



NATIONAL MENTAL HEALTH RESEARCH STRATEGY

BACKGROUND PAPER: Digital and eHealth research (Session 3C)

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Definitions

For the purposes of this background paper, several terms have been adopted to represent key concepts relevant to the discussion.

‘Consumer’ will be used as a term to represent people with a lived experience of mental health disorders and problems, who may or may not have engaged with mental health services or sought treatment for their symptoms.

‘Digital’ is an umbrella term that will be applied across the range of technological conduits to delivering programs and research, including eHealth, Internet, Web, Mobile, App, Smartphone, Virtual Reality, etc.

‘Telemental health’ will be used as a term on its own to refer to the use of videoconferencing tools (such as Skype, Facetime, Zoom) by mental health clinicians to engage in real time with consumers regarding their mental health (e.g. assessment, treatment). Research involving telephone-delivered sessions between clinicians and consumers is also included in this category.

Introduction

At any one time, >10 million Australians experience a mental disorder (including alcohol/other drug use disorders), and this is increasing by about 3% each year.¹ Mental disorders are much like physical disorders; given appropriate and timely intervention, they can be successfully prevented, managed and treated. Despite this, one-third of people who need mental health treatment in a 12-month period do not receive it.²

A recent meta-analysis of 34 studies reported that 75% of people with mental disorders state a clear preference for psychological over medication-based treatment.³ This was consistent across treatment-seeking and non-treatment-seeking samples. Yet in Australia, the most common mental health treatment provided is psychiatric medication (approx. 1 in 6 Australians), most often by a general practitioner (87% of all mental-health prescriptions), with the highest rates of mental health prescriptions occurring in rural/remote Australia.⁴ Psychological and medication-based treatments for depression, anxiety and alcohol/other drug use problems have similar efficacy.³ However, psychological treatments are largely not available when people need them most and do not typically target the co-occurrence of many mental disorders simultaneously, and many consumers receive a wide variety of treatments that are not evidence-based.⁵ Despite significant investment by the Australian Government to improve access to psychologists for mental disorders (Better Access Scheme), there is no evidence of impact or effectiveness⁶ and accessibility is a significant issue, especially in rural/remote Australia.⁷

In Australia, there are not enough mental health providers available to meet the treatment needs for the one in five Australians who experience a mental disorder in any one year (e.g. 1 psychiatrist per 1,424 Australians

with mental disorders in 2017, and 88% of these are located in major cities⁸). The World Health Organisation estimates a shortage of 1.8 million mental health workers across the globe.⁹ There is a paucity of psychologists and allied mental health workers who can deliver evidence-based treatments for mental disorders.⁵

Digital interventions offer an important potential solution, being available 24/7, offered at relatively low cost, delivering psychological treatment at scale, and facilitating access to evidence-based treatment with high fidelity.⁷ Central to realising the potential of digital interventions is research to explore whether this modality is safe, effective and able to be integrated within and around the existing pathways to care for people experiencing mental health disorders.

Background

A significant body of research supports the application of digital tools for the screening, assessment, prevention and treatment of mental health disorders. This section presents a brief overview of the main focus of research to date in digital mental health and highlights those areas where there is consensus on outcomes.

Screening and assessment

There is strong evidence that many pencil-and-paper questionnaires can be directly transported to digital delivery, with scoring algorithms providing real-time scores and feedback to people completing these questionnaires. There are consistent findings showing that digitally-administered assessment methods solicit more honest, open responding of personal information compared to a human-to-human screening or assessment approach.¹⁰ In a study that observed 239 people completing a real time assessment process, those who believed they were interacting with a computer reported lower fear of self-disclosure and lower impression management, and displayed their sadness more intensely, compared to when they thought they were interacting with a human operator.¹⁰ The important factor in this process, however, is that the person participating in the screening or assessment interaction needs the platform and tools to be safe, secure and private, and people need to know who is seeing their data and for what purpose. These are important issues to understand and engage with people about, prior to implementing electronic health records or similar digital initiatives here in Australia.

