Superior
Health Council

DIGITAL INTERVENTIONS AND APPS FOR MENTAL HEALTH

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Federal Public Service Health, Food Chain Safety and Environment

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ADVISORY REPORT OF THE SUPERIOR HEALTH COUNCIL no. 9745

Digital interventions and apps for mental health

In this scientific advisory report, which offers guidance to public health policy-makers, the Superior Health Council of Belgium provides recommendations of digital interventions and apps for mental health.

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6 March 2024[1]

Keywords and MeSH descriptor terms[2]

MeSH terms*	Keywords	*Sleutelwoorden*	*Mots clés*	*Schlüsselwörter*
Digital technology	Apps	*Apps*	*Applications*	*Apps*
Digital Health	Digital intervention	*DIgitale interventie*	*Intervention numérique*	*Digitale Intervention*
Mental Health	Mental Health	*Geestelijke gezondheid*	*Santé mentale*	*Psychische Gesundheit*
Delivery of Health Care	Clinical Practice	*Klinische praktijk*	*Pratique Clinique*	*Klinische Praxis*
Ethics	Ethics	*Ethiek*	*Ethique*	*Ethik*

MeSH (Medical Subject Headings) is the NLM (National Library of Medicine) controlled vocabulary thesaurus used for indexing articles for PubMed: http://www.ncbi.nlm.nih.gov/mesh.

List of abbreviations used

AI	Artificial Intelligence
AR	Augmented Reality
CBT	Cognitive Behavioral Therapy
EU	European Union
GAD	Generalized Anxiety Disorder
GDPR	General Data Protection Regulation
MDR	Medical Device Regulation
MHC	Mental Healthcare

[1] The Council reserves the right to make minor typographical amendments to this document at any time. On the other hand, amendments that alter its content are automatically included in an erratum. In this case, a new version of the advisory report is issued.
[2] The Council wishes to clarify that the MeSH terms and keywords are used for referencing purposes as well as to provide an easy definition of the scope of the advisory report. For more information, see the section entitled "methodology".

OCD	Obsessive Compulsive Disorder
OECD	Organisation for Economic Co-operation and Development
PTSD	Post Traumatic Stress Disorder
RCT	Randomized Controlled Trial
SHC	Superior Health Council
UTAUT	Unified Theory of Acceptance and Use of Technology
VR	Virtual Reality
WHO	World Health Organization
XR	Extended Reality

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I INTRODUCTION AND ISSUE

"*Mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community. It is an integral component of health and well-being that underpins our individual and collective abilities to make decisions, build relationships and shape the world we live in. Mental health is a basic human right. And it is crucial to personal, community and socio-economic development.*" (WHO, 2022). However, maintaining mental health proves to be a considerable challenge for many.

As stated in the advisory report 9667 of the Superior Health Council (SHC), 1 in 8 people worldwide have a mental health disorder (Institute of Health Metrics and Evaluation, 2019). Individuals with mental disorders are defined as those who fulfil the diagnostic criteria according to psychiatric classification systems including disorders such as depression, anxiety, bipolar disorder and schizophrenia. Currently, two of the five disorders which contribute most to the burden of disease in Belgium are mental health disorders (i.e., depression and alcohol and other drug disorders) (Sciensano, 2022). These problems usually develop early in life (75 % occur before the age of 24) and have a significant impact on many aspects of life, such as school drop-out, absenteeism and inability to work, poverty, and isolation (SHC 9667, 2022). All these aspects contribute to significant direct and indirect costs in society. In 2015, the indirect costs of mental health problems in the labour market represented 2.30 % of Belgium's gross domestic product (GDP), the highest percentage among the member countries of the OECD (OECD, 2018).

Despite relatively well-developed mental healthcare (MHC) systems, access to and use of treatment remains suboptimal. A recent study on unmet mental health needs in the province of Antwerp, found a clinical need in 10 % of participants, which was unmet for half of them. (Rens et al, 2022). This gap between demand and supply of care is linked to a variety of causes, e.g., lack of services and waiting lists, but also to stigma and negative attitudes towards mental health care (Kazdin & Blase, 2011). An important part of the solution to address these challenges and to strengthen our MHC system, could be the use of technology. Using technology in MHC goes by many names (Smoktunowicz et al, 2020), but in this report, we will be referring to it as digital mental health.

In 2016 the SHC published an advisory report "Towards a generic framework for the development of quality indicators for mental health care in Belgium." (SHC 9204, 2016), in which the availability of technological tools was considered as a quality criterion for mental health care provision. In that report, the SHC gave an overview of the recommendations for high-quality mental health care, based on a systematic review of the literature. The availability of technological tools for assessment and treatment was defined as a quality criterion for accessible mental health care. The report stated that digital mental health *"is now seen as a promising approach to providing effective and efficient mental health care through the use of intelligent information and communication technologies*". Computer-assisted cognitive behavioural therapy (CBT) and videoconferencing technology were mentioned explicitly and the provision of (online) self-help services were also hinted at, as one of the ways to better take into account and promote the rights of people with mental health problems.

The Covid-19 pandemic accelerated this change. The restrictions imposed by the pandemic and the increase in mental health problems increased interest in the potential of digital mental health. Given the need for adapted care, technology made it possible to continue offering services while maintaining social distancing (Raphael et al, 2021). These seemed to offer promising means to provide affordable and easily accessible solutions to a large number of people at times of increased needs (see advisory reports of the SHC 9589, 9610, 9676 and 9662; Bocklandt et al, 2020). While the pandemic has resulted in first, mostly positive

experiences with digital mental health for many professionals and patients, online consultations seemed to be used most commonly (Van Daele et al, 2022).

