourage availability of easily usable electronic communications apparatus,[344] and specific duties to publish reports on age assurance,[345] use of app stores by children,[346] researchers' access to information,[347] and user experiences,[348]
- share, attain and compel retention of a deceased child's information for investigations,[349]
- assume functions transferred from other regulatory bodies and the Secretary of State.[350]

Compliance

5.14.2.5 Ofcom **promotes compliance** by:

- providing and reviewing non-binding guidance to services on how to comply with relevant duties through **codes of practice** [5.14.2.7] and **risk profiles** [5.14.2.6].
- issuing **additional guidance** on specific matters [5.14.2.8].
- maintaining a **registry** of services with additional statutory duties [5.13.2.8].[351]
- reviewing regulatory burdens.[352]

5.14.2.6 Ofcom publishes **risk profiles** with guidance for Part 3 services to comply with risk assessment duties [5.13.2.24]–[5.13.2.24], [5.13.2.30].[353] Risk profiles may be prepared for groups of Part 3 services with shared characteristics and risk levels.[354] Specific consideration of risks of harm to children in different age groups is required.[355]

Ofcom has published a **Children's Register of Risks** which includes two non-designated content categories of depression content and body stigma content.[356]

[338] OSA (UK) s164.
[339] OSA (UK) s92.
[340] OSA (UK) ss16–21; also see s91 for general duties under the *Communications Act 2003* (UK) (CA).
[341] CA s152.
[342] OSA (UK) s41(6).
[343] CA s1(5); also see ss14–15; also note recommendations from the Parliamentary Education Committee that OFCOM assess the safety and reliability of edtech: [131].
[344] CA s10.
[345] OSA (UK) s157.
[346] OSA (UK) s161.
[347] OSA (UK) s162.
[348] OSA (UK) s154.
[349] OSA (UK) s101.
[350] OSA (UK) s2, Schedule 1.
[351] OSA (UK) s95.
[352] CA s6–7; also see OSA (UK) s93.
[353] OSA (UK) s99.
[354] OSA (UK) s98(6).
[355] OSA (UK) s98(c).
[356] OFCOM, Children's Register of Risks (2025) Chs 10–11.

5.14.2.7 Ofcom publishes **codes of practice**[357] to describe measures recommended for Part 3 services to comply with applicable duties.[358] Codes are subject to Ministerial[359] and Parliamentary approval.[360]

Ofcom has published codes of practice for the protection of children by user-to-user services and search services.

- *These codes may include specific information about the mental health and wellbeing of children and young people.*

5.14.2.8 Ofcom must issue **additional codes of practice** with guidance on:

- primary priority content and priority content.[361]
- user identity verification options[362] and age restriction duties that apply to regulated pornographic content.[363]
- transparency, accountability and freedom of expression protections.[364]
- Transparency reporting.[365]
- Deceased Child Users.[366]
- enforcement operations [5.14.2.13][367] and content moderation operations [5.14.2.18].[368]
- protecting women and girls.[369]
- super-complaints [5.14.2.19].[370]

Ofcom has produced **additional guidance** in:

- Children's access assessments Guidance.
- Children's Risk Assessment Guidance and Children's Risk Profiles.
- Guidance on Content Harmful to Children.
- Record-Keeping and Review Guidance with a Protection of children template.
- Guidance on highly effective age assurance: For Part 3 services.[371]
- Guidance on highly effective age assurance and other Part 5 duties: For Part 5 services.

5.14.2.9 Ofcom **monitors compliance** through **transparency reporting** and **information-gathering** powers, which it uses for **investigations** and **enforcement programmes**, of:

- entry, inspection and audit,[372]
- holding interviews;[373]
- compelling production of reports by skilled persons;[374]

[357] OSA (UK) Pt 3, Ch 6.
[358] OSA (UK) s41. Not all duties: see s52 & Pt 4, Chap 2.
[359] OSA (UK) s43(1); 44.
[360] OSA (UK) s43. They can be issued if no resolution is made within 40 days.
[361] OSA (UK) s53.
[362] OSA (UK) s65.
[363] OSA (UK) s82.
[364] OSA (UK) s73.
[365] OSA (UK) s78.
[366] OSA (UK) s76.
[367] OSA (UK) s151.
[368] OSA (UK) s127.
[369] OSA (UK) s54.
[370] OSA (UK) s171.
[371] Also see Proposed Codes at a glance.
[372] OSA (UK) ss107–8.
[373] OSA (UK) s106.
[374] OSA (UK) s104.

- requiring certain information.[375]

5.14.2.10 Ofcom oversees **transparency reporting** by making annual requests from some larger Part 3 services to provide information [5.13.2.8]. Ofcom must produce **transparency reports** based on these reports containing observed patterns or trends and measures considered good industry practice.[376] Ofcom must also produce reports on regulated services' reporting and complaints procedures.[377]

5.14.2.11 At the time of writing, Ofcom has commenced 11 **investigations** on pornography-related age restriction duties and one on an online suicide discussion forum.[378]

Ofcom also operates a "small but risky" supervision taskforce to monitor services too small to attract statutory obligations but risky enough to merit oversight. The taskforce promises rapid enforcement on evidence of non-compliance with illegal/harmful content duties.[379] Forums that provide instruction or promotion of harmful practices such as self-harm/suicide and disordered eating were highlighted as a relevant issue when Ofcom was asked to set up the taskforce.[380]

5.14.2.12 Ofcom established relevant **enforcement programs** in relation to children's risk assessments[381] and priority content,[382] and age assurance vis-à-vis protecting children from content harmful to children,[383] pornographic content,[384] and on UK video-sharing platforms.[385]

5.14.2.13 Ofcom **compels compliance** through a process involving:

- notifying service providers of suspected[386] and confirmed[387] compliance failures.
- specifying actions for a service provider to take for notified compliance failures.[388]
- publishing details of certain enforcement decisions[389] or requiring others to.[390]
- requiring payment of penalties for non-compliance.[391]

5.14.2.14 Ofcom **enforces compliance** by seeking injunctions, specific performance or other civil remedies,[392] or apply to the court for business disruption measures requiring ancillary

[375] OSA (UK) s100.
[376] OSA (UK) s159.
[377] OSA (UK) s160
[378] Investigation into an online suicide discussion forum and its compliance with duties to protect its users from illegal content;
[379] OFCOM, Letter from Dame Melanie Dawes (2024); Department for Science, Innovation & Technology, What does the Online Safety Act do? (2025).
[380] Department for Science, Innovation & Technology, Letter from the Secretary (2024).
[381] https://www.ofcom.org.uk/online-safety/protecting-children/enforcement-programme-to-monitor-if-services-are-meeting-their-childrens-risk-assessment-duties-under-the-online-safety-act-2023
[382] https://www.ofcom.org.uk/online-safety/protecting-children/enforcement-programme-to-protect-children-from-encountering-pornographic-content-through-the-use-of-age-assurance
[383] https://www.ofcom.org.uk/online-safety/protecting-children/enforcement-bulletin-enforcement-programme-to-protect-children-from-harmful-content-through-the-use-of-age-assurance
[384] https://www.ofcom.org.uk/online-safety/protecting-children/enforcement-programme-to-protect-children-from-encountering-pornographic-content-through-the-use-of-age-assurance
[385] https://www.ofcom.org.uk/online-safety/protecting-children/cw_01266
[386] OSA (UK) s130(1). Most duties constitute enforceable requirements: 131.
[387] OSA (UK) s132
[388] OSA (UK) ss133–136.
[389] OSA (UK) s149.
[390] OSA (UK) s150.
[391] OSA (UK) ss132–3, 139–141.
[392] OSA (UK) s133(9).

services/access facilities to act in place of service provider intransigence.[393] Ofcom can also carry on criminal proceedings.[394]

Informing/educating

5.14.2.15 Ofcom **informs/educates** the public by:

- preparing and publishing successive **media literacy strategies.**[395]
- providing **consumer advice** on online protections,[396] and encouraging the development and use of related technologies and systems.[397]

5.14.2.16 Ofcom has **published media literacy strategies** in 2021[398] and 2023.[399] Its media literacy work operates through a Making Sense of Media program[400] supported by an advisory panel,[401] Research, Evidence and Evaluation Working Group[402] and Online Information Advisory Committee.[403] Ofcom advocates for improved teacher training supported by a statutory curriculum-aligned mandate for media literacy teaching in schools.[404] Related Ofcom activities include:

- commissioning organisations to improve online media literacy skills among at-risk groups, including children aged 10–14.[405]
- publishing media literacy intervention resources including an evaluation toolkit[406] and guidance on Best Practice Design Principles.[407]
- publishing research papers on 'minority views'[408] and discussion papers on future technology trends and implications.[409]

5.14.2.17 Ofcom has published **consumer guidance** on:

- Age checks for online safety – what you need to know as a user;
- Online safety rules: what you need to know;
- Protecting your child in the digital world;
- Parental controls for games consoles;
- Parental controls for mobile phones.