Digital platforms facilitate self-monitoring and self-management in a way not previously possible via face-to-face or paper-based methods. There has been a rapid increase in data being collected around interventions, ranging from the old-fashioned questionnaires to data being collected by means of mobile devices such as Ecological Momentary Assessment (EMA), which has emerged as a digital method of measuring and reporting on behaviours, thoughts and feelings as they occur in everyday life. EMA is based on the premise that the phenomena are assessed as they occur, assessments occur according to a carefully timed schedule, assessments occur repeatedly over time and assessments are made in the time and place (environment) that a person typically inhabits.¹¹ EMA techniques have been tested with success across many behaviours and environments, including pain, mood and mood dysregulation,¹² young people,¹³ psychotic disorders,¹⁴ eating disorders and obesity, and non-suicidal self-injury.¹⁵

Prevention

There is a substantive body of evidence demonstrating that the onset of many mental disorders can be significantly delayed, and in some cases prevented altogether. Recent reviews and meta-analyses highlight that psychological preventive interventions are able to substantially reduce rates of new onset of different types of mental disorders.¹⁶ Digital technologies provide an ideal platform to transform the prevention strategies for mental health disorders, providing easy access, in real time, to strategies and information that

can be integrated into the person's daily life.¹⁷ These effective digital interventions draw on cognitive behaviour therapy, behavioural activation techniques, social learning principles and psychoeducation.¹⁸ They incorporate reading materials, Q&A exercises, games, quizzes and skill-building activities. Strategies to engage people with the digital material include lived experience stories, chat sessions and, in some cases, remote support by health professionals or trusted peers.¹⁸ Many of the most successful and effective digital prevention programs operate in the environments that people are already in and, for example, engage school teachers as trusted advisors to teach the prevention strategies integrated within the school curriculum.¹⁸ Strong, robust evidence exists to support the use of digital programs in a prevention setting for depression and anxiety¹⁹ and alcohol/other drug use.¹⁸

Treatment

There is strong and convincing evidence that digital treatment programs which use the internet/web or a smartphone app to deliver standardised psychological treatment are effective. A growing number of efficacy trials have shown strong outcomes for digital mental health treatments across a range of mental disorders,²⁰ and have a high potential for scalability.²¹ Meta-analyses provide considerable evidence of effectiveness for digital programs to treat depression,²² anxiety²³ and substance use disorders^{24,25} (including alcohol²⁶ and tobacco²⁷), with emerging evidence of effectiveness for reducing suicidal ideation.^{28,29} There is also evidence for managing depression and alcohol use comorbidity,³⁰ transdiagnostic anxiety disorders,^{31,32} mixed anxiety and depression,³³ and comorbid depression and substance use disorders.^{34,35}

For mild-moderate anxiety disorders, there is high quality, consistent evidence that digital interventions are effective, particularly when they use cognitive behaviour therapy strategies.³⁶ Many of these programs have been implemented without (or with very minimal) therapist guidance. The strongest effects were demonstrated when these interventions were compared to no treatment or wait-list controls, with smaller effects (and often little difference) observed between these interventions and high-quality usual care or active control groups. Hence, these interventions are best implemented in the community, outside of usual care settings, among people who are unlikely or unable to access usual care services.³⁶

For mild-moderate depressive disorders, there is also high quality, consistent evidence that digital interventions are effective, with little difference between digital programs offering cognitive behaviour therapy, positive psychology, problem solving therapy, mindfulness-based stress reduction, interpersonal therapy and psychodynamic therapy.³⁶ Most digital programs for depression have been trialled with concurrent therapist guidance and support, hence the safety and efficacy of these interventions without such support is currently unknown. As with anxiety, these interventions have demonstrated the largest effects when compared with no treatment or wait-list controls. Thus, they will likely have the greatest impact when implemented with non-treatment-seeking adults, or those who are unable to access usual care.³⁶ There is good evidence that digitally-delivered interventions for depression have a high probability of being cost-effective compared to usual care.³⁶ There is good evidence that digitally-delivered interventions translate well to those aged 18–25 years, and that this age group has a strong preference for and equivalent response to digitally-delivered interventions by young people with minimal or no therapist contact.³⁶

Meta-analyses suggest the strongest evidence for digital interventions exists for alcohol use reduction, followed by cannabis and illicit substances.³⁷ These approaches often incorporate therapist assistance and evidence suggests that this addition, even when offered remotely or asynchronously with completion of the digital intervention, can increase engagement and adherence to the digital program.³⁸ For alcohol use particularly, there is strong, robust evidence that brief interventions, incorporating personalised feedback and brief motivation enhancement and goal setting, can lead to significant reductions in alcohol use over the short term.³⁹