Digital mental health is nevertheless more than online consultations and consists of different solutions (e.g., digital interventions, apps, wearables, immersive technologies) which together have the potential to address a wide range of existing mental health needs, with very diverse objectives and target populations, at all phases of the healthcare continuum: prevention, mental health promotion, early detection and intervention, diagnosis and treatment, relapse prevention and follow-up. Possible advantages are therefore numerous, e.g., reaching more people (which would otherwise not be reached), improving accessibility of care, reducing waiting times, promoting continuity of care, and improving early identification. At the same time, there's the potential to offer greater flexibility, to promote active participation of users by giving them tools for self-management, to intervene in the natural context, to reduce the risk of stigma, and to be more cost-effective compared to existing services.

The landscape of mental health interventions is undergoing a transformative shift with the integration of digital technologies. Research and technology-driven advancements are propelling the digitalization of mental health interventions, yet a noticeable gap persists in their implementation within current clinical practices. The efficacy of these digital interventions remains a subject of debate, necessitating a comprehensive assessment of their feasibility and exploration of contextual factors influencing their safe and effective integration. Recent studies highlight the imperative need to cautiously navigate the potential negative side-effects associated with digital interventions and apps, particularly those involving chatbots (Liu & Schueller, 2023; Moe-Byrne et al, 2022). As we tread into this evolving terrain, it becomes crucial to unravel the complexities and nuances surrounding digital mental health interventions, ensuring a balanced and responsible integration into the broader mental health landscape.

To what extent current international findings can translate to the Belgian context and clinical practice is nevertheless unclear. Currently, an overarching national framework for digital mental health is lacking. MHC professionals therefore lack clear and specific national guidelines on 1) what are high-quality tools in terms of evidence, theory and end-user involvement, 2) who can make use of these tools, under which circumstances and for what purpose (e.g., contra-indications, but also necessary education and training for professionals), and 3) which ethical and legal considerations have to be taken into account when planning to use such tools (e.g., informed consent, confidentiality, privacy, crisis intervention setup). This advisory report therefore aims to formulate a first set of recommendations that can help shape such a national framework and guide further developments on this domain, based on available research data and existing international guidelines applied to the Belgian context. We will also pay specific attention to children and young people, as a lot of mental health problems arise typically in this age group. At the same time, as technology is so omni-present in day to day life of children and adolescents, technology may also offer great opportunities for prevention and early intervention.

II METHODOLOGY

After analysing the request, the Board and the Chair of the working group identified the necessary fields of expertise. An *ad hoc* working group was then set up which included experts in medicine, orthopedagogy, psychology, psychiatry, social work, sociology, and digital mental health. The experts of this working group provided a general and an *ad hoc* declaration of interests and the Committee on Deontology assessed the potential risk of conflicts of interest.

This advisory report is based on a review of the scientific literature published in both scientific journals and reports from national and international organisations competent in this field (peer-reviewed), as well as on the opinion of the experts. The nominal group technique approach was used to consolidate the collective expertise and recommendations. It is described in detail in the report.

Once the advisory report was endorsed by the working group (and by the standing working group mental health), it was ultimately validated by the Board.

III ELABORATION AND ARGUMENTATION

In a first chapter, we provide an introduction to the field of digital mental health, after which we will zoom in on digital interventions and apps and their current evidence-base and costs. Subsequently, we will discuss the current uptake in clinical practice in terms of users, interventions, context, and ethical and deontological challenges. In a fourth and final chapter, we will detail the development of the recommendations.

1 Introduction

After a broad overview of the different technological approaches in digital mental health, the concrete scope of the report will be detailed.

1.1 Overview of existing technologies

Digital mental health can be used to support and improve mental disorders and mental health care. It encompasses the use of digital technologies and new media for the delivery of health promotion, prevention, screening, early intervention, treatment and relapse prevention, as well as for improvement of health care delivery (e.g. through the use of electronic patient files, or staying in touch outside of face-to-face consultations), professional education (e-learning), and online research in the field of mental health.

The way technology is used in mental health care is diverse, both in terms of interventions and technologies used. De Witte et al (2021) proposed a taxonomy that identifies 9 types of interventions and 9 types of technology, which in theory gives 81 possible combinations (although not all technologies are suitable for all interventions). These technologies also address a wide variety of target groups, i.e., adults but also children and young people. In terms of type of intervention, it is possible to offer preventive interventions, measurement and monitoring interventions, supportive interventions, skills training, game-based interventions, psychotherapeutic interventions, such as cognitive-behavioural psychotherapeutic approaches, or mindfulness and acceptance and commitment therapy. In terms of technologies, De Witte et al (2021) proposed three broad categories: conventional care that is delivered online, programs specifically developed online, and new technologies that are gradually being introduced in clinical settings. These are discussed in more detail below.

<u>Conventional Approaches Using (a)Synchronous Technologies</u>

Synchronous media: The user and professional have real-time virtual contact via, for example, video calling or chat.

Asynchronous media: The exchange takes place offline, as in e-mail conversations. These interventions by MHC professionals are most often aimed at providing psycho-education and psychosocial support.

Digital programs

These can be offered as self-help or in combination with professional support that monitors progress (a)synchronously and/or provides feedback. Computer programs have often focused on psychotherapeutic interventions, but have also been used in the context of skills training. Running these programs (in part) on smartphones offers the additional advantage of relying on a compact and wireless device, with low purchase and running costs, and easy access to the internet for a large part of the population (Torous et al, 2021). The ease of creating applications and making them available also greatly facilitates the dissemination of tools. In addition, these devices can be used for capturing data in real-life settings (i.e., ecological momentary assessment), as well as delivering timely and context-embedded interventions (i.e., ecological momentary intervention).

