

The role of technology in mental healthcare



OVERVIEW

- Emerging technologies have the potential to provide flexible and tailored mental health support, lower barriers to accessing mental healthcare, and offer insights into the mental health and wellbeing of individuals and populations.
- Mental health technologies raise ethical concerns relating to reductions in face-to-face contact; the effectiveness, quality, and safety of care; exacerbation of health inequalities; and data privacy and security.
- Healthcare providers and developers should take into consideration that:
 - Many people affected by mental health problems do not have access to or are reluctant to use mental healthcare technologies. If these are to become widely adopted in the future, there should be choice about using them.

Technology solutions should not divert resources from other important forms of mental healthcare and support and should be used as an addition to what is already available, rather than a replacement.

Evidence is needed on which technologies are safe and evidence based, and which are not.

- Challenges ahead include improving the evidence base for mental health technologies, ensuring appropriate regulatory frameworks to help users, healthcare professionals, and developers navigate the market, and involving potential users, their families, and care professionals in the development and regulation of technology.

INTRODUCTION

Recent years have witnessed the rapid development of technology for the assessment, monitoring, and managing of mental health conditions and for improvement of mental wellbeing. Technology is developing at speed and many expect it to provide innovative solutions for many challenges faced by mental health services.¹

The shift towards new contactless forms of mental health support has been accelerated by

the COVID-19 pandemic and the consequent increased exposure of the population to remote healthcare technologies.²

This briefing note summarises emerging technological advancements and the potential ethical and social issues that their application in mental healthcare might raise. Our work was informed by a series of engagement sessions with people with lived experience of mental health problems organised by Rethink Mental Illness.³

MENTAL HEALTH IN THE UK

Research suggests that mental distress is increasing in the UK population.⁴ Commonly experienced mental health problems include depression and generalised anxiety.⁵ The proportion of children and young people reporting experiencing mental health problems has also increased over the last few years, with rising rates of self-harm behaviours and suicidal thoughts.⁶

The fear, stress, and social isolation brought by COVID-19 have affected many people's mental health.⁷ This adds further pressure on mental health services, already stretched by a shortage of workforce and resources.⁸

INTEREST AND INVESTMENT IN TECHNOLOGY

The demand for technological forms of mental health support has grown in recent years. In the UK, the number of people searching for mental health apps increased substantially during the COVID-19 pandemic.⁹ Investment in mental health technology is also rising. Global funding for mental health tech start-ups reached \$5.5 billion in 2021.¹⁰

There is interest in the application of mental healthcare technologies within the NHS.¹¹ In England, digital therapy is already available as part of the Increasing Access to Psychological Therapy (IAPT) programme. The NHS plans to further expand access to digital support in the coming years and to leverage technology to tackle anxiety and depression in children and adults.¹²

EMERGING TECHNOLOGIES IN MENTAL HEALTHCARE

This section provides examples of emerging technologies that could come into widespread use in the future.

SMARTPHONE APPS AND CHATBOTS

Smartphone apps can offer flexible support, tailored to individuals' lifestyles and needs. Some apps are designed to improve wellbeing through activities such as meditation, self-help exercises, and mood tracking practices. Others

use artificial intelligence (AI) to operate a chatbot and simulate conversations with users in order to provide assessments and suggestions to improve wellbeing.¹³

Some apps aim to provide clinical support for people with mental health conditions. While particular attention has been given to mild depression and anxiety, apps for the treatment of severe conditions have also been developed.¹⁴ These are usually based on principles derived from

existing therapeutic methods, such as cognitive behavioural therapy (CBT) and relaxation training. For example, some CBT-based apps teach people to manage depression by encouraging them to track symptom severity over time and keep a thought diary.¹⁵