Ofcom appears to have little to no consumer guidance specific to mental health; however, it did publish a research report on Mental health and media literacy.

Content moderation

[393] OSA (UK) s144–7.
[394] CA s1(5).
[395] OSA (UK) s166; CA s11.
[396] OSA (UK) s165(3)(1A): includes: (a) nature and impact of harmful content and activities, (b) ways to reduce exposure (c) ways to use/apply features of regulated services, and tools or apps (d) establishing reliability, accuracy and authenticity of content (e) nature and impact mis/disinformation and reduce exposure (f) protection of personal information.
[397] OSA (UK) s165(3)(1B); CA s10
[398] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/approach
[399] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/msom-annual-plan
[400] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/making-sense-of-media
[401] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/msom-panel
[402] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/research-evidence-and-evaluation-working-group
[403] https://www.ofcom.org.uk/about-ofcom/structure-and-leadership/ofcom-establishes-online-information-advisory-committee
[404] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/a-teachable-moment
[405] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/ofcom-supports-organisations-boosting-online-literacy-skills-in-local-communities
[406] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/toolkit
[407] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/best-practice-design-principles-for-media-literacy
[408] Understanding experiences of minority beliefs on online communication platforms (2023); Co-creating ways to navigate and mitigate against mis and disinformation (2025) which discusses "facilitating the shift away from a minority view".
[409] https://www.ofcom.org.uk/media-use-and-attitudes/media-literacy/discussion-papers

5.14.2.18 Ofcom can issue section **121 notices** requiring Part 3 services to identify/remove and/or prevent users from encountering terrorist/CSEA content.[410] Ofcom must first obtain a skilled person's report[411] and issue a warning notice.[412]

Handling complaints

5.14.2.19 Ofcom's functions for **handling complaints** are limited to receiving super-complaints from specific entities regarding regulated service harms.[413] The Secretary of State may make (but has not yet made) regulations about which entities can make super-complaints, and what Ofcom must do in response.[414] Regulations have been drafted.[415]

Government departments and agencies

5.14.2.20 The **Department of Education** supports school education through:

- **making rules/standards** by setting national curriculum, including online safety lessons,[416] and issuing statutory guidance and standards, including filtering and monitoring systems[417] and education,[418] and non-statutory guidance.[419]
- **education/informing** the public by setting national curriculum and providing school funding grants.[420]

5.14.2.21 Other Government Departments may have relevant functions depending on policy; for example, a Private Members' Bill currently before Parliament proposes **Chief Medical Officers** publish advice for parents and carers on children's use of smartphones and social media use, with the **Department for State for Science, Innovation and Technology** to assess the impact of use of social media on children, and age consent technologies.[421]

Non-Ministerial Departments

5.14.2.22 The **Office for Standards in Education, Children's Services and Skills** is a non-ministerial department with responsibilities for schools including:

- **making rules/standards** for early years and children's social care services;
- **monitoring/promoting compliance** through inspections of services providing education, training and care, and reporting on its findings.[422]

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[410] OSA (UK) ss121, 125. Using accredited technology or developing/sourcing suitable technology with minimum standards of accuracy.
[411] OSA (UK) s122.
[412] OSA (UK) s123.
[413] OSA (UK) s169.
[414] OSA (UK) s170.
[415] Draft Online Safety Super-Complaints (Eligibility and Procedural Matters) Regulations 2025. Also see Government response to consultation (2025).
[416] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [64].
[417] Keeping children safe in education (2023).
[418] Eg Relationships and sex education (RSE) and health education (2019); also note Parliamentary Education Committee "Screen time" recommendations for increased training and support for teachers delivering digital literacy and additional core content on online safety: [75].
[419] Eg Mobile phones in schools (2024) [see 0]; also note Parliamentary Education Committee "Screen time" recommendations for non-statutory guidance on digital safety and subject knowledge enhancement courses: [76]
[420] Note Parliamentary Education Committee "Screen time" recommendations for device management funding and renewal strategy: [136].
[421] Protection of Children (Digital Safety and Data Protection) Bill.
[422] Office for Standards in Education, Children's Services and Skills, About Us (webpage). https://www.gov.uk/government/organisations/ofsted/about; also note Parliamentary Education Committee "Screen time" recommendations for Oftsted inspection improvements: [83].

5.14.2.23 The Competition and Markets Authority is a non-ministerial government department responsible for promoting competitive markets and addressing unfair practices. Its functions include promoting/monitoring compliance and education/informing the public about rights and obligations under competition and consumer law.[423] It receives complaints but does not handle them directly; devolved consumer advice bodies are available for such a purpose.[424]

Statutory bodies ("non-departmental public bodies")

5.14.2.24 Responsibilities for higher education are devolved in the UK,[425] with the **Office for Students** acting as regulator for higher education in England.[426] There is also the **Commission for Tertiary Education and Research in Wales** and the **Scottish Funding Council**;[427] in Northern Ireland, the Higher Education Division of the Department for the Economy maintains direct responsibilities. The **Office of the Independent Adjudicator** run an independent student complaints scheme for England and Wales.[428]

5.14.2.25 The **Information Commissioner** is an independent public body with regulatory and legislative duties under the *Data Protection Act 2018* (DPA) and *Freedom of Information Act 2000* (FOIA) and others.[429] Its functions include:

- **making rules/standards**, e.g., Children's Code with 15 standards applying general data protection regulations to children using digital services. This is a design and systems style regulation, which requires things like data minimisation and prohibition of nudge techniques and rules to avoid 'dark patterns' or design tricks that encourage children to share more than they need to, or make risky choices;[430]
- **monitoring/promoting compliance** including through providing guidance to organisations,[431] taking enforcement actions, and auditing/oversight activities;[432]
- **handling complaints** regarding data protection and freedom of information matters;[433]
- **informing/educating the public** including on matters like microtargeting, smart product security, and online safety.[434]

5.15.2.26 The **Gambling Commission** is the non-departmental public body responsible for regulating gambling,[435] including remote (online and phone) gambling services.[436] Its functions include:

[423] https://www.gov.uk/government/organisations/competition-and-markets-authority/about
[424] https://www.gov.uk/consumer-advice
[425] https://researchbriefings.files.parliament.uk/documents/CBP-9640/CBP-9640.pdf
[426] https://www.officeforstudents.org.uk/about/ - established under the *Higher Education and Research Act 2017*
[427] https://www.sfc.ac.uk/about-us/
[428] https://www.oiahe.org.uk/about-us/
[429] https://ico.org.uk/about-the-ico/who-we-are/relationship-with-dsit/
[430] Age appropriate design: a code of practice for online services (2020) that contains 15 standards explaining how general data protection regulations apply in the context of children using digital services
[431] https://ico.org.uk/for-organisations/
[432] https://ico.org.uk/action-weve-taken/
[433] https://ico.org.uk/make-a-complaint/
[434] https://ico.org.uk/for-the-public/
[435] *Gambling Act 2005*, amended by *Gambling (Licensing and Advertising) Act 2014*.
[436] https://www.gamblingcommission.gov.uk/about-us/guide/what-we-regulate

- **making rules/standards** including the Licence Conditions and Codes of Practice and Remote gambling and software technical standards;[437]
- **informing/educating** including public advice on online gambling matters;[438] and
- **promoting/monitoring compliance** including through enforcement actions.[439]

It does not handle complaints.[440]

5.15.2.27 UK Children's Commissioners are devolved with the **Office of the Children's Commissioner** in England and Wales,[441] the **Commissioner for Children and Young People Scotland**,[442] and the **Northern Ireland Commissioner for Children and Young People**.[443] They generally have functions of **informing/educating**[444] and **conducting research and investigations**.[445] The first Commissioner appears more focused on representing children's views; the latter are more rights-focused.