The sensors in smartphones are increasingly used as a means to monitor and provide data to support the implementation of personalised interventions. Aside from functionalities like geofencing using GPS data, solely relying on "mobile sensing" currently seems to offer yet little added value in practice (Niemeijer, 2023). Enriching smartphone data with input from self-report and wearables (also discussed in the section of emerging technologies) is therefore also increasingly being explored (e.g., WARN-D, 2024). Smartphones can nevertheless facilitate access to interventions, either as self-help or in combination with professional support, but also support monitoring and diagnosis through data capture and analysis, and facilitate access to other interventions (e.g., peer support, clinical care).

Emerging technologies

Emerging technologies are not mainstream and still under development. Although they have sometimes been the focus of (extensive) research, they are not yet widely used in clinical practice and evaluation in routine care is still relatively limited.

Extended Reality (XR): Extended Reality refers to Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR). Virtual Reality involves immersion in a computer-simulated interactive environment through a headset. The ability to create and control exposure to virtual environments offers significant opportunities for mental health assessment and treatment (measuring reactions in real time, providing a safe, convenient and accessible means of delivering personalised exposure-based treatments, learning skills, but also encounters in virtual environments and real-time interactions). AR involves adding virtual elements to the real environment using a smartphone or headset. MR involves a mixture of the virtual and real worlds.

Social media: Social media connect people from their own devices to global networks of friends, information and health resources. It is mainly used for peer-to-peer contact and social networking through both large population-level social networking sites, as well as specialised digital communities (e.g., *psychosenet.be*, *Zelfmoord 1813 forum*). Social media are often seen to have both positive and negative effects on mental health. For example, they can be a source of social support for many socially isolated and lonely people. They can also be used to detect the worsening of mental health symptoms, identify content that may be linked to risks of mental health problems, or understand mental health trends at a population level. The impact of social media on the developing brain is still under discussion however (Torous et al, 2021), and social media may contain also other risks such as misinformation and stigmatisation.

Wearables: Sensors and devices can be worn on the body to collect physiological and behavioural data (e.g. heart rate, physical activity) non-invasively and continuously throughout daily life. This data are increasingly of relevance to MHC. However, several challenges remain

to make it relevant for routine MHC in terms of ease of implementation, data quality, and actionable insights (Debard et al, 2020).

Chatbots: These are conversational agents, programs capable of conversing and interacting with the user through spoken, written and visual communication. These automated systems can detect and respond to immediate mental health needs. Chatbot interfaces have become a key feature of many commercially available mental health applications. However, they have a number of limitations, such as security issues (privacy), and challenges to recognize serious mental health concerns (Torous et al, 2021).

Artificial Intelligence

Until recently, all of these technologies relied on conventional programming techniques and approaches (e.g., decision trees, algorithms). Increasingly, however, Artificial Intelligence (AI) is introduced to further enhance these, for example through AI-based conversational agents to increase chatbot potential (Sedlakova & Trachsel, 2023), potentially overcoming some of the aforementioned limitations. Digital phenotyping, allowing for precision prevention and medicine by making better use of available data using machine learning techniques is another example of the use of AI in MHC (Fagherazzi et al, 2020). Although the potential added value seems clear, there are theoretical, practical, as well as ethical considerations to be kept in mind. These will be discussed in more detail further in this report.

1.2 Scope of the report

Taking into consideration that all these technologies and related interventions are diverse, this report will be unable to examine and consider all of them in sufficient detail. The most frequently studied technologies are programs on computers, smartphones or cross-platform digital environments (De Witte et al, 2021), which are also the solutions most frequently found in national repositories (e.g., *onlinehulp-apps.be*). This report will therefore focus on these digital interventions and apps for mental health, for different uses in clinical practice: stand-alone self-help interventions, guided interventions with minimal professional support, and blended interventions in which technology is combined with conventional practice. This pragmatic choice nevertheless should not underscore the potential relevance and impact of other aforementioned technologies; the proposed recommendations in this report can furthermore also be of relevance to the broad field of digital mental health.

2 Digital interventions and apps for mental health: current evidence-base

This chapter discusses the current evidence-base for digital interventions and apps for mental health, exploring efficacy and effectiveness for adults, as well as for children and adolescents, followed by the cost-effectiveness of these interventions. Within both age-groups, we will look at most common disorders (i.e. depressive and anxiety disorders and addiction). To date, research in this domain has primarily focused on well-defined target groups with clear-cut diagnoses. We will report these studies as such. It is nevertheless important to note that these studies investigate the efficacy of digital interventions and apps for mental health in optimal conditions, especially in children and adolescents. Not only is comorbidity highly common, but the way their symptoms present or evolve, might make them move through separate psychiatric diagnoses. In practice, digital interventions and apps for mental health, which allow for dynamic tracking and treating of symptoms, might benefit more from a transdiagnostic approach integrating categorical and dimensional assessment (Blase et al, 2023). Additionally, it is important to note that the content of this chapter is not the result of a systematic review. As a narrative review, its main aim is to provide a broad overview of and introduction to the domain of digital interventions and apps for mental health. Throughout this chapter, we nevertheless relied extensively on existing systematic reviews and meta-

analyses. When discussing results, we will refer to reported effect sizes (often summarized as Cohen's *d* or Hedge's *g)* as either small (.2), medium (.5) or large (≥ .8).