PREDICTIVE ANALYTICS

Digital phenotyping involves the collection of data outside of clinical settings to get insights into the behaviour and mental health of individuals and populations. Smartphones, wearables, and other devices with sensors are sources of a large amount of physiological and behavioural data.¹⁶ By monitoring changes in location, phone interactions and physiological measurements, researchers have been able to monitor treatment adherence and response in psychiatric patients, with the aim of helping to prevent relapses.¹⁷ The analysis of content posted on social media can also provide insights into the mental health of users.¹⁸ Facebook has developed an algorithm to identify posts from people who might be at risk of committing suicide or self-harm.¹⁹

With advances in AI and computer science, it may be possible to use digital data to make predictions about people's mental health. In the future, machine learning (ML)²⁰ and natural language processing (NLP)²¹ techniques could be used to predict people's likelihood of developing a mental health condition or possible clinical outcomes.²² Researchers at the Alan Turing Institute are investigating whether NLP analysis of transcribed speech could help predict who is likely to develop psychosis in a population of at-risk individuals.²³ If integrated with other information, the collection of speech data via personal devices could help clinicians track the progression of disease over time.

While methodological and technical limitations need to be addressed to draw definitive conclusions, including the need for larger sample size, there are hopes that digital phenotyping and computer science techniques will be able to help inform clinical decision-making in the future.²⁴

IMMERSIVE TECHNOLOGIES

Over the past twenty years, researchers have investigated the use of virtual reality (VR) for the treatment of conditions such as phobias and

post-traumatic stress disorder (PTSD).²⁵ Recently, experimental studies have focused on the development of fully automated forms of support that can be delivered without the involvement of human therapists. A new automated VR therapy that targets social anxiety in patients with psychosis is currently being tested in several NHS Trusts as part of the gameChange clinical trial.²⁶

As it becomes more affordable, immersive technology is also starting to play a role in promoting mental wellbeing. Meditative games are reported to help players develop a range of skills to manage stress and anxiety. In the meditative game *Deep*, users are led into an underwater world that can be controlled through diaphragmatic breathing with the help of a breath belt. The aim is to enable players to learn long-term meditative breathing and emotion regulation skills to help manage stress and anxiety, as well as improve mood and relaxation.²⁷

CONSUMER NEUROTECHNOLOGY

Brain recording and stimulation devices were previously accessible only to clinicians and researchers. Now, these tools can be purchased directly by consumers with claims they can enhance wellbeing, reduce stress and anxiety, and improve mood. For example, by wearing a portable electroencephalography (EEG) device during meditation, electrical activity in the brain can be recorded and transferred to a smartphone application where it is immediately translated into a sensory signal. This real-time sensory feedback guides users during meditation.²⁸

Other neurotechnology devices are marketed for the treatment of psychiatric and psychological conditions. For example, a wearable transcranial direct current stimulation (tDCS) device can be used in combination with psychological therapy delivered through an app to improve symptoms of depression.²⁹ The ethical issues raised by novel neurotechnologies have been explored in a previous Nuffield Council report.³⁰

REGULATION OF MENTAL HEALTH TECHNOLOGIES

Some mental health technologies, such as wearables and apps, are considered to be medical devices and are regulated by the Medicines and Healthcare products Regulatory Agency (MHRA).³¹ To qualify as a medical device, software, instruments and other tools must have a 'medical purpose'. The same tool might not be considered a medical device in a different context.

The distinction between health apps with medical and non-medical purposes can be nuanced, particularly in the case of mental healthcare and wellbeing apps. To help determine whether an app is a medical device, the MHRA has issued guidance on the regulation of software applications.³² The MHRA is currently in the process of reviewing its regulatory regime and intends to develop more provisions that can be specifically applied to software and AI.³³

In 2021, NHSX introduced the Digital Technology Assessment Criteria for Health and Social Care (DTAC) with the aim of providing national baseline criteria for digital health technologies entering into the NHS and social

care.³⁴ DTAC are designed for use by NHS organisations piloting, using or procuring digital health technologies.

The National Institute for Health and Care Excellence (NICE) provides an evidence standards framework for digital health technologies.³⁵ NICE is currently updating the framework to include data-driven technologies that incorporate AI.