Self-regulation bodies

5.15.2.28 Advertising regulation operates through a self-regulatory model where industry regulates itself through two independent bodies. The **Committee of Advertising Practice** (CAP) is responsible for **making rules/standards** including the CAP Advertising Codes which include rules to protect children and young people.[446] It also **promotes compliance** by providing advice and guidance to advertising bodies on how to create campaigns that comply with the rules. The **Advertising Standards Authority** is more directly responsible for **promoting/monitoring compliance** with the Advertising Codes, and **handling complaints**.[447]

Classification and certification bodies

5.15.2.29 The **British Board of Film Classification** is an independent, non-governmental body that has been designated as a classification authority for films and videos under the *Video Recordings Act 1984*.[448] Its decisions can be overridden by local council authorities but this is rare.[449] The legal framework and its application to different forms of media is complex, leading to loopholes.[450] The **Games Rating Authority** classifies games that fall outside the VRA scope's via the PEGI (Pan European Game Information) system.[451]

[437] https://www.gamblingcommission.gov.uk/standards/remote-gambling-and-software-technical-standards/
[438] https://www.gamblingcommission.gov.uk/public-and-players/guide/page/how-gambling-companies-keep-you-safe-while-betting-online
[439] https://www.gamblingcommission.gov.uk/about-us/guide/how-we-regulate
[440] https://www.gamblingcommission.gov.uk/public-and-players/guide/page/how-to-complain
[441] *Children Act 2004* and *Children and Families Act 2014.*
[442] *Commissioner for Children and Young People (Scotland) Act 2003*, amended by the *Children and Young People (Scotland) Act 2014.*
[443] *Commissioner for Children and Young People (Northern Ireland) Order (2003).*
[444] See, eg, Office of the Children's Commissioner comments on Ofcom actions.
[445] See, eg, Office of the Children's Commissioner surveys on children's views and here.
[446] See House of Commons, Advertising to children
[447] https://www.asa.org.uk/about-asa-and-cap/about-regulation/self-regulation-and-co-regulation.html
[448] 4
[449] ALRC https://www.alrc.gov.au/publication/classification-content-regulation-and-convergent-media-alrc-report-118/appendix-3-international-comparison-of-classification-and-content-regulation/the-united-kingdom/
[450] http://news.bbc.co.uk/2/hi/uk_news/8219438.stm
[451] https://gamesratingauthority.org.uk/RatingBoard/about-history

5.15.2.30 **BSI** is the National Standards Body of the UK. It is entirely independent of government but has a memorandum of understanding with the UK government.[452]

5.14.3 Canada

Bodies with relevant powers/responsibilities

5.14.3.1 Canada does not currently have a single, dedicated national regulator with comprehensive responsibility for digital platform oversight. Instead, responsibilities relevant to online content and child safety are distributed across a mix of self-regulatory bodies, statutory regulators with sector-specific mandates, and so on. Other public bodies may also exercise peripheral or indirect influence through functions relating to education, privacy, gambling, advertising, consumer protection, children's rights, and product or service certification.

5.14.3.2 For example, the Canadian Broadcasting Standards Council (CBSC) is a voluntary, self-regulatory organisation that makes rules/standards through codes for private (radio and television) broadcasters. It also handles complaints about programme content and is responsible for media classification on TV.[453] The CBSC is also responsible for the development of a television rating classification system which was approved by the CRTC in 1997.

5.14.3.3 The Canadian Radio Television and Telecommunications Commission (CRTC) is an administrative tribunal with compliance functions for broadcasting and telecommunications. Much of its work seems to focus on competition law.[454]

5.14.3.4 The Government has a National Strategy for the Protection of Children from Sexual Exploitation on the Internet, which coordinates law enforcement, prevention, and victim support efforts.[455] While not a regulatory instrument, the strategy provides an important policy framework relevant to online harms affecting children.

5.14.3.5 Finally, Project Arachnid is a technology-based initiative that supports the automated detection and removal of child sexual abuse material online.[456] It is operated in partnership with law enforcement and online service providers, it plays a significant operational role in addressing the most serious forms of online harm, although it does not exercise regulatory or enforcement powers.

[452] https://www.bsigroup.com/en-GB/about-bsi/national-standards-body/working-with-governments/. Also note proposals: guidance for parents and schools on the educational value of purported educational websites and apps within a year – 'government to commission', and Engage with tech companies to encourage introduction of standards for the use of educational labels and removal of apps which do not offer educational benefit

[453] https://www.cbsc.ca/about-us/

[454] https://crtc.gc.ca/eng/acrtc/acrtc.htm

[455] https://www.securitepublique.gc.ca/cnt/cntrng-crm/chld-sxl-xplttn-ntrnt/actns-nln-chld-sxl-xplttn-en.aspx

[456] https://www.projectarachnid.ca/en/

5.14.4 New Zealand

Bodies with relevant powers/responsibilities

5.14.4.1 New Zealand does not currently have a single, dedicated national regulator with comprehensive responsibility for digital platform oversight. Regulatory bodies relevant to online safety in New Zealand include[457] the Digital Violent Extremism Team (DVET) at Department of Internal Affairs is responsible for **content moderation**.[458] After the 2019 Christchurch terror attack, New Zealand developed the Online Crisis Response Process to facilitate the rapid assessment and coordinated response to online crises between relevant bodies, including government, NGO and industry. Crisis powers include content takedown, blocking or filtering in line with existing laws.[459]

5.14.4.2 New Zealand Media Council is an independent self-regulatory body that **handles complaints** about media content and classification, including some online content.[460]

5.14.4.3 Netsafe is an independent body that **informs/educates** the public on online safety issues.[461]

5.14.4.4 The Broadcasting Standards Authority (BSA) is the statutory authority that regulates the broadcasting standards regime including **handling complaints**, **making rules/standards** and **compliance functions** vis-à-vis broadcasting standards and **informing/educating** the public.[462]

5.14.4.5 Te Mana Whakaatu (Classification Office) is the statutory authority for determining the **classification** of films, videos, and publications in New Zealand.[463] The Film & Video Labelling Body works with the Classification Office.[464]

5.14.4.6 Advertising Standards Authority has a Committee that **makes rules/standards** by developing and reviewing advertising Codes.[465]

5.15 Age-Based Restrictions

This section identifies existing or proposed approaches to restricting or banning children and young people from digital technology use in Australia, Canada, New Zealand, and the UK.

5.15.1 Australia

Overview

5.15.1.1 OSA (Cth) requires **social media services to prevent under-16 users** from having accounts. It also provides a scheme for social media, direct messaging, multiplayer

[457] As identified in Safer Services, p. 5.
[458] Under the the Films, Videos, and Publications Classification Act 1993 (Classification Act): https://www.dia.govt.nz/Countering-Violent-Extremism-Transparency-reports
[459] https://www.dia.govt.nz/diawebsite.nsf/Files/New%20Zealand%20Online%20Process/$file/New%20Zealand%20Online%20Crisis%20Response%20Process.pdf
[460] https://www.mediacouncil.org.nz/
[461] https://netsafe.org.nz/netsafe
[462] https://www.bsa.govt.nz/about-us/
[463] https://www.classificationoffice.govt.nz/about/
[464] https://www.fvlb.org.nz/about/
[465] https://asa.co.nz/about-us/codes-committee/

gaming and content delivery/access services to **restrict 'high-impact' (R18+) material to 18+ users**.

5.15.1.2 **Age verification requirements** either exclude the collection of certain information or are subject to a 'reasonableness' threshold.

Social media age restriction

5.15.1.3 Social media services **must** take reasonable steps[466] to prevent users under 16 from having accounts. Civil penalties apply.[467]

5.15.1.4 These requirements apply to all internet services that enable social interaction as the service's sole, *or significant*, purpose.[468] Other platform regulations that apply to social media services only apply to services that enable social interaction as the service's sole, *or primary*, purpose.

5.15.1.5 Social media services may **not use accredited digital ID services**[469] **nor collect government-issued ID** material,[470] to comply with age restriction requirements. Additional legislative rules may proscribe other information from being collected.[471]

5.15.1.6 Services **must destroy information collected** once properly used or disclosed,[472] and **may not use or disclose that information** for other purposes or without consent.[473] Breach of these conditions amounts to an **interference with privacy**.[474]

5.15.1.7 These provisions are supported by **regulatory powers** to require relevant information,[475] and to make, provide and publish statements of non-compliance[476], similar to other eSafety powers [5.14.1.18].