2.1 Adults

Digital interventions and apps focus primarily on common mental disorders such as depression and anxiety, addictions and other health behaviours such as sleep, diet and substance use, using a variety of working mechanisms (e.g., psychoeducation, cognitive restructuring, skill building, behavioural contracting, relaxation, self-monitoring; cfr. Wasil et al, 2019). These are supplemented by varying degrees of human support ranging from self-help over guided and blended formats. If support is provided it can be offered synchronously or asynchronously. In the following paragraphs, the current evidence-base will first be summarized for depressive and anxiety disorders, addiction, and other mental health problems.

2.1.1 Depressive and anxiety disorders

The majority of research on digital interventions and apps has focused on depression and anxiety disorders. According to Torous et al (2021), most of the applications used for depression and anxiety include reference to an evidence-based theoretical framework (also see Marshall et al, 2020). Most often cognitive behavioral therapy techniques are used, but also cognitive training procedures may be applied in the context of depression (Vander Zwalmen et al, 2023). A meta-analysis by Linardon et al (2023) found overall small but significant effects on symptoms of depression and generalized anxiety, and that specific features of apps - such as CBT or mood monitoring features and chatbot technology - are associated with larger effect sizes. Other meta-analyses (Firth et al, 2017; Olthuis et al, 2016) have also shown that online interventions can be efficacious in treating symptoms of several anxiety disorders, with medium effects when compared to waitlist control and small effects compared to active control conditions. In the following paragraphs, we will discuss the current evidence base according to intervention type.

Self-help interventions
Medium-sized reductions in symptoms of anxiety and depression were found in controlled studies on stand-alone treatments in a recent meta-analysis (Seegan et al, 2023). Studies with longer treatment duration and more severe symptoms found greater therapeutic effects. Little information was often reported on both the usability, as well as the participant engagement for these interventions. Adherence is generally low, but can probably at least partially be explained by the observation that most unguided interventions do not include additional content or rely on additional technological features to compensate for the lack of therapist support (Burger et al, 2020).

Guided interventions
Such human support can contribute significantly to the effectiveness of digital interventions. Guided interventions are consistently found to be more effective than unguided interventions in a range of common mental disorders (Domhardt et al, 2020; Domhardt et al, 2019), with small to large effect sizes compared to waitlist and similar effects compared to active controls (e.g., face-to-face therapy). A systematic review by Torous et al (2021) also showed that studies offering professional support in addition to a smartphone app (for example, through supportive phone calls or personalized feedback from therapists) produced larger effect sizes than studies that did not. Research has in the past found that these online guided interventions could be as effective as conventional face-to-face therapies for patients with anxiety disorders and depression (Cuijpers et al, 2010; Carlbring et al, 2018), although caution nevertheless seems warranted (O'Kearney et al, 2019).

Blended interventions
For some patients who require in-person contact with their therapist, blended interventions may also have advantages. Several studies on blended treatment of depression and anxiety suggest comparable clinical effects between the blended intervention and the control intervention (Kooistra et al, 2019; Ly et al, 2015; Nakao et al, 2018; Romijn et al, 2021; Thase et al, 2018). Mathiasen et al (2022) also demonstrated the possibility to replace half of all consultations with online modules in the treatment of depression in adults, with virtually no loss of treatment effect. No changes were also found in completion rates or in therapeutic alliance, which is often considered an important factor in the effectiveness of psychotherapy. Similar results regarding the therapeutic alliance also appear in other blended care studies (Preschl et al, 2011).

An important consideration to make when looking at the effects of these different types of interventions on depressive and anxiety disorders is that research has primarily focused on patients with mild to moderate symptoms. Its potential applicability in the clinical management of severe mood disorders, such as bipolar disorder and major depressive disorder therefore remains uncertain. In a systematic review evaluating 19 studies focussing on the treatment of depression and anxiety, Etzelmueller et al (2020) assessed acceptability (uptake, participants' characteristics, adherence, and satisfaction) alongside effectiveness of nonrandomized pre-post designs in routine care. Despite a highly heterogenous sample, on average, clinically relevant changes were found with effect sizes ranging from medium to large. A meta-analysis by Eilert et al (2020) reporting large effect sizes for primary outcomes of anxiety and worrying supports the effectiveness of Internet treatments for generalized anxiety disorder (GAD). According to the authors, digital interventions are also effective in treating comorbid symptoms of depression, improving general levels of functioning and quality of life. A systematic review (Liu et al, 2020) also found positive effects of digital interventions in bipolar disorder on depressive and manic symptoms, but only four of the ten studies included were Randomized Controlled Trial (RCTs). Another meta-analysis (Karyotaki et al, 2018) indicated that internet-based CBT offered clinically significant results in people with severe depressive symptomatology. In a 15-week RCT with one year follow-up, finally, Romijn et al (2021) demonstrated the potential acceptability, efficacy and cost-effectiveness of blended cognitive-behavioural therapy in specialist mental health care for patients with GAD, social anxiety disorder and panic disorder.

2.1.2 Addiction

Research on addiction is still limited. We will therefore highlight the current evidence base for substance-use disorders, as well as non-substance related disorders.

Substance related disorders
Regarding smoking cessation, a recent meta-analysis (Weisel et al, 2019) observed a small overall effect for reducing smoking frequency although the authors were cautious to recommend it because of the limited number of studies included. A Cochrane review (Whittaker et al, 2019) found no significant differences in smoking cessation rates between apps and non-app smoking cessation support conditions.

With regard to alcohol use, the meta-analysis by Weisel et al (2019) identified a small and non-significant pooled effect size for a self-help application compared to a control condition; while a systematic review by Schouten et al (2021) showed the effectiveness of digital interventions on alcohol consumption (and depressive symptoms) in people suffering from depression concomitant with problematic alcohol consumption.