The Regulatory Horizons Council is currently undertaking research with the aim of advising the UK Government on regulatory reform required to facilitate the rapid and safe development of neurotechnologies that interact with the nervous system, with a report due to be published by the end of summer 2022.³⁶

Many mental healthcare technologies do not fall under the category of a medical device nor are in scope to be assessed for use in the NHS. The regulatory landscape for these technologies has been called "fragmented and not fully developed" and there are calls for more work to help developers navigate the market.³⁷

ETHICAL AND SOCIAL ISSUES

Here we describe some of the ethical and social issues raised by the potential use of emerging technologies in mental healthcare. Some of these overlap with the issues raised by the use of telepsychiatry and other forms of online medicine. These have been considered in a previous Nuffield Council report.³⁸

HUMAN CONNECTIONS

Technology can play a key role in connecting people, for example by linking service users who may be geographically very distant but who share similar experiences and needs.³⁹ This may be especially important for people with rare conditions who would normally not have a chance to meet.

If mental healthcare becomes increasingly contactless and automated, it is important to reflect on the impact that lack of human contact may have on those seeking care. For many service users, in-person therapy, community participation, peer and group support, and other activities involving face-to-face interactions can make the difference for improving clinical outcomes.⁴⁰ Initial studies examining experiences of care during COVID-19 have shown that while some people adapted quickly and appreciated the flexibility offered by remote care, others experienced exacerbated feelings of loneliness, isolation, a sense of disconnection from communities, and an overall deterioration of mental health.⁴¹

THERAPEUTIC RELATIONSHIP

Some service users might find it difficult to build a relationship of trust with health professionals without face-to-face contact.⁴² This may have implications for clinical outcomes, given the importance of the therapeutic relationships for the recovery process.⁴³ There are calls for more research on the effects of cultivating therapeutic relationships with non-human agents.⁴⁴ Despite recent advances in affective computing,⁴⁵ automated systems are still a long way from understanding a person's subjective experience of mental illness.⁴⁶ It is also not known whether machines will ever be able to fully replicate the richness of human emotions and interactions.⁴⁷

EFFECTIVENESS AND SAFETY

Interventions delivered via digital technology can be very effective. Individuals affected by phobias might find it easier to confront their fears in virtual environments compared to real ones, making VR treatments very effective and appealing for some.⁴⁸

Concerns have been raised about the lack of evidence supporting the use of some technologies.⁴⁹ Despite having millions of users, most commercially-developed apps have not undergone rigorous scientific testing and, when they have, they often use a small sample size with no follow-up.⁵⁰ In addition, studies are sometimes conducted by the apps' own developers, rather than by independent research teams.⁵¹ As a result, it is not always clear whether these tools are effective or not, and whether they could cause harm. There have been calls for further research on the effectiveness and safety of mental health apps⁵² and for the introduction of more robust regulatory frameworks.⁵³

Similar concerns have been raised about wearable neurotechnologies. Claims of effectiveness made by developers are often based on the effectiveness of the treatment on which a given product is based, such as tDCS, rather than on the product itself.⁵⁴

ACCURACY

There are questions about how accurate diagnostic and prediction tools need to be for them to be used in clinical decision-making,

particularly if these are to be used without the involvement of clinicians. The way in which accuracy is defined is important. In some research studies, accuracy is measured by how closely the tool matches clinicians' determinations.⁵⁵

Concerns about accuracy also arise in non-clinical settings. For example, some have warned against the use of automated social media content analysis in decision-making in areas such as law enforcement, highlighting that the accuracy level commonly reached by NLP tools is not sufficiently high.⁵⁶

Some ethnic and age groups are under-represented in mental health data sets. Technologies that draw on biased data sets will not have the same accuracy or predictive validity for those groups, potentially exacerbating inequalities in experience of mental healthcare.⁵⁷ Questions of reliability and data bias and other issues raised by the use of AI in healthcare are explored in a previous Nuffield Council briefing note.⁵⁸