5.15.1.8 The social media age restriction has been subject to criticism for "neglect[ing] the positive aspects of social media for mental health support for young people", [477] varying widely in terms of its stated objectives,[478] and abandoning a proposed exemption if social media platforms could prove they were low-risk to children by avoiding features deemed harmful.[479]

5.15.1.9 In preparation for Australia's under-16 social media age restrictions, the Government commissioned a national age assurance technology trial to evaluate the real-world

[466] Further advice on what steps may be considered reasonable is expected: ABC News, Six months out from deadline, online safety chief tempers social media ban expectations (2025).
[467] OSA (Cth) ss63D, 5 (definition of 'age-restricted user').
[468] OSA (Cth) s63C(1). Services may be included or excluded by legislative rules. Note that social media services that must comply with these obligations are slightly broader than social media services under platform regulations [0] as they include services with a "significant" purpose to enable social interaction, whereas other regulations apply to social media services with such a "primary" purpose. Services may be included or excluded by legislative rules.
[469] OSA (Cth) s63DB(1)(b).
[470] OSA (Cth) s63DB(1)(a).
[471] OSA (Cth) s63DA;
[472] OSA (Cth) s63F(3).
[473] OSA (Cth) s63F(1). Additional exceptions apply: Privacy Principles 6.2(b), (c), (d) or (e).
[474] OSA (Cth) s63F; see *Privacy Act* 1998 (Cth) s13.
[475] eSafety: 63G. Information must be about social media service compliance with 63D, or electronic service specification or exemption vis-à-vis applicability of age-restriction laws.
[476] eSafety under 63H re: taking steps and non-use of government/digital ID; and information commissioner under 63K for improper use, disclosure or failure to destroy collected information.
[477] Insight, Queer youth at risk of losing mental health support access in social media ban (2025).
[478] Crikey, Here's every problem the teen social media ban will fix, apparently (2025).
[479] Crikey, The secret deal which removed a 'crucial' part of the teen social media ban (2025).

performance, privacy implications, usability and security of a broad range of age-verification and age-estimation technologies; the final report assessed multiple methods—including facial age estimation, identity verification and parental control approaches—to inform regulatory guidance and compliance expectations.[480]

'High-impact' (R18+) material restriction

5.15.1.10 eSafety can require social media, direct messaging, multiplayer gaming and content delivery/access (or hosting) services to remove (or cease hosting) **class 2 material** [*].

5.15.1.11 **High-impact class 2 material** is material that has been rated unsuitable for children (generally R18+).[481] Class 2 material that is pornographic (generally X18+) is categorised separately.[482] (Note that the OSA (Cth) Review recommended including instruction or promotion of harmful practices such as self-harm/suicide and disordered eating as high-impact class 2 material [0].[483])

5.15.1.12 When served with a notice from eSafety, 'high-impact' class 2 material can be subjected to a **restricted access system** as an alternative to removing it.[484]

5.15.1.13 A **restricted access system**[485] must only provide access to the material to people for whom the following requirements are met, including through a PIN or similar means:[486]

- end-users must apply for access to the material, and submit a declaration that they are at least 18 years of age;[487]
- the service must provide a warning about the nature of high-impact Class 2 material, and safety information about parental/guardian controls;[488] and
- the service must incorporate reasonable steps to confirm the age applicants.[489]

Location restrictions

5.15.1.14 At least one Australian jurisdiction has implemented a **mobile phone ban in schools**. In February 2024, the Victorian Department of Education issued a Ministerial policy[490] prohibiting the use of mobile phones in Victorian schools.[491]

[480] https://www.infrastructure.gov.au/department/media/publications/age-assurance-technology-trial-final-report?utm_source=chatgpt.com
[481] OSA Cth s107(1) (f)–(l); *Classification (Publications, Films and Computer Games) Act 1995* (Cth) s7; Australian Classification, What are the ratings?.
[482] OSA Cth s107(1)(a)–(e); Australian Classification, What are the ratings?.
[483] Recommendation 32.
[484] OSA (Cth) ss119–120.
[485] OSA (Cth) ss108, s5 (definition of 'access-control system'); Online Safety (Restricted Access Systems) Declaration 2022 ('OSA Declaration').
[486] OSA Declaration 2022 r9.
[487] OSA Declaration 2022 r6.
[488] OSA Declaration 2022 r7.
[489] OSA Declaration 2022 r8.
[490] under section 5.2.1(2)(b) of the Education and Training Reform Act 2006 (Vic)
[491] https://www2.education.vic.gov.au/pal/students-using-mobile-phones/print-all

5.15.2 United Kingdom

Overview

5.15.2.1 OSA (UK) requires user-to-user services and pornographic content services to use **age verification and/or estimation** from 25 July 2025.[492]

5.15.2.2 Some **age verification requirements** are subject to a 'highly effective' threshold.

Social media services

5.15.2.3 User-to-user services that allow users to encounter content generated, uploaded or shared by other users, and that are likely to be accessed by children must use 'highly effective'[493] **age verification and/or estimation**[494] to *prevent* children encountering **primary priority content** [cf 5.13.2.14]–[5.13.2.16].[495]

5.15.2.4 **Primary priority content** is content that is pornographic or that encourages, promotes or provides instructions for suicide, deliberate self-injury or eating disorders.[496]

5.15.2.5 User-to-user services that do have, or are likely to attract, a significant number of child users must use **age verification and/or estimation** to conclude that children cannot access the service; this does not need to be 'highly effective'.[497]

5.15.2.6 User-to-user services that do not have, and are not likely to attract, a significant number of child users do not need to use age verification and/or estimation.

Pornographic content services

5.15.2.7 Internet services that display or publish **regulated provider pornographic content** must use 'highly effective'[498] **age verification and/or estimation** to ensure that children are not normally able to encounter that content.[499] They must also:

- keep written records of the kinds of age verification or estimation used, how they are used, and how decisions on their use were made to comply with privacy laws;[500] and
- ensure summaries of these records are publicly available.[501]

5.15.2.8 **Regulated provider pornographic content** excludes text-only content, paid-for advertisements or text-only content accompanied by non-pornographic GIFs and/or emojis/symbols.[502]

[492] OFCOM Online age checks now in force (2025).
[493] OSA (UK) s 12(6).
[494] OSA (UK) s12(4). Except to the extent that the service prohibits a particular kind of primary priority content for all users: 12(5).
[495] OSA (UK) s12(3)(a).
[496] OSA (UK) s61. Behaviours associated with eating disorders is included. Text-only pornography is not.
[497] OSA UK s35(2).
[498] OSA (UK) s81(3).
[499] OSA (UK) s80(2), 81(2). Unless exempt under Schedules 1 or 9: s80(3).
[500] OSA (UK) s81(4).
[501] OSA (UK) s81(5).
[502] OSA (UK) s79. This is slightly broader than pornographic primary priority content [5.13.2.11] as it includes text-only content accompanied by content that is text-only or not itself pornographic but that identifies a user of an internet service: 236 (definition 'identifying content).

Regulatory supports

5.15.2.9 Ofcom **regulatory functions** to support age restrictions include its general compliance functions [5.14.2.9]–[5.14.2.14] as well as the provision of specific guidance on:

- kinds and uses of age verification/estimation that are, or are not, 'highly effective';
- how decisions on their use can be made to comply with privacy laws;
- compliance principles and examples of non-compliance;
- ease of use, effectiveness for all users, and interoperability, and may refer to any existing industry or technical standards.[503]

5.15.2.10 Ofcom may require user-to-user services and search engines that attract but are not complying with regulated pornographic content duties to use **proactive technology** to comply with children's online safety, illegal content, fraudulent advertising duties.[504]

Location restrictions

5.15.2.11 In February 2024, the Department of Education issued non-statutory guidance **prohibiting the use of mobile phones in English schools**.[505] On 25 May 2024, the House of Commons Education Committee recommended a formal monitoring scheme to measure the implementation and effects of the ban.[506]

Proposals

5.15.2.12 A public e-petition with 132,102 signatures called for **social media age restrictions** banning under-16 users. After Parliamentary discussion, the government responded: "The government is not currently minded to support a ban for children under 16."[507]

5.15.2.13 In 2024, the Education Committee recommended the government:

- "consider... the total ban of smartphones (internet-enabled phones) for children under 16, parental controls installed as default on phones for under 16s, additional guidance for parents at point of sale and controls at App Store level to prevent children from accessing or utilising age inappropriate content as well as controls at system level to prevent children uploading nude images";[508]
- "work with mobile phone companies and network operators to promote children's phones, a class of phone which can be used for contact and GPS location but not access to the internet or downloading apps."[509]

[503] OSA (UK) s83.
[504] OSA (UK) s136.
[505] Department for Education, Mobile phones in schools, February 2024.
[506] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [43].
[507] E-petition 700086. UK Government and Parliament, Introduce 16 as the minimum age for children to have social media (2025).
[508] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [114].
[509] Parliamentary Education Committee, Screen time: impacts on education and wellbeing [115].