For psychosis-spectrum disorders, digital technologies such as smartphone apps are acceptable and feasible.⁴⁰ Research provides evidence of the safe and effective use of digital tools to provide assessments and training in key intervention strategies that can increase coping with symptoms of psychosis (e.g. hallucinations).⁴¹ In these contexts, digital tools have demonstrated benefits in helping people monitor and manage hallucinations in daily life, and to connect young people with lived-experience peers to provide social support.⁴² Importantly, digital tools have only been tested as an augmentation or enhancement to real-time clinical services and not as a stand-alone intervention. At this point, there is no evidence to suggest that digital tools for psychotic disorders are equivalent to being engaged with a therapist in real life.⁴⁰

Telemental health approaches – the use of telemedicine to provide mental health assessment and treatment at a distance – have significantly scaled up access to services. Although few studies have looked specifically at the effectiveness of telemental health approaches,⁴³ recipients report facilitated empowerment, safety and more honest communication in the light of the psychological and physical distance. A review of 709 studies employing telemental health indicated that this form of digital intervention has been used for diagnosis and assessment across many populations (adult, child, geriatric and culturally diverse) and for disorders in many settings (emergency, home health) and appears to be comparable to in-person care.⁴³

‘Serious games’, or the use of computer games for purposes that might be considered more serious than entertainment alone, have also been applied to mental health disorders. A recent meta-analysis across 10 studies indicates that these digital interventions have been used across the lifespan (age range 7–80 years), have focused symptoms of depression ($n = 2$), post-traumatic stress disorder ($n = 2$), autism spectrum disorder ($n = 2$), attention deficit hyperactivity disorder ($n = 1$), cognitive functioning ($n = 2$) and alcohol use disorder ($n = 1$).⁴⁴ Across these studies, a moderate improvement in the symptoms of the target disorder were observed when these interventions were compared to no-intervention controls.⁴⁴ Thus, serious gaming approaches show promise in managing symptoms associated with these mental health disorders.

Virtual reality (VR) is a computer generated image, which uses feedback from the user’s location and orientation to make them feel like they are immersed in the image (environment) displayed by the computer.⁴⁵ At its best, immersive VR creates interactive computer-generated worlds, which produce the sensation of actually being in life-sized new environments (an ecologically valid world). Difficulties interacting in the world are commonly experienced across mental disorders, such as becoming highly anxious near spiders, experiencing flashbacks triggered by reminders of previous trauma, fearing physical attack due to persecutory delusions and resisting the urge to drink alcohol when encountering a craving or trigger for drinking.⁴⁵ VR can recreate the problematic situations that lead to difficulties and, paired with evidence-based psychological treatment, can help a person learn and practice new ways to cope, trying out new strategies in real-world situations.⁴⁵ A systematic review of 285 studies integrating VR into mental health assessments and management identified evidence of successful application of this technology in the treatment of anxiety, schizophrenia, substance use disorders and eating disorders.⁴⁵ Many of the studies included in this review were proof-of-concept, not well controlled and had small sample sizes. A second review focussing on VR treatment⁴⁶ identified 24 studies that compared VR treatment to a control. This review reported that VR treatments were more effective than treatment as usual and had comparable effects when compared to traditional treatments for mental health disorders (agoraphobia, social anxiety disorder, fear of flying, post-traumatic stress disorder, multiple phobias, autism and schizophrenia).

Gaps and uncertainties

Digital treatments can rapidly and significantly improve treatment access, act in place of ‘on the ground’ services when they are not accessible and be actively provided to people in earlier phases of their disorder. To optimise the finite resources in mental health prevention, early intervention and service delivery, and to

realise the potential for digital tools in this space, priority should be given to programs, models and strategies that demonstrate evidence of their effectiveness. However, building an evidence base is an incremental process, and several gaps and uncertainties exist.

Areas where further research is needed

The role of therapist assistance: Whilst there is good evidence that mild depression can be managed without therapist guidance using digitally-delivered interventions, there is insufficient evidence about the role of therapist guidance in managing moderate depression. It is unclear how critical therapist support, provided by telephone, email or SMS, for about 10-20 minutes duration per session of digital intervention, is in accounting for the results observed in studies of depression.³⁶ As mental healthcare expands to smartphone apps and other technologies that may offer therapeutic interventions without a therapist involved, it is important to assess the impact of non-traditional therapeutic relationships. A measure is required to evaluate the digital therapeutic alliance.⁴⁷ This is particularly important for mental health disorders that can escalate or that are vulnerable to relapse to acute states. More research is required to understand the types of safety protocols or algorithms required to identify risk/potential escalation in non-face-to-face environments (e.g. online), and when real-time clinician input should be triggered.⁴⁰