ACCESS TO CARE

There are inequalities in access to mental health services among some population groups. These include children and young people, people with ethnic minority backgrounds, homeless people, older adults, refugees, and people living in poverty.⁵⁹ Technology might increase access to care and could help reach some under-served population groups. For example, virtual support may encourage people to seek help who would not otherwise feel comfortable in doing so, because of the perceived stigma associated with mental illness. Others might feel less judged or embarrassed in disclosing symptoms to virtual agents.⁶⁰

As highlighted during the COVID-19 pandemic, increased reliance on technology can exacerbate inequalities by excluding individuals and communities who experience difficulties in using or accessing technology, or those for whom home is not a private or safe place, such as victims of domestic violence.⁶¹ Factors that influence access to and use of technology include health and digital literacy, socio-economic status, age, ethnicity, and level of education.⁶² Significantly, many people affected

by mental health problems do not have access or are reluctant to use technology and therefore start from a position of digital exclusion.⁶³

If mental healthcare systems increasingly rely on technology, questions arise on what technological interventions are prioritised by developers and why. Mental health technologies tend to focus on the most common mental health conditions, such as mild anxiety and depression.⁶⁴ This might lead to more technological interventions being available for common mental health conditions than for rarer conditions.

INDIVIDUAL RESPONSIBILITY FOR HEALTH

The availability and use of mental health technologies might increase individual responsibility for mental wellbeing.⁶⁵ Technology could empower people to take responsibility for their own health, for example by increasing access to information about mental health and encouraging self-reflection and self-care. However, in order to be empowered, people need to have access to technology and have certain levels of health and digital literacy (see above).⁶⁶

It is also important to reflect on the possible impact that an increased medicalisation of everyday life can have on individuals.⁶⁷ People might become excessively preoccupied with changes in mood and behaviour and experience anxiety, or they might worry unnecessarily that these could be interpreted as symptoms of ill health.⁶⁸

DATA PRIVACY AND SECURITY

While some believe all types of health data to be equally sensitive, others argue that mental health information is particularly sensitive.⁶⁹ When personal information is collected and used in the context of mental healthcare, it is important to ensure that transparent data and privacy policies are in place. If mental health technologies become increasingly used in both healthcare and non-healthcare settings, there are concerns that information about a person's mental health could be used in ways that result in discrimination, justify unnecessary coercive interventions, or be used for commercial purposes that the person did not intend.⁷⁰

Some have warned of an increased risk of

cyberattacks targeting mental health service providers.⁷¹ Data breaches involving sensitive mental health information could have devastating consequences for users and providers, as shown by recent high-profile cyberattacks to service providers.⁷² There are calls for higher security standards to protect users and support victims of attacks, and for more research to be conducted on implications of mental health data breaches.⁷³

THE IMPORTANCE OF CHOICE

Emerging technologies are full of promise by nature and often accompanied by an optimism bias.⁷⁴ However, it is important to recognise that technology might not always represent a good or better solution for everybody, and different people will have different needs.

There are concerns that an excessive focus on technology solutions could divert resources from other important interventions, such as increasing social interactions or tackling the social determinants of poor mental health. This may impact the quality of support, as mental wellbeing depends on a number of intertwined factors, including social connectedness, housing, employment, and education.⁷⁵ If technological forms of mental health support become widespread, service users may fear being left without a choice, especially those whose experience of care has been characterised by a lack of autonomy and choice. In clinical settings, these technologies should be used as an addition to what is already available, rather than a replacement, and alternatives to technological interventions should always be available, including hybrid forms of support.⁷⁶

TRUST AND ACCEPTABILITY

Some mental health technologies involve a high level of surveillance. This may be perceived as excessively intrusive and could undermine trust in mental healthcare and in the organisations that deploy digital technologies, with implications for their acceptance and uptake. If used inappropriately, remote monitoring could increase symptoms of mental distress and anxiety in people with mental health problems,⁷⁷ damage the relationship between service users and clinicians, and breach the basic human right to privacy.

There are questions as to whether people would always be able to give informed consent to mental health monitoring and support tools, particularly with direct-to-consumer technologies.⁷⁸ Novel technologies may be unfamiliar to many. Users may, for example, consent to specific forms of surveillance and data collection without fully understanding all the implications of their use.