5.15.3 Canada

Proposals

5.15.3.1 In May 2025, the Canadian Government introduced a Bill to impose **age restrictions on pornographic content** online (Bill S-209).[510] This Bill appears to be a continuation of ongoing Government efforts to legislate these restrictions since 2021.[511]

5.15.3.2 Bill S-209 would make it an offence for an organisation to make pornographic material available on the internet to a young person.[512]

5.15.3.3 Unless an organisation has a legitimate purpose "related to science, medicine, education or the arts",[513] it must implement a **prescribed age-verification or age-estimation** method to limit access,[514] or comply with any steps required by an enforcement authority.[515] Failure to comply would allow the enforcement authority to apply for an order requiring the service to prevent access to the material by young people.[516]

5.15.4 New Zealand

Proposals

5.15.4.1 In 2025, the National Party (majority party in coalition government) introduced a Members' Bill with **social media age restrictions** banning under-16 users, similar to the Australian model.[517] This does not seem to have the support of fellow Coalition party ACT.[518]

5.15.5 France

Platform restrictions

5.15.5.1 From Component 2, Document 1: "SREN Act & ARCOM technical standard applies double-anonymised age-verification. Since 11 April 2025 every site that "principally" hosts pornographic content must deploy a certified, privacy-preserving age-check or face blocking orders and fines. This is the first national system to make age-verification technology mandatory at scale. The European Commission is examining whether France's standard should become the EU-wide solution."

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[510] *An Act to restrict young persons' online access to pornographic material.* The Bill progressed to second reading in June 2025: Parliament of Canada, S-209 (2025).
[511] Parliament of Canada, S-210 (2025). Bill S-209 appears to be the same as Bill S-210 which was introduced in 2021 but stalled in June 2024 before Trudeau resigned.
[512] 5.
[513] 7(2).
[514] 7(1).
[515] 7(3)
[516] 10(1)
[517] Social Media (Age-Restricted Users) Bill. The Bill uses the Australian definition for social media, but with the "sole or primary purpose" threshold that applies to broader OSA Cth provisions, not the "sole or significant" purpose threshold that applies to social media age restrictions under Pt 4A.
[518] The Conversation, 10 reasons why banning social media for New Zealanders under 16 is a bad idea – and will affect adults too (2025).

5.15.6 China

Device restrictions

5.15.6.1 From Component 2, Document 1: ""Minor-mode" regime imposes very strict rules on handset makers, app stores, and social platforms to pre-install "Minor Mode" with enforced daily screen-time caps."

Proposals

5.15.6.2 A very recent proposed new law on AI anthropomorphism, titled 'Interim Measures for the Administration of Humanized Interactive Services Based on AI', has a provision requiring 'minor mode' features when 'AI Companionship' or chatbot services are provided to minors, which includes parental consent.[519]

[519] See <https://www.cac.gov.cn/2025-12/27/c_1768571207311996.htm>

Part 3

5.16 Empirical Support for Law and Policy Changes

Part 3 shifts from the analysis of regulatory frameworks to an assessment of evidence, examining the extent to which legislative and policy interventions have been empirically evaluated and what is currently known about their effects – intended or unintended – on children and young people's mental health and wellbeing.

5.16.1 Research Questions

The rapid review was guided by two questions:

- To what extent has the impact of legislation and regulation designed to protect and promote the mental health and wellbeing of children and young people in relation to digital technologies been evaluated?
- Among evaluations that have been conducted, what effects or outcomes of legislation and regulation have been observed?

5.16.2 5.16.2 Scope and Methods

A rapid review methodology is a truncated version of a systematic review (Khangura et al., 2012), and is described by Hamel and colleagues as 'a form of knowledge synthesis that accelerates the process of conducting a traditional systematic review through streamlining or omitting a variety of methods to produce evidence for stakeholders in a resource-efficient manner' (Hamel et al., 2021).

A rapid review was adopted for pragmatic purposes, as it offers a timely and policy-relevant synthesis of available evidence. This approach is suited to areas where the evidence base is heterogeneous, emerging, and dispersed across academic and grey literature. It enables a structured but proportionate assessment of existing evaluations without the requirements of a full systematic review. For the purposes of this study, the review approach involved identifying relevant studies, extracting key information on interventions and outcomes, and grouping findings into themes aligned with (1) the type of study and, (2) the areas of regulation examined.

The review focused on three primary categories of regulatory intervention identified in Part 2:

- content moderation laws;
- design and systems regulation (including measures addressing 'dark patterns', default settings, and platform features); and
- age-verification or age-assurance laws.

Searches were conducted across academic databases (ProQuest, Scopus, Medline, PsycInfo, and Google Scholar) and grey literature sources, such as government inquiries and reports from non-government organisations. The search was limited to material published between 2015 and 2025, reflecting the period of most significant regulatory development in this area.

The search strategy was developed with a senior librarian at La Trobe University. More detail, including search strings, is available in Appendix C.

5.16.3 Inclusion and Exclusion Criteria

Studies were included where they met the following criteria:

- Population**:** children and young people aged approximately 5–25 years.
- Intervention**:** legislative, regulatory, or government-mandated measures relating to digital technologies designed to improve children or young people's mental health, including content moderation, design and systems regulation, and age-verification or age-assurance mechanisms.
- Outcomes**:** reported impacts on mental health, wellbeing, or safety, including both positive and negative effects.
- Study type: empirical studies (quantitative, qualitative, or mixed-methods), as well as relevant policy evaluations, government reviews, NGO reports, and commentaries that refer to outcome data, but do not contain primary empirical data.
- Timeframe and language: published in English between 2015 and 2025.

Studies were excluded where they:

- focused solely on general online safety without reference to mental health or wellbeing.
- were commentary, opinion, or editorial pieces without evaluative data.
- concerned laws or regulations unrelated to children or young people.
- were purely technical analyses (such as a computer science examination of age verification technology) without a policy or regulatory dimension. or
- duplicated findings reported elsewhere in a more comprehensive source.

5.16.4 Summary of Results

The review returned a total of 496 articles. Following screening, 18 empirical studies were identified as eligible for inclusion. In addition to the 18 empirical studies, six non-empirical sources were included where they provided relevant evaluative insights, such as policy reviews or reports containing outcome-related data, even though they did not contain primary empirical data (Colder Carras et al., 2021; Livingstone et al., 2024; Makama et al., 2025; Mok, 2025; Robinson et al., 2025; Zhang et al., 2024). Hence, a total of 24 studies were examined in this rapid review (listed at 0).

Of the 18 empirical studies, only four directly evaluated the impact of legislation or regulation. Of these, three studies examined online gaming restrictions in China and South Korea (Choi et al., 2018; Yang et al., 2023; Zhou et al., 2024), and one study evaluated advertising restrictions in the United Kingdom (Rossi et al., 2021). We discuss these studies in more detail below.

The remaining empirical studies primarily focused on adjacent or indirect interventions. Nine studies evaluated school-based restrictions on digital technology use (such as phone bans), while six examined the effectiveness of specific technologies (such as filtering or monitoring tools) or explored user perceptions and emotional responses to legislative or policy measures.

We have categorised the included studies according to the extent to which they specifically examine *legal or regulatory change*, effectively grouping the studies according to study type and prioritising the most direct attempt to evaluate the impact of legal change. However, there are

other evaluations to proxy measures for the impact of proposed changes in law, policy, and practice (for example, measuring changes in screen-use) or implementation contexts (such as a school-level restrictions).

Overall, the evidence base is *limited and uneven*. Direct evaluations of legislative and regulatory interventions are scarce, as noted above, only four were identified across the review. Much of the available evidence instead relies on proxy measures or the examination of specific contexts, like schools, rather than examining the impact of laws at a population-level. Among the small number of direct evaluations, findings are mixed, with some studies reporting modest or context-specific benefits, and others identifying limited or negative effects.

5.16.3.1 Thematic Categorisation Based on the Extent to which Studies Specifically Examine Legal or Regulatory Change

Studies that directly evaluated specific laws

Only a subset of the studies specifically examined a new legal or regulatory change and empirically quantified its impact. These studies primarily focus on online gaming (Choi et al., 2018; Yang et al., 2023; Zhou et al., 2024) with one study on advertising (Rossi et al., 2021). An outline of the included studies, their methodological approach and a summary of findings is shown in Table 5.1.

Online gaming restrictions

1. Choi et al. (2018) evaluated the impact on adolescents of South Korea's 2011 'shutdown policy' (under Article 26 of the *Juvenile Protection Act* (South Korea)), which prohibited online gaming for adolescents under 16 between midnight and 6:00 am. The study examined outcomes for Internet use, Internet addiction, and sleep duration but did not directly examine online gambling engagement. Despite an immediate reduction in Internet use for affected adolescents relative to those not impacted by the policy, there were no long-term effects, with internet use increasing steadily in the years following its implementation. Additionally, no clear improvements in or addiction levels or sleep were observed.