Several systematic reviews reported guided interventions being superior to fully automated ones (Riper et al, 2018; Hadjistavropoulos et al, 2020) for alcohol consumption, which was also demonstrated in a Belgian study on the *alcoholhulp.be* platform (Vangrunderbeek et al,

2022). With regard to other substance-related disorders, the reviews by Staiger et al (2020) and Nuamah et al (2020) did not identify any RCTs of application-based interventions.

Non-substance related disorders
As for non-substance-related disorders, in their systematic review of behavioural addictions, Boumparis et al (2022) identified significant effects on gambling-related symptoms. The most frequent intervention was online CTB, with in some cases interactions with a therapist aimed at providing feedback, support and answering questions. The results are in line with those of a meta-analysis (Sagoe et al, 2021), which found medium effect sizes for internet-based interventions for gambling disorder on gambling symptoms, frequency and amount of money lost, the effects being greater when there was support with the therapist.

Boumparis et al also identified studies concerning other forms of behavioural addiction: gaming disorder, internet use disorder, hoarding disorder, and pornography use disorder, revealing generally promising, but limited, results.

2.1.3 Other health problems

A review by Milne-Ives et al (2020) showed that participants' perceptions were generally positive for the health applications (physical activity, diet, drug and alcohol use, and mental health), but found ultimately little evidence of any change in behaviour or health outcomes.

Online cognitive behavioural therapy interventions may however be effective and cost-effective in reducing insomnia (Zachariae et al, 2016; Buntrock et al, 2021; Natsky et al, 2020). There are also some, but few, studies regarding the effectiveness of eating disorder apps. In their review, Torous et al (2021) state that two previous reviews concluded that very few of the available eating disorder apps incorporated evidence-based treatment elements, with some even providing potentially harmful information (Juarascio et al, 2015; Fairburn & Rothwell, 2015).

There are a few studies on the role of smartphone applications as a complement to traditional face-to-face services (Hildebrandt et al, 2017; 2020), in particular to improve treatment adherence and skills use in bulimia, but these results are still insufficient to determine the effectiveness of these applications over the long term, or for other eating disorders. In their meta-analysis, Linardon et al (2020) found that digital interventions were more effective than control conditions in reducing established risk factors and symptoms, but there were issues with intervention engagement. Whether digital interventions can help prevent eating disorders onset remains unclear.

2.2 Children and adolescents

The mental health of children and adolescents is a public health priority, since mental health problems have a 20 % prevalent rate among children and adolescents worldwide (WHO, 2003) and most mental health problems develop during adolescence and young adulthood (Solmi et al, 2021). Moreover, it is conceivable that smartphones could be a suitable means of dissemination for this target group. However, many of the technologies tested with young people were initially developed for adult populations, rather than being designed and co-produced by young people themselves (Torous et al, 2021).

As with adults, research demonstrates the effectiveness of applications using cognitive behavioural techniques for anxiety and depression (Christ et al, 2020; Hollis et al, 2017; Temkin et al, 2020), with results also being more favourable when treatment is supported by a therapist or parent (Grist et al, 2019). This is in line with the finding that children and adolescents, even more than adults, rely on adults to regulate their emotions. In their meta-analysis, Domhardt et al (2020) reported the effectiveness of internet and mobile phone-based

interventions for some health problems in young people, with evidence mainly for depression and anxiety. Offering (young) patients more control over their own treatment can increase their motivation and lead to better treatment outcomes (Van Yperen et al, 2003). In their systematic review, Szlyk et al (2020) also found promising results on the effect of universal online prevention interventions for youth suicide (including for suicidality and proactive behaviours such as initiation of formal treatment).

For mental health of young people, applications can also target parents. Florean et al (2020) found online parenting interventions to be effective in reducing behavioural problems in children and adolescents, by improving parental behaviour, and impacting parental distress and parental effectiveness. These results were obtained in comparison to a waiting list, but with no greater effect than traditional interventions. Online parenting interventions could nevertheless still improve behavioural problems, as well as parenting outcomes.

2.3 Costs

Whether these digital interventions and apps are cost-effective is increasingly becoming of interest, as making the transfer from research to routine care also leads to questions regarding the costs associated with these tools and their use (de Mévergnies et al, 2023).

Cost-effectiveness research is increasingly being conducted, but still relatively scarce to date. A systematic review from Rohrbach et al (2023) found that the cost-effectiveness of internet interventions for mental disorders compared with a care-as-usual approach is likely, but given the heterogeneity of the different studies (e.g., recruitment, implementation, type and frequency of guidance), generalizability proved to be difficult. Focussing specifically at guided interventions, Kählke et al (2022) found significant evidence for their cost-effectiveness for depression and anxiety and first new evidence for under-researched symptoms and disorders such as OCD, PTSD, stress, and sleep.

2.4 Conclusion

A variety of digital interventions and apps have been developed, tested in research, and sometimes implemented in routine clinical practice. Overall, research suggests that digital interventions and apps can be as effective as face-to-face psychotherapies for mild to moderate symptoms and that these treatments may also be effective in clinical practice, with more human support leading to stronger effects.

The evidence available to date therefore suggests that these technological solutions could help to fill the current gaps in care provision. They might therefore be able to help alleviate the health and economic burden of these disorders, by increasing the coverage of mainstream care services and promoting access for people who do not have access to mainstream treatments, thanks to their accessibility, acceptability, innovative and scalable format, perceived anonymity and low cost. Although evidence for effectiveness is found across different levels of human support, guided or blended interventions seem to lead to larger overall effect sizes.