To improve public trust and acceptability, service users, their family, and care professionals need to be involved in research and development of technology for mental health and in the development of future regulation and research priorities.⁷⁹

CONCLUSIONS

Emerging technologies for the assessment, monitoring, and treatment of mental health conditions are advancing quickly. They have the potential to expand the choice of treatment options available and to improve the health and wellbeing of individuals and communities. To ensure that mental health technology works for all, there is a need to improve the evidence base for the effectiveness and safety of mental health technologies, ensure appropriate regulatory frameworks to help users, clinicians

and developers navigate the market, and involve potential users, their families, and care professionals in the development of technology. It is important that technology improves existing inequalities in access to care and does not exacerbate them. Technology solutions should not divert resources from other important interventions and forms of mental health support, such as increasing social interactions and tackling the social determinants of poor mental health.

Acknowledgments: Many thanks to Dr Becky Inkster (Cambridge University; UK and self-employed advisor), Dr Christopher Burr (Alan Turing Institute), Prof. Martyn Pickersgill (The University of Edinburgh), Dr Sarah Morgan (Cambridge University), Dr Tom Foley (Health Service Executive Ireland; Newcastle University) and Rethink Mental Illness for reviewing a draft of this briefing note. We would also like to thank everyone who took part in the engagement sessions who shared their personal experiences and views so articulately and honestly.