2. Yang et al. (2023) examined the effectiveness for rural adolescents of Chinese policies addressing smartphone game addiction that implemented progressively stricter restrictions over 2019–2021. They reported a significant decrease in weekly game time and found that addiction scores for some groups dropped below the clinical threshold after the stricter 2021 regulations were introduced.

3. Zhou et al. (2024) also evaluated Chinese online gaming restrictions, focusing on compliance and alternative behaviours among 'heavy gamers'. The study found a high compliance rate of 84.7%, though it noted that many users shifted to other digital activities, such as watching short videos and circumvention efforts including use of family members' identities and account sharing.

Advertising restrictions

4. Rossi et al. (2021) presented three empirical evaluations of UK gambling advertising laws intended to restrict advertising of gambling to children and young people. Studies focused on gambling advertisements on Twitter. The research examined technical success, and found significant non-compliance, with two-thirds of gambling ads failing to

meet regulations, and highlighted that approximately 41,000 children in the UK follow gambling accounts.

Studies that did not directly evaluate specific laws – categorised thematically

The remaining studies that did not directly evaluate a specific national law were categorised thematically as follows:

- content moderation and age verification;
- school- or university-level phone and social media bans; and
- general social media-related law.

These categories may help researchers and policymakers understand the technological feasibility, behavioural risks, and implementation challenges that influence whether a legal change will actually succeed.

Content moderation and age verification

The studies concerning content moderation and age verification primarily examined the technological feasibility of tools that legislation frequently mandates (see eg. Chawki, 2025; Eltaher et al., 2025; Livingstone et al., 2024). Additional studies examined the responses of users to these legislative and policy responses.

Regarding technical feasibility of content moderation, one study argued that AI-driven moderation was necessary due to the massive scale of user-generated content, but this type of moderation faces significant operational challenges (Chawki, 2025). The authors of the study report that while AI is highly efficient at filtering explicit content and enforcing community guidelines, it often lacks the contextual sensitivity required to prevent harm, such as distinguishing between benign play and harms like grooming or bullying (Chawki, 2025). Furthermore, current legal frameworks in the UK, EU, and US contain 'legal loopholes,' such as a weak distinction between virtual harms and geographic locations, which complicates enforcement (Chawki, 2025).

Other research on content moderation provide some evidence that actions may have unintended emotional and social consequences for youth. Smith and Cipolli (2022) conducted an observational study of the 2019 platform restriction on graphic self-harm imagery implemented specifically on Instagram and Facebook. The study was a sentiment analysis and found that the restriction produced significant shifts in the emotion *conveyed* in users' social media lexicons—that is, the written expression of users themselves in their posts (Smith & Cipolli, 2022). Specifically, there was a measurable decrease in linguistic expression of positive emotions like joy and trust in their social media posts and a corresponding increase in expressions conveying negative emotions, including anger, anticipation, and sadness (Smith & Cipolli, 2022). Again, this was a sentiment analysis: whether these linguistic expressions had any bearing on the mental health of the young people was not evaluated.

Furthermore, some research suggests that moderation efforts may drive harmful content further underground rather than eliminating it (Zhang et al., 2024). Pro-eating disorder communities have been found to develop 'lexical variants'—such as misspelling words like 'anorexia' or using euphemisms like 'unalive'—to evade censorship (Zhang et al., 2024). Findings

suggest that while these 'evasive' communities may be smaller, their members are often more engaged, and the posts contain more distressing content than those using banned tags (Zhang et al., 2024). The researchers suggested that current moderation practices may occasionally do more harm than good, and that platforms should consider evidence-based or community-led moderation approaches (Zhang et al., 2024).

Unintended consequences have also been raised by other scholars. Drawing on evidence from previous attempts at mandatory internet filtering in Australia (tested in 2008), Mok drew attention to the apparent significant network speed reductions (up to 86%) and a high rate of 'false positives,' where benign content was incorrectly blocked that resulted from these actions (Mok, 2025).

The evidence on age assurance is limited and centres on two strands: technical effectiveness and legal/rights-based implementation challenges. First, available technical evidence suggests that current age assurance systems are largely ineffective. Major platforms continue to rely on self-declared age ('asserted age assurance'), which can be easily bypassed using simple workarounds such as disposable email accounts, as discussed by Eltaher et al. (2025). As a result, existing systems are unlikely to meet stricter regulatory requirements. Eltaher and colleagues applied IEEE benchmarks and reported that major social media platforms currently operate at the lowest level of age verification (meaning that their current systems rely almost entirely on self-declaration by platform users, which minors can circumvent (see also, Makama et al. 2025). This indicates that existing industry practices are unlikely to satisfy stricter legal requirements, such as those associated with the EU's digital age of consent (Eltaher et al., 2025). To meet these legal obligations, the researchers argue that platforms must move away from self-declaration and adopt 'stronger and more reliable' methods, such as ID verification or third-party assurance, which are currently only used by social media platforms retrospectively if an account is already under suspicion (Eltaher et al., 2025). One study cited the French National Commission for Technology and Freedoms as stating that a 2017 law restricting access to social media sites for children under 16, by 2023, had 'been ineffective in limiting French kids' access to social media' (Makama et al., 2025). However, the study did not cite primary evidence of the Commission making this statement.

Using a sociolegal analysis of EU age verification laws, Livingstone and colleagues (2024), report ongoing challenges in translating legal expectations about age-assurance into practice. Regulatory frameworks often provide limited operational guidance, creating uncertainty for service providers about how to implement age assurance in a way that is both effective and compliant with children's rights (Livingstone et al., 2024). More robust approaches raise concerns about privacy and proportionality. Techniques such as ID verification or biometric estimation, risk normalising intrusive data collection, while also shifting responsibility onto children and parents to provide accurate information (Livingstone et al., 2024).

For these reasons, Livingstone and colleagues argue that technical measures alone may have limited impact, with factors such as the quality of child–parent relationships playing a more significant role in shaping online risk (Livingstone et al., 2024). Yet, relying on parental relationships too heavily will have iniquitous results, they argue, 'given parents' differential resources, expertise and competence to manage and mediate the impact of the digital

environment on their child' (Livingstone et al., 2024, 731). There is some empirical evidence to support the importance of the parental role in the success of age assurance policies: in Australia, one study pointed to evidence presented by the eSafety Commissioner that a large proportion of underage users – around 80% – reported receiving assistance from guardians to access social media despite age limits (Robinson et al., 2025).

In their sociolegal analysis, Livingstone and colleagues call for a 'a mixed economy of age assurance methods' using a framework that is based on children's rights (Livingstone et al., 2024, 738). They conclude by calling for 'setting standards for the efficacy of age assurance and age restrictions, combined with certification schemes as a statutory requirement for providing age-restricted content' and call for careful consideration of the impact of these measures on child users and children's rights (Livingstone et al., 2024, 739).

School- or University-Level Phone and Social Media Bans

Nine empirical papers examined school-based phone bans (Baggio et al., 2025; Bar et al., 2025; Botelho, 2023; Bottger & Zierer, 2024; Goodyear et al., 2025; King et al., 2024; Liu et al., 2024; McAlister et al., 2024; Radunz et al., 2025).

Several of these papers used specific instances of policy implementation to quantify impact through 'natural experiments'. For example, Strickland et al. (2025) took advantage of a policy shift at a university-level, using a quasi-experimental design when a university-wide TikTok ban was introduced partway through the research. It measured students' engagement with disordered eating content and found that the ban did not alter how students interacted with such material; that is, it had no impact on reducing student engagement with disordered eating content (Strickland et al., 2025). This study suggests that even when access is restricted at an institutional level, it may fail to achieve specific mental health or safety goals (Strickland et al., 2025).

Some studies that examined school-related restrictions as a proxy indicator for what the effects might be of broader legal bans paint a mixed picture. Two studies examined the impact of a statewide or school-specific mobile phone ban implemented in South Australian secondary schools (Baggio et al., 2025; King et al., 2024). Baggio et al. (2025) quantified a small decrease (2.4%) in psychological distress and in negative affect (5.2%). Conversely, King et al. (2024) found minimal to no differences in bullying or students' sense of school belonging after the ban.

Most studies on school-level prohibitions report little to no measurable effect on mental wellbeing, academic engagement, or bullying (Goodyear et al., 2025; King et al., 2024; Radunz et al., 2025). Several studies report no significant differences between students in schools with restrictive versus permissive phone policies (Goodyear et al., 2025; Radunz et al., 2025). One study, focused on adolescents with major depressive disorder, found no positive effects and reported higher 'cravings' and lower productivity in adolescents attending schools where phone use was restricted relative to schools where such restrictions were not in place (Liu et al., 2024).