3 Uptake in clinical practice

Digital interventions and apps for mental health can improve access to mental health care, and several studies have demonstrated their effectiveness in improving symptoms, especially when combined with a certain level of human support. There are also first indications that these techniques might be cost-effective as well. Much evidence nevertheless also concerns efficacy and comes from research conducted outside of routine clinical care. Caution is therefore warranted when drawing conclusions regarding routine care potential of digital interventions and apps. Romijn et al (2019) for example found that the effects of online

interventions for anxiety were weaker in samples recruited from clinical practice than in samples recruited from the community.

Unsurprisingly, a number of challenges remain. Most online interventions and apps need to be used on a regular basis and require integration into the user's routine. In their systematic review of the relationship between engagement and mental health outcomes, Gan et al (2021) showed that greater engagement was significantly associated with improvements in mental health after the intervention, regardless of the type of intervention (unguided/guided), diagnostic status or mental health status. These results confirm that users' level of engagement with the content of the intervention is probably a key mechanism (or at least an indicator) for predicting the extent of therapeutic benefits obtained. However, according to Torous et al (2021), engagement is often a challenge, because there is evidence to suggest that up to 90 % of general population users drop out within 10 days (Baumel et al, 2020) and the median duration of use is 5.5 days (Pratap et al, 2020). This should not necessarily pose an issue if applications are conceptualised to be used sporadically or intermittently. However, if applications are for example conceptualised to deliver interventions consisting of several consecutive steps that users should go through, or where repeated practice is needed to foster sustainable effects, early drop-out will evidently lead to a reduced impact.

Several frameworks are available to support the implementation of digital interventions and apps for mental health. Two relevant Belgian adaptations of frameworks relevant for implementing online and blended care can be highlighted. A framework that focuses specifically on (predictors of) technology acceptance is the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al, 2003; UTAUT2; Venkatesh et al, 2012; Flemish version by De Witte & Van Daele, 2017). It primarily takes into account perspectives from end-users and how they perceive the digital interventions and apps and the context in which these are implemented. An adaptation of the business model canvas (Osterwalder & Pigneur, 2010) by Bocklandt (2018) takes a broader approach in which the complex interplay is taken into account between the digital intervention and apps for mental health and patients, professionals and partners involved, as well as required hardware and software, and privacy and ethical aspects that come into play. As a leading narrative to explore uptake in clinical practice in this report, we will firstly rely on a systematic review by Borghouts et al (2021), who explored common barriers and facilitators that influence user engagement. These factors may relate to the digital tools themselves, the people who use them (patients and professionals), and the context. Afterwards, we will explore current legal and ethical challenges in depth.

3.1 Users

3.1.1 Patients

Several user characteristics have an impact on engagement, such as mental health status, socio-demographic data (age in particular), socio-economic status, and knowledge of mental health and technologies. Depending on the context, these end users can be referred to as either patients or clients, but for ease of reading, we will use the term patients throughout this report.

Health status

The severity of mental health symptoms increases interest in digital interventions and apps, but on the other hand, symptoms linked to depression, mood and fatigue can hinder engagement. In a study of the factors that encourage or hinder the implementation of e-mental health applications in hospitals, Van Assche et al (2022) found that lack of motivation due to severe depressive symptoms was the main reason for non-participation. However, Borghouts et al (2021) also showed that participants were more committed at the start of their treatment,

but that if they use it at a later stage they are better informed about their health and better able to make sense of their health information.

Age

Young people are particularly sensitive to certain barriers to conventional MHC, such as stigma or negative beliefs about mental health services held by their families, or a lack of knowledge about mental health (Velasco et al, 2020). In this respect, technologies could be useful for this target group. Lattie et al (2022) also describe a number of specific needs that should be considered when designing tools for young people: age-appropriate flexibility and cognitive load; attention to language; variability in general knowledge; brevity (weaker ability to retain and manipulate information, so it may be difficult to scroll through text, particularly on smaller screens). In addition, the need for parental consent or parental involvement (whether to provide logistical support or to enhance the effect of interventions through this support) may be an obstacle for some young people (Lattie et al, 2022).

However, there is very little age-specific research. Whereas interventions are aimed at specific age groups with different needs and preferences, technological tools are most often evaluated and developed with adults. With regard to digital mental health usage by an elderly population, studies are inconsistent. Some studies seem to suggest that older adults may not be as comfortable with technology or have little confidence in its use, some even seeing digital innovations as excluding rather than stimulating (Lattie et al, 2022). According to these authors, even if the digital divide between generations is narrowing, older adults may still face additional barriers compared to younger adults to the effective use of (new) technology, e.g., less experience and less access. However, Torous et al (2021) argue that the data on the effect of age on engagement is unclear, and in any case does not confirm the common misconception that older adults are by default less engaged than younger people in the use of technological tools, with some studies suggesting the opposite. Similarly, Mace et al (2022) urge to challenge largely outdated beliefs rooted in societal ageism that digital health and older adults are incompatible and to strive for digital health inclusion, also for older patients.

Socio-economic status

A review by Schueller et al (2019) found that digital interventions and apps specifically designed for marginalized populations show promise in terms of feasibility and acceptability. Large-scale efficacy testing and scaling potential are however still lacking. Similarly, the potential for children and adolescents has not been widely researched to date either. A systematic review by Piers et al (2023) found moderate evidence for digital interventions and apps to help meet mental health needs of socioeconomically and digitally marginalised children and young people.