Alcohol and substance use disorders: Very few trials exist testing digital interventions for psychostimulant use disorders and opioid use disorders. Among the existing published trials of digital treatments for alcohol/other drug use disorders, there is a need for longer follow-up periods, active rather than non-active control groups, outcome standardisation and increased focus on comorbidity.³⁷

Culturally and linguistically diverse programs: There is only emerging evidence for how existing digitally-delivered interventions could be adapted for different cultural groups. Current models rely heavily on access to native language speaking clinicians. More work needs to engage communities in this effort.³⁶

Aboriginal and Torres Strait Islander programs: Very few digital interventions appear in the published literature that have been developed or adapted for people of Aboriginal and/or Torres Strait Islander descent.

Gender Diversity: Very few digital interventions have been developed or adapted for people identifying as lesbian, gay, bisexual, transgender or intersex.

Ecological Momentary Intervention (EMI): More research is needed to understand how to make better use of data collected via sensors and EMA techniques, so that the person providing this data can feel empowered to make real time changes to their environment and behaviour. EMIs are a form of digital intervention that attempts to do this, by providing prompts, coping skills, and information to people during their everyday lives to encourage behaviour change and better coping in their natural environment.¹³

Expansion of the scope of digital prevention and early intervention programs to other mental health disorders and settings: More research is also needed to understand the potential of digital programs to prevent and intervene early in other mental disorders, including psychotic disorders, eating disorders and trauma. School-based digital prevention programs as a concept and framework could be expanded and tested in other settings in the community, such as workplaces, TAFE and universities. Research exists to support prevention and early intervention activities for mental health disorders in these contexts, but the potential for digital tools to augment these programs is less realised and could be a focus of future implementation research.

Implementation and digital integration

In 2013, the NHMRC Translation Research Faculty Mental Health Steering Committee released a call-for-action for depression, inviting submissions from Australian experts to identify a significant gap where strong research evidence exists, but is not being used in healthcare practice. Completed and published in 2015,⁴⁸

this case-for-action proposal represents consensus opinion and research evidence from Australian experts in eHealth and depression, and highlights the critical need to bridge the gap between what we 'know' and what we 'do' in utilising effective eHealth programs to treat depression in Australia. Evidence that digital therapies work under experimental conditions is not enough to demonstrate that they should be upscaled and implemented, nor is it adequate to demonstrate how these services might operate within or around a health system.⁴⁹ Despite extensive evidence that digital interventions are effective in treating mental health problems, uptake of these programs is suboptimal.⁵⁰ No clear models currently exist for digital treatment integration into health services, and Australian clinicians significantly underuse digital treatments in their clinical practice.²² Despite their positive findings, there are very few examples of successful implementations of digital interventions in clinical services, and many failures.²⁰ While the call-for-action has provided the field with a roadmap, there have been no objective studies conducted to date that guide the operationalisation of this roadmap, nor the translation of digital interventions into clinical practice. Objective data are therefore needed to guide practice and to assess outcomes.

Challenges

Digital health technologies offer tremendous potential in increasing access to services and augmenting existing services. Utilising these technologies, however, poses new ethical considerations for clinicians, researchers and healthcare organisations.⁵¹ A range of financial, structural and technological health system barriers exist,⁵² adding to the significant issues facing clinicians who want to improve access to effective treatments for people living with mental health disorders. Integrating digital treatments into mental health care will require significant paradigm shifts in the Australian mental health system and the way treatment for mental disorders is considered. Key issues may pose barriers to the uptake of digital interventions in practice, and include:⁵³

- data access and management (including data linkage, quality, standards and storage)
- ethics, regulation and governance (including data ownership)
- community engagement and trust
- benefit and harm
- capacity and skills.