In relation to social and academic outcomes, findings are inconsistent. A systematic review found modest improvements in social wellbeing, such as reductions in bullying, but limited effects on academic performance (Bottger & Zierer, 2024).

Qualitative research from Bar and colleagues indicates a range of student and teacher perspectives. Reported benefits include increased face-to-face interaction, improved concentration, and reductions in cyberbullying (Bar et al., 2025). Reported drawbacks include feelings of isolation, concerns about parental contact and safety in emergencies, reduced independence, and fewer opportunities to develop responsible phone use (Bar et al., 2025; see also McAlister et al., 2024). Teachers also report challenges in implementation, including the need for constant enforcement and the use of discretion, such as allowing 'phone breaks' (Botelho, 2023). There is some work suggesting that everyday classroom management strategies are often more effective in addressing phone use than reliance on formal policy enforcement alone (Botelho, 2023).

Overall, the evidence base for effects of phone-restrictions at school and university level has been characterised as weak and inconclusive (Bottger & Zierer, 2024; McAlister et al., 2024).

General Social Media-related Law

One large-scale study in Peru evaluated how legal frameworks influence social media use and impacts on mental health through a survey of 8,350 adolescents (Rodriguez-Saavedra et al., 2025). The authors concluded that the 'role of law' – which they characterise as the way legal regulations impact social network use – has a direct and significant effect on a minor's perception of platform-led enforcement of rules, and the two factors of (1) platform regulation by government, and (2) enactment or enforcement by platform companies, mediate the effect on adolescent's actual social media use. The study concluded that platform regulation clearly contributes to shaping behaviour and reducing negative experiences, but its effectiveness appears closely dependent on contextual factors such as digital literacy, the socioeconomic status of children and young people, and parental involvement.

Table 5.1. *Summary of included studies and findings.*

Category	Study type (N)		Summary of Findings
	Empirical	Other	
Generally-framed social media-related law	1	0	Positive associations found between self-reported perceptions of legal impacts on social media use and actual social media use (Rodrigues-Saavedra et al., 2025).
Content moderation	2	1	No direct evaluation of laws found. Content moderation technologies found to be "highly efficient" at filtering certain harmful content but compromised by false positive and false negatives; increase in some negative emotions found to have followed a platform ban on self-harm imagery; evidence of potential negative consequences of bans on disordered eating content (Chawki, 2025; Smith & Cipolli, 2022; Zhang et al. 2024).
Age assurance	1	1	No direct evaluation of laws found. Social media age assurance technologies were evaluated as meeting the lowest standard of a 5-level rating system; a non-empirical evaluation of laws noted

Category	Study type (N)		Summary of Findings
	Empirical	Other	
			several problems in translating laws into practice (Eltaher et al., 2025; Livingstone, 2024).
School phone bans	9	0	No direct evaluation of laws found. Several empirical studies have evaluated the effect of restrictive phone policies/phone bans at schools, generally finding mixed/minimal to no effects on mental health and social wellbeing. Some positive effects have been found, but some negative effects have been found too (Goodyear et al., 2025; Baggio et al., 2025; King et al., 2024; Radunz et al., 2025; Liu et al., 2024; Bottger & Zierer, 2024; McAlister et al., 2024; Bar et al., 2025; Botelho, 2023).
Social media bans	1	3	No direct evaluation of laws found. One empirical study found a university TikTok ban did not reduce engagement with disordered eating content on TikTok (Strickland et al., 2025). Three further articles provided sceptical accounts of legislative impact, though none provided 'hard' evidence (Makama et al., 2025; Mok, 2025; Robinson et al., 2025).
Restricting access to online gaming	3	1	South Korean and Chinese laws were evaluated across 3 studies: the South Korea study found laws restricting access to online gaming produced temporary benefits that were vitiated by long-term increases (Choi et al., 2018); 2 Chinese studies positively evaluated laws restricting access to online gaming but with potential methodological issues (Yang et al., 2023; Zhou et al., 2024).
Advertising	1	0	Evaluation of UK gambling laws found significant non-compliance with laws and persisting child engagement with gambling accounts (Rossie et al. 2021).

5.16.4 Discussion and Conclusion

A recurring issue in law reform *in general* is how the objective is defined. This is not straightforward, and different approaches are available. One approach is to adopt the stated aim of the reform at face value, effectively relying on its apparent validity in and of itself. A second situates the objective within prior experience of similar law and policy change, with a view to anticipating implementation challenges and possible unintended consequences (that is, looking at what has happened in the past when similar reforms were attempted). Less commonly, the question is framed in terms of what can be shown to be effective in practice, drawing on available evidence.

Hence, although the scale of regulatory activity concerning age verification appears to sit in stark contrast to the limited evidence evaluating its effects, this is not particularly unusual for law reform. Nevertheless, it remains striking that only a small number of studies directly assess legislative or regulatory interventions concerning digital technology and children and young people in general, and regarding their mental health and wellbeing in particular. Most evidence in the literature does not directly focus on mental health and wellbeing outcomes, but considers proxies such as screen time, technology usage, or social media engagement patterns, as indicators of the effects of legislation and regulation change.

Across the themes, findings are mixed and context-dependent. Some interventions show modest or short-term behavioural effects (such as with gaming restrictions), while others show variable or limited impact on mental health or wellbeing outcomes (such as school phone bans and social media bans). One consistent pattern, discussed above, is the gap between regulatory intent and implementation in practice, as evident in non-compliance (advertising), technical limitations (age assurance), and user circumvention (social media and gaming restrictions).

Interpretation of these findings is further complicated by the sheer heterogeneity of the studies in this review; they vary substantially in design, population, and outcome measures, which limits comparability across findings and makes it difficult to draw generalisable conclusions about effectiveness.

Taken together, it seems reasonable to conclude that legal and policy interventions simply cannot operate in isolation, and that the mental health and wellbeing of children and young people is a highly complex social phenomenon. Contributing variables – economic, social, political, cultural, and indeed, technological – make it difficult, to confidently assert causation between legal and policy change concerning technology-use and the mental health and wellbeing of children and young people, particularly in light of the limited evidence base.

This is not to suggest that efforts to measure these effects should be abandoned. Rather, the studies indicate that multiple approaches to assessing impact are available, even as the overall task remains methodologically challenging.

Limitations

This review has several limitations. The streamlined search and selection process, even as it is appropriate for producing timely, policy-relevant insights, does not include formal quality appraisal of included studies and likely omits relevant literature. The heterogeneity of literature is an issue: as noted, the studies included vary substantially in design, population, and outcome measures, limiting comparability across findings. Many focus on short-term behavioural changes rather than long-term mental health outcomes. In addition, some evidence is drawn from non-empirical or critical accounts, which provide useful insights into implementation challenges but do not offer causal evaluation. These limitations mean that conclusions should be interpreted cautiously, particularly in relation to generalising findings across different regulatory settings.

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Appendices

Appendix A – Other Contextual Regulatory Efforts by Governments

In addition to the three core domains of government action examined in section 5.6, governments deploy a range of contextual measures, such as research initiatives, certification schemes, media classification frameworks, and inter-agency coordination, that shape the broader regulatory environment. We summarise them here, but do not examine them in detail because they are highly context-specific, unevenly evaluated, or do not constitute primary mechanisms for regulating children's digital technology use.

Research and technology developments

Research and technology developments refer to government-funded research programs, commissioned studies, pilot projects and collaboration with technology developers to address evidence gaps, support innovation, and test regulatory or technical solutions.

Examples include:

- Pilot evaluations of existing technologies, often accompanied by strategic plans, such as:
    - Funded pilot of age assurance technologies (Australia).
    - Proposed pilot for artificial intelligence (A) in schools (Australia).
- Government collaboration with technology developers, including:
    - Proposed support for the development of content filters and tools (Canada).
    - Proposed collaboration with mobile phone companies and network operators to promote "children's phones" (UK).
- Parliamentary, independent and other reviews, including commissioned research, such as:
    - Research into young people's exposure to pornography online (Australia).
    - Commissioned research into content harms and international regulatory frameworks for the review of the media content regulatory system (New Zealand).
    - Research into online child sexual exploitation under the gender-based violence strategy (Canada).

This policy avenue may be pursued, for example, where there are evidence gaps or technological limitations that affect the feasibility of particular interventions.
Research and technology development initiatives were out of scope for this review because they are typically exploratory, time-limited, and highly context-specific, and do not constitute stable or comparable regulatory frameworks suitable for systematic cross-jurisdictional analysis.