Published by Nuffield Council on Bioethics, 100 St John Street, London EC1M 4EH

April 2022

© Nuffield Council on Bioethics 2022

 bioethics@nuffieldbioethics.org

 @Nuffbioethics

 NuffieldBioethics

www.nuffieldbioethics.org

REFERENCES

- 1 NHS Confederation (2019) [Using digital technology to design and deliver better mental health services.](#)
- 2 WISH (2020) [The digital mental health revolution: transforming care through innovation and scale-up.](#)
- 3 The Nuffield Council on Bioethics commissioned Rethink Mental Illness to run engagement sessions with people with lived experience of mental health problems to inform this briefing note. For a summary of the discussions, see: Rethink Mental Illness (2022) [Summary paper: Engaging experts by experience about the role of digital technology in the future of mental healthcare.](#)
- 4 Pierce M, et al. (2020) [Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population.](#)
- 5 NICE (2019) [NICE Impact mental health.](#)
- 6 House of Commons (2021) [Children and young people's mental health.](#)
- 7 Inkster B (2021) [Early warning signs of a mental health tsunami: A coordinated response to gather initial data insights from multiple digital services providers;](#) Centre for Mental Health (2021) [COVID-19 and the nation's mental health Forecasting needs and risks in the UK: May 2021.](#)
- 8 BMA (2019) [Measuring progress: Commitments to support and expand the mental health workforce in England.](#)
- 9 ORCHA (8 October 2021) [On World Mental Health Day, ORCHA reports that the use of mental health apps is still on the rise.](#)
- 10 CB Insights (24 February 2022) [State of mental health tech 2021 report.](#)
- 11 Health Education England (2019) [The digital future of mental healthcare and its workforce: a report on a mental health stakeholder engagement to inform the Topol Review.](#)
- 12 NHS (2019) [The NHS long term plan.](#)
- 13 Marley J and Farooq S (2015) [Mobile telephone apps in mental health practice: uses, opportunities and challenges.](#)
- 14 Anthes E (2016) [Mental health: there's an app for that.](#)
- 15 APA (2019) [Choosing the right CBT app for depression and anxiety.](#)
- 16 Ada Lovelace Institute (2020) [The data will see you now. Datafication and the boundaries of health.](#)
- 17 Huckvale K, et al. (2019) [Toward clinical digital phenotyping: a timely opportunity to consider purpose, quality, and safety.](#)
- 18 Microsoft (2013) [Predicting depression via social media.](#)
- 19 Facebook (10 September 2018) [How Facebook AI helps suicide prevention.](#)
- 20 Branch of AI and computer science focused on developing computer systems capable to learn and adapt without following specific instructions. It can be used to analyse and draw inferences from patterns in data.
- 21 Branch of AI and computer science focused on the application of computational techniques to the analysis and synthesis of natural language and speech. It can be used to build machines that understand and respond to text or voice data.
- 22 See, for example, Chekroud A, et al. (2016) [Cross-trial prediction of treatment outcome in depression: a machine learning approach.](#)
- 23 SE Morgan (2021) [Natural language processing markers in first episode psychosis and people at clinical high-risk.](#)
- 24 Le Glaz A, et al. (2021) [Machine learning and natural language processing in mental health: systematic review.](#)
- 25 Freeman D, et al. (2017) [Virtual reality in the assessment, understanding, and treatment of mental health disorders.](#)
- 26 Lambe, et al. (2020) [Developing an automated VR cognitive treatment for psychosis: gameChange VR therapy.](#)
- 27 Weerdmeester J, et al. (2020) [An integrative model for the effectiveness of biofeedback interventions for anxiety regulation: viewpoint.](#)
- 28 The Unwired (3 February 2022) [What is an EEG headset and why should you use one?](#)
- 29 Borrione L, et al. (2020) [The Flow brain stimulation headset for the treatment of depression: overview of its safety, efficacy and portable design.](#)
- 30 Nuffield Council on Bioethics (2013) [Novel neurotechnologies: intervening in the brain.](#)
- 31 UK Medical Devices Regulations 2002.
- 32 MHRA (2021) [Guidance: Medical device stand-alone software including apps \(including IVDMDs\).](#)
- 33 MHRA (2021) [Software and AI as a Medical Device Change Programme.](#)
- 34 NHSX (2021) [Digital Technology Assessment Criteria \(DTAC\).](#)
- 35 NICE (2022) [NICE health technology evaluation: the manual.](#)
- 36 Regulatory Horizons Council (RHC).
- 37 Future Care Capital (July 2021) [Mental health tech landscape review.](#)
- 39 Rethink Mental Illness (2022) Summary paper: Engaging experts by experience about the role of digital technology in the future of mental healthcare.
- 40 Webber M and Fendt-Newlin M (2017) [A review of social participation interventions for people with mental health problems;](#) Davidson L, et al. (1999) [Peer support among individuals with severe mental illness: a review of the evidence.](#)
- 41 Mind (2021) [Trying to connect – The importance of choice in remote mental health services;](#) Liberati E, et al. (2021) [Remote care for mental health: qualitative study with service users, carers and staff during the COVID-19 pandemic.](#)
- 42 Rethink Mental Illness (2022) Summary paper: Engaging experts by experience about the role of digital technology in the future of mental healthcare.
- 43 Bordin ES (1979) [The generalizability of the psychoanalytic concept of the working alliance Psychotherapy: Theory.](#)
- 44 Henson P, et al. (2019) [Digital mental health apps and the therapeutic alliance: initial review.](#)
- 45 Affective computing is the study and development of systems that can recognise, process, and simulate human affects; Mensio M, et al. (2018) [The rise of emotion-aware conversational agents: threats in digital emotions.](#)
- 46 Gillett G (2020) [A day in the life of a psychiatrist in 2050: where will the algorithm take us?](#)
- 47 Kretschmar K, et al. (2019) [Can your phone be your therapist? Young people's ethical perspectives on the use of fully automated conversational agents \(chatbots\) in mental health support.](#)
- 48 The Guardian (5 April 2022) [VR role-play therapy helps people with agoraphobia, finds study.](#)
- 49 Torous J, et al. (2019) [Towards a consensus around standards for smartphone apps and digital mental health.](#)
- 50 Woodward K et al. (2020) [Beyond mobile apps: a survey of technologies for mental well-being.](#)
- 51 Anthes E (2016) [Mental health: There's an app for that.](#)
- 52 Holli C, et al. (2018) [Identifying research priorities for digital technology in mental health care: results of the James Lind Alliance Priority Setting Partnership.](#)
- 53 Murphy C, et al. (2020) [Unlocking the potential for digital mental health technologies in the UK: a Delphi exercise.](#)
- 54 McCall IC, et al. (2019) [Owning ethical innovation: claims about commercial wearable brain technologies.](#)
- 55 Centre for Democracy and Technology (2017) [Mixed messages? The limits of automated social media content analysis.](#)
- 56 Ada Lovelace Institute (2020) [The data will see you now. Datafication and the boundaries of health;](#) Centre for Democracy and Technology (2017) [Mixed messages? The limits of automated social media content analysis.](#)
- 57 Stanford news (14 May 2021) [Debiasing artificial intelligence: Stanford researchers call for efforts to ensure that AI technologies do not exacerbate health care disparities;](#)