It's important to note that despite these positive (first) findings, all studies discussed in both reviews explicitly targeted these minorities. Most research to date on digital interventions and apps has focused on the general population, not explicitly (or sufficiently) taking into account marginalized and underserved populations, e.g., ethnic and racial minorities, rural populations, individuals experiencing homelessness, and sexual and gender minorities (Schueller et al, 2019). Digital interventions and apps therefore do seem to pose a risk to further increase the digital divide. There are, however, also potential merits like increased accessibility to adequate help or reduced stigma, which are thresholds that otherwise impede people with low socio-economic status to gain access to adequate MHC. It is therefore key to take their perspectives into account when designing, evaluation, and implementing any digital mental health intervention. In parallel, more high-quality research is needed to fully determine whether digital interventions and apps can truly help to bridge the digital divide, even when they are created with these principles in mind (Arevian et al, 2019).

Knowledge and beliefs

According to Borghouts et al (2021), the negative and positive opinions of other people can both form a barrier or a facilitating factor for engagement. In particular, participants are more inclined to use digital mental health tools if people close to them think they should use them. Alongside the established concept of health literacy (Berkman et al, 2010), technology literacy is also of importance: patients are more likely to use technologies if they know how to properly use them or receive training on how to do so. They also need to know and consent to how their data is collected, managed and used, which is essential to maintaining their trust. Trust, adherence and technical skills training or support are particularly important for older people to maximise the chances of successful implementation. For young people, it is also important to build trust around confidentiality and data sharing (Lattie et al, 2022). To promote the use of digital interventions and apps for mental health, it is therefore important to train patients so that they are not only more competent but also feel more confident in their digital technology use. In order for this trust and confidence to not be misplaced, guarantees obviously need to be in place concerning the quality of digital interventions and apps, and the context in which they can be used (cfr. 3.2 digital interventions and 3.3 context).

3.1.2 Mental healthcare professionals

There are a number of barriers to the use of digital interventions and apps for mental health that relate to healthcare professionals. According to Smith et al (2023), clinicians' attitudes and lack of knowledge about technology play an important role in their adoption in clinical practice. Torous (2021) also mentions trust as an important factor favouring engagement: trust regarding the veracity of the information available, but also regarding data sharing (impact of privacy protection regulations) or the maintenance of the therapeutic alliance. According to Borghouts et al (2021), therapists' past experience with technological tools and their ability to integrate them into their practice also play a role in user engagement. In the study by Van Assche et al (2022), lack of time and high workload were significant barriers to the use of a digital intervention for mental health, despite professionals finding it a useful means to facilitate the transition between inpatient and outpatient care.

Knowledge and training can help to increase a clinician's willingness to use technology. According to Smith et al (2023), these can act by influencing known moderators such as the effort or performance expected to use the technology in clinical practice and by reducing concerns. However, in the past decade, digital (mental) health has rarely been a part of the curriculum of aspiring healthcare professionals and a lack of insight into the potential and implementation of technology in MHC has hindered high-quality and widespread adoption.

3.2 Interventions

Digital interventions and apps for mental health must, of course, be effective and do no harm. According to Borghouts et al (2021), an intervention will be better adhered to if the user perceives the benefits, and if there is an impact on symptoms. Another favourable factor is the fact that these tools enable a better understanding of health and a feeling of being in control of one's own health. According to these authors, participants are also more likely to get involved if they perceive the program as useful and adapted to their needs. Technologies must meet the needs, characteristics and preferences of each user.

It is important to take this into account when designing, choosing and using digital interventions and apps for mental health. When designing them, the specific characteristics of the target audience must be taken into account (for example, symptom severity, also discussed in the section "health status" under 3.1.1). This means including the various groups of user populations (including minority groups) and stakeholders at different stages in the process of designing and evaluating technological tools. This helps to make them clear, usable

and attractive to people with mental health problems, and fosters trust. When choosing the right digital intervention or app for mental health, mental health service providers, such as clinicians, can select those that are appropriate for their patients, or help patients to choose appropriate interventions; in particular to take account of how to integrate them into their daily lives. Finally, when using these solutions, relevant content and personalisation according to personal preferences helps to generate commitment.

Lattie et al (2020) consider that the development of tools that are more responsive to the user's context could be useful, such as just-in-time adaptive interventions that provide intervention elements to individuals at the right time to support behaviour change, based on data obtained in real time.

According to Borghouts et al (2021), another important facilitating factor is social connection, where the user can interact with other users (with whom they would not otherwise have been in contact), as this can improve mood and help combat depression. Anonymity can be both an obstacle and a facilitator, depending on the user, the context in which it is implemented and the type of intervention. In particular, it will facilitate access to care for people who feel stigmatised. But anonymity also makes it harder to establish a relationship of trust with the therapist in the event of interaction.

We also know that human support is the factor that contributes most to engagement (Torous et al, 2021). Guided interventions generally have a higher rate of engagement than unguided interventions. In their review, Werntz et al (2023) also show that human support has a greater impact on people with more severe symptoms. However, human support may require significant resources. According to Borghouts et al (2021), automated reminders could be a solution to facilitate engagement without requiring additional human resources. However, they would be less effective in terms of lack of motivation and the need for social support. According to Smith et al (2023), there is currently insufficient data to recommend chatbots and similar technologies as a replacement for humans. Additional benefits of human support are that it's to scale up intervention intensity, adjust it to fit the specific context of the patient, modify treatment or refer to an expert in case of crisis/escalation, non-response, or other factors that go beyond the scope of the digital intervention. In the end, it may enhance motivation and adherence (Renfrew et al, 2021).