Certification and kitemarking schemes

Certification or 'kitemarking' schemes support consumers to select online products/services that have been evaluated and certified, accredited or graded to provide certain benefits. These may be voluntary or subject to legal requirements. Examples include:

- Family Friendly Filter program (Australia)
- Proposed kitemarking scheme for educational apps/tools (UK – proposed).
- Potential accreditation scheme for digital mental health services, e.g., AI, telehealth.

It is beyond the scope of this review to compare such schemes in depth, as it depends on which product range is being compared, for which there may or may not be evaluations or operable evaluation metrics.

Media classification systems

Classification frameworks for digital and media content, including games and online material, are intended to mitigate harms associated with exposure to inappropriate content. There remain ongoing debate reflecting concerns about how well such schemes apply to online media, including images and texts of online platforms, as well as games and programs, and efforts to address emerging harms have been made. For example, video games with 'loot boxes', which are virtual items that players can open to receive a random selection of in-game rewards, were recently reclassified in Australia to receive a minimum classification of M (mature) given concerns about the potential to encourage addictive behaviours (Australian Classification Board, 2024; Australian Government Department of Infrastructure, Transport, Regional Development, Communications and the Arts, 2023; *Classification (Publications, Films and Computer Games) Act 1995* (Cth)).

Media classification systems were not examined in depth for this review, because they are longstanding, content-specific regimes that vary significantly in scope and application to online environments, and their effects on children's digital experiences are largely mediated through other regulatory mechanisms considered elsewhere in the review.

Collaboration and information-sharing mechanisms

Protocols and groups, both formal and informal, have been established to support coordination, intelligence-sharing and joint problem-solving between regulators, government agencies, industry, and civil society. Examples of these include:

- Information-sharing mechanisms:
    - Digital Platform Regulators Forum (Australia).
    - Proposed database for image-based abuse (Canada).
- Advisory groups:
    - Online Safety Youth Advisory Council (eSafety Commission, Australia).
    - Ofcom Online Information Advisory Committee (UK).
- Law enforcement protocols:
    - Online Crisis Response Protocol (New Zealand).

Collaboration and information-sharing arrangements were excluded from detailed comparison as they are context specific, process-oriented, and difficult to evaluate comparatively.

Appendix B - Defining 'Regulator', Other Key Terms, and Concepts

For the purposes of our analysis, and for identifying relevant 'regulators', we use the following definitions for key terms:

Regulation: 'Any rule endorsed by government where there is an expectation of compliance' (Department of Prime Minister and Cabinet, 2014, p. 9).

Rule: A broad and inclusive term including: Legislation, Regulations (i.e. that are contained within Acts and Schedules), Standards, Codes of Practice, and the like (for more information on 'Rules' see Pink, 2021, p. 255); and

Regulator: A broad term denoting an official who performs one or more of the regulatory functions across the 'extended regulatory spectrum', noted below.

Figure 5.2. *Regulatory functions in the 'Extended Regulatory Spectrum' (New Zealand Productivity Commission, 2014, p17).*

Function	Description/examples
Make rules or standards (under legislative or delegated authority)	Set standards, guidelines or rules to which regulated entities, individuals or activities must comply, reflecting the regulatory objectives set out in statute.
Inform and educate	Provide general or targeted information to firms and individuals that are subject to regulation about compliance.
Approve/ban activities	Provide approval to carry out regulated activities (eg, issue consents, approve mergers), refuse to provide approval, or ban activities that are contrary to the objectives of the regulatory regime.
Promote and monitor compliance	Actively seek information from regulated entities and/or collect market intelligence to assess compliance levels and identify potential risks.
Handle complaints from the public	Receive and process complaints from the public about the performance of regulated entities and their compliance with regulatory requirements. Where appropriate, require the regulated party to make amends.
Enforce compliance where breaches suspected	Investigate cases where entities or individuals are suspected of having breached regulatory requirements, assess whether any breach has occurred, and assess the impacts of any breaches. Where appropriate, issue penalties or enforcement action.

Notes:

1. Adapted from a framework from the Victorian State Services Authority, 2009.

Appendix C - Search Strategy Search Strings

PsycINFO (Ovid), Scopus and Social Sciences Premium Collection (Proquest) were searched with a comprehensive Boolean strategy based on the three concepts “social media legislation” (legal intervention), “mental health” (outcome) and “young people” (population). The search strategy was developed following a streamlined rapid review protocol with a doctrinal approach.

For the first concept a proximity search was used to control the results allowing for “social media” to be within 10 words of “legislation” (or any of their synonyms) and find contextually relevant results. This assisted in excluding results including a law and social media element that were not focused on legislation as it related directly to social media.

The interdisciplinary nature of the review also meant a keyword-only strategy was adopted, simplifying translation of the search and avoiding inconsistent indexing across the three databases. Results were filtered to 2015-2026 and to English language results, reflecting the recent period of rapid regulatory development.

The strings for each concept are provided below. The proximity operator in this case is for ProQuest, and is the only element of the search string that requires translation between databases.

(Legislat* or Law or laws or policy or policies or statute* or bill or bills or ban or bans or legal) NEAR/10 ("social media*" or "digital platform" or "digital technolog*" or "online platform" or "internet platform" or "mobile phone*" or cellphone* or "cell phone*" or smartphone* or "mobile device*" or "digital device*" or "online device*" or "online gam*" or "multiplayer gam*" or "digital gam*" or "internet gam*" or "online technolog*" or "internet technolog*")

AND

"mental health" or wellbeing or "well being" or anxiety or depress* or "quality of life" or distress or Suicid* or "self-harm" or harm* or "body image" or "eating disorder*" or "psychiatric disorder" or "psychiatric illness"

AND

youth* or "young people" or teen* or adolescen* or child* or minor* or boy* or girl*

Individual strings

Social Science Premium Collection:

(Legislat* or Law or laws or policy or policies or statute* or bill or bills or ban or bans or legal) NEAR/10 ("social media*" or "digital platform" or "digital technolog*" or "online platform" or "internet platform" or "mobile phone*" or cellphone* or "cell phone*" or smartphone* or "mobile device*" or "digital device*" or "online device*" or "online gam*" or "multiplayer gam*" or "digital gam*" or "internet gam*" or "online technolog*" or "internet technolog*")

AND

"mental health" or wellbeing or "well being" or anxiety or depress* or "quality of life" or distress or Suicid* or "self-harm" or harm* or "body image" or "eating disorder*" or "psychiatric disorder" or "psychiatric illness"

AND

youth* or "young people" or teen* or adolescen* or child* or minor* or boy* or girl*

Scopus:

(Legislat* or Law or laws or policy or policies or statute* or bill or bills or ban or bans or legal) W/10 ("social media*" or "digital platform" or "digital technolog*" or "online platform" or "internet platform" or "mobile phone*" or cellphone* or "cell phone*" or smartphone* or "mobile device*" or "digital device*" or "online device*" or "online gam*" or "multiplayer gam*" or "digital gam*" or "internet gam*" or "online technolog*" or "internet technolog*")

AND

"mental health" or wellbeing or "well being" or anxiety or depress* or "quality of life" or distress or Suicid* or "self-harm" or harm* or "body image" or "eating disorder*" or "psychiatric disorder" or "psychiatric illness"

AND

youth* or "young people" or teen* or adolescen* or child* or minor* or boy* or girl*

PsycINFO:

(Legislat* or Law or laws or policy or policies or statute* or bill or bills or ban or bans or legal) adj10 ("social media*" or "digital platform" or "digital technolog*" or "online platform" or "internet platform" or "mobile phone*" or cellphone* or "cell phone*" or smartphone* or "mobile device*" or "digital device*" or "online device*" or "online gam*" or "multiplayer gam*" or "digital gam*" or "internet gam*" or "online technolog*" or "internet technolog*")

AND

"mental health" or wellbeing or "well being" or anxiety or depress* or "quality of life" or distress or Suicid* or "self-harm" or harm* or "body image" or "eating disorder*" or "psychiatric disorder" or "psychiatric illness"

AND

youth* or "young people" or teen* or adolescen* or child* or minor* or boy* or girl*

In addition to database searches, targeted grey literature searches were conducted using Google and Google Scholar. These included domain-restricted searches of relevant government and organisational websites (for example, site:gov.au and site:org), as well as targeted searches of key regulatory bodies (such as the eSafety Commissioner).

Search strings combined terms relating to social media, legislation, and policy, and were adapted to capture different document types (for example, filetype:pdf and filetype:doc). Domain and

filetype filters were used in combination to identify relevant reports, policy documents, and evaluations not indexed in academic databases.