- STAT (6 August 2021) [Responsible AI: leveraging data and technology to counteract bias](#).
- 58 Nuffield Council on Bioethics (2018) [Artificial intelligence \(AI\) in healthcare and research](#).
- 59 National Collaborating Centre for Mental Health (2019) [Advancing mental health equality](#); Centre for Mental Health (2020) [Mental health inequalities: factsheet](#).
- 60 Lucas GM, et al. (2017) [Reporting mental health symptoms: breaking down barriers to care with virtual human interviewers](#); Lucas GM, et al. (2014) [It's only a computer: virtual humans increase willingness to disclose](#).
- 61 Mind (2021) [Trying to connect – the importance of choice in remote mental health services](#).
- 62 Beaunoyer E, et al. (2020) [COVID-19 and digital inequalities: reciprocal impacts and mitigation strategies](#).
- 63 Centre for Mental Health (2020) [COVID-19: understanding inequalities in mental health during the pandemic](#); Spanakis P, et al. (2021) [The digital divide: amplifying health inequalities for people with severe mental illness in the time of COVID-19](#).
- 64 Future Care Capital (July 2021) [Mental health tech landscape review](#).
- 65 Maturo A, et al. (2016) [An ambiguous health education: the quantified self and the medicalization of the mental sphere](#).
- 66 Calvillo J, et al. (2013) [How technology is empowering patients? A literature review](#) *Health expectations*
- 67 Pickersgill M (2019) [Digitising psychiatry? Sociotechnical expectations, performative nominalism and biomedical virtue in \(digital\) psychiatric praxis](#).
- 68 Gillett G and Saunders KE (2019) [Remote monitoring for understanding mechanisms and prediction in psychiatry](#).
- 69 Gooding P (2019) [Mapping the rise of digital mental health technologies: emerging issues for law and society](#).
- 70 Ienca M and Andorno R (2017) [Towards new human rights in the age of neuroscience and neurotechnology](#); Burr C, et al. (2020) [Digital psychiatry: risks and opportunities for public health and wellbeing](#).
- 71 Inkster B (2021) [Cybersecurity: a critical priority for digital mental health](#).
- 72 The Guardian (26 October 2020) [‘Shocking’ hack of psychotherapy records in Finland affects thousands](#); BBC (21 March 2022) [Scottish mental health charity SAMH targeted in cyber attack](#).
- 73 Inkster B (2021) [Cybersecurity: a critical priority for digital mental health](#).
- 74 Nuffield Council on Bioethics (2021) [Emerging biotechnologies: technology, choice and the public good](#).
- 75 Public Health England (2018) [Health matters: reducing health inequalities in mental illness](#); Social Exclusion Unit (2004) [Mental health and social exclusion](#).
- 76 Rethink Mental Illness (2022) Summary paper: engaging experts by experience about the role of digital technology in the future of mental healthcare.
- 77 Gillett G and Saunders KE (2019) [Remote monitoring for understanding mechanisms and prediction in psychiatry](#).
- 78 Martinez-Martin N and Kreitmair K (2018) [Ethical issues for direct-to-consumer digital psychotherapy apps: addressing accountability, data protection, and consent](#).
- 79 Carr S (2020) [‘AI gone mental’: engagement and ethics in data-driven technology for mental health](#).