The reality is also that developments in digital technology are outpacing the rigorous evaluation digital health interventions,²¹ and more advanced, responsive methodologies are needed to keep up with the pace of digital technology development. Many of the digital tools evaluated in trials are technologically obsolete by the time they have been through traditional randomised controlled trials. The way we use the internet/digital technology has also changed over time such that digital interventions based on face-to-face models of therapy (e.g. 45–60min appointments, once weekly, homework assigned) may not appeal to people today. New models of therapy and therapeutic processes are needed, that leverage the advantages of digital tools, rather than replicate what could be done face-to-face. Newer methodologies, such as 'just in time adaptive interventions' (JITAI) that use digital technology as the modality for intervention delivery, may be a solution.²¹ The need for co-production of digital tools with and for people with lived experience of mental health disorders is central to this.²¹

In recent years a number of innovative trial designs have gained attention, that are ideally suited to identifying effective treatment components and may help to further improve the effectiveness of current state-of-the-art digital treatment. These include Fractional Factorial Designs, Micro-Randomised Trials and

multiphase optimisation strategy (MOST), which are showing huge promise in improving the efficiency with which interventions can be disseminated and implemented.

Opportunities

Globally, consumers are more likely to have access to a mobile phone than mental health care.⁵⁴ Digital platforms are increasingly becoming the medium through which assessment and intervention are taking place. In many cases, talking to people in person is not necessarily an individual's first choice method of communication. Several studies show that some people actively choose to seek help and support from peers online via forums and social media websites,⁵⁵ whilst others prefer to communicate their feelings and experiences about their wellbeing and mental health using online blogs.⁵⁰ *Openness to using digital tools* in place of or to augment mental health treatment has been demonstrated in rural/remote Australia, and in older age populations.⁵⁶

Peers have a critical role to play in destigmatising treatment, reinforcing attitudes and behaviours, and supporting people through the treatment experience.⁵⁷ Peer-led interventions, designed to increase social connectedness, have strong potential to address mild-moderate depression and can be offered online or via videoconference to increase accessibility.³⁶ Given a systematic review of 49 studies of digital interventions for mental disorders indicated that acceptability was higher when these interventions were provided alongside remote online support, there is a key opportunity for active engagement of a peer workforce to support digital intervention provision and integration.⁵⁵

Machine learning and big data are emerging areas where digital technology will potentially play an increasingly prominent role, supporting methods in data science to further our understanding of mental health and inform and personalise digital interventions.⁵⁴ This will also potentially help us to better understand the factors that play a role in the onset of mental health problems, and assist with personalising and tailoring digital treatments for the right person at the right time.⁴⁶

Smartphone sensor technology has great potential in mental health research, providing the capability to collect objective data on behavioural markers of mental health, including sleep, activity, interaction with the smartphone, light exposure and so on.⁵⁸ The power of sensor technology is that it operates in the background, requiring no input from the person directly, and collects real time, moment-to-moment information about the person's behaviour.⁵⁸ There is a genuine opportunity work with people experiencing mental health disorders to understand how these data can be used in real time to help address their needs and challenges in everyday life.

Chatbots, or digitally created avatars/images that are programmed to simulate a human conversation, are being developed and considered for application to counselling-type situations. Chatbots respond to key terms or phrases used by the person, by linking these cues with a pre-set answer in real time. Chatbots can be a more interactive experience for the user to receive information, or complete diagnostic tools, or to even be used for counselling.⁵⁹ With increasing sophistication of digital technology, Chatbots could be incorporated into digital interventions, or used as standalone interventions.⁵⁹

Key opportunities and enablers for future research include:

- optimising research so that it is multidisciplinary, actively fosters collaboration between researchers and clinicians, prioritises prevention, focuses on intervention and harnesses the potential of digital technologies
- developing the next generation of researchers and clinicians to ensure multidisciplinary research capability that capitalises on the change drivers of health and emerging technologies

- strengthening, aligning and expanding the mental health research sector by fostering links between researchers, services delivery agencies and mental health professionals for more and better translation of research, and the generation of meaningful, consumer and service-driven research questions
- identifying and addressing barriers to digitally enabling mental health services, by investing in a national audit of service structure, culture, training needs and service principles to facilitate adoption of digital tools into mental health care and monitor the outcomes
- identifying methods to increase public and professional support and recognition of the role, credibility, safety and efficacy of digital interventions as a legitimate and, often, first-line tool for mental health problems and disorders
- developing and testing effective implementation models to translate digital tools into clinical practice and community settings.

Conclusion

Digital health is a fast-developing technology that will “transform the way that health and social care is delivered”.⁵³ The great majority of people experience barriers that prevent access to treatment, aggravated by a lack of mental health specialists.²⁰ For digital technology to achieve its potential to transform the ways we detect, treat and prevent mental disorders, there is a clear need for continued research involving multiple stakeholders, and rigorous studies showing that these technologies can successfully drive measurable improvements in mental health outcomes.⁵⁴

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