Gan et al (2021) also found that external strategies such as automated reminders, therapist-led coaching and peer support groups can be effective in promoting engagement with digital mental health interventions. Another possibility is to broaden the categories of professionals likely to offer this support. It does not necessarily have to come from mental health professionals with in-depth training (Werntz et al, 2023). One possibility is to extend traditional roles and involve non-clinicians to provide certain aspects of treatment in hybrid models of care and to help patients to use technology: to find useful applications, install and troubleshoot technology, customise technology according to clinical needs, offer support for ongoing use and summarise data for presentation to both clinician and patient (Smith et al 2023; Torous et al, 2021).

3.3 Context

Contextual factors (technological environment, organizational support, regulation) are other important determinants of users' actual involvement in these interventions. Among these, the technological environment, and in particular technical problems, is a common obstacle (Borghouts et al, 2021), also simply people's ability to integrate the use of technology into their lives (e.g., possession of smartphone with data connection).

In their study, Van Assche et al (2022) found that implementation in hospitals was hampered by technical difficulties, such as the lack of structural facilities for using a digital intervention

for mental health. Technical problems must therefore be addressed by providing the necessary equipment and connections, and offering technical assistance. A key concept in this context is digital inclusion, which especially gained importance and attention in Belgium during the pandemic, with strong efforts being done in education, local services and social work to make services more accessible and inclusive (e.g., DigitAll, www.digitall.be). Within Belgian MHC, less attention seems to have been paid to this important topic to date. According to Borghouts et al (2021), engagement is furthermore hindered or facilitated by respect for user privacy, whether in terms of data storage and sharing or the physical environment in which these interventions are used. Indeed, the use of mental health platforms can enhance the sense of privacy, but can also diminish it when participants do not have the opportunity to use them in a physically private setting. It is therefore important to take into account the situational context of users (i.e. where they physically access the digital intervention). It is also important that information is treated confidentially and to put in place transparent, easy-to-understand regulations that guarantee respect for privacy.

3.4 Privacy, legal and ethical challenges

Furthermore, it is important to emphasize that digital interventions and apps entail certain risks concerning privacy, and come with a number of legal and ethical challenges.

Considering the legal point of view, there are many regulations in place within the EU to safeguard the privacy and health of its citizens. General Data Protection Regulation (GDPR; European Union, 2016) and more recently the AI act proposal (European Commission, 2021) provide excellent general frameworks that assure high-quality digital services, also within MHC. Two examples are the general right to data access and ownership when it comes to personal data (GDPR) and being fully transparent when making use of AI and assuring a human-in-the-loop (AI act), respectively. Additionally, the requirements for digital interventions and apps have been made more strict in recent years, in particular following the update of the EU's Medical Device Regulation (EU MDR; European Union, 2017). It offers a very high-quality, yet also very stringent framework for the use of technology within healthcare. Across the EU, several national frameworks and reimbursement systems have been put into place which continue to build on the EU MDR, such as the fast track procedure for digital healthcare apps in Germany, the guide on specific features of clinical evaluation of a connected medical device in France, the Digital Health Technology Assessment framework in Finland or the guidance for assessment of digital care (San Miguel et al, 2023).

Internationally, Belgium was a frontrunner when it released the validation pyramid of the mHealthBelgium initiative back in 2018. However, few apps (35 at the onset of 2024) and even less mental health apps (4 at the onset of 2024) have been approved and/or reimbursed within these systems. A wide range of applications are nevertheless being developed in Belgium by non-profit organisations or *ad hoc* initiatives, sometimes with national or regional government funding (see for example *www.onlinehulp-apps.be* for a Flemish overview consisting of 157 apps, of which 83 with a mental health focus at the onset of 2024). Still, most of them are currently not able to make the necessary investments to adhere to EU MDR or the criteria of mHealthBelgium. In the short-term, this might result in practical and legal challenges for these providers, potentially causing concern. As it stands, no immediate solution seems to be available, except for adhering to these regulations, which implies substantial costs and time investments (e.g., to obtain CE-certification). The development of novel digital interventions and apps seems hampered as well, as funding is often available for academic research concerning potential, but – if proven effective – not for the subsequent costly and time-consuming accreditation process. Public-private partnerships are one way to overcome this, but are currently not an established practice in Belgian MHC, nor do they offer a solution for the development of digital apps and interventions being developed in the common interest and to be used for free.

A promising alternative approach has been adopted in Australia, where digital interventions and apps for mental health received a “conditional exemption”. In doing so, developers were relieved from a significant number of requirements, while at the same time they were subjected to several substantial ones, i.e. following established (mandatory) clinical practice guidelines, referencing these guidelines and displaying the reference in the tool, and allowing the user to clearly view the guidelines. In the context of the EU MDR, this could translate to mandatory proof of efficacy paired with a mandatory demonstration of data protection compliance (Steindl et al, 2023).

Ethical challenges nonetheless remain regarding the use of digital interventions and apps as well, even when these adhere to all necessary legal requirements and industry standards. Common questions to which there is no clear-cut answer (yet), are for example whether there is room for the use of more automated systems within healthcare, whether technology can replace certain aspects of MHC services or if they can only be used as an (optional) supplement, and how to properly safeguard access to services, assuring their accessibility and appropriateness for vulnerable populations. As an example, the ongoing move towards stronger regulation especially causes frictions when considering the accessibility of (digital) care for the most vulnerable patients. When MCH professionals have to reach out to them in case of low adherence or dropout, they may need to rely on easily accessible and established (unsafe) platforms (such as WhatsApp or social media). The deontological choice to prefer unsafe digital help over no contact at all may - to some extent and in some cases - be defensible. Little information is available on how pervasive these practices are in Belgian MHC There are however documented cases from adjacent domains such as social work (Verplancke & De Zitter, 2021). The aforementioned Australian approach nevertheless also demonstrates this key concern, which is that too much regulation might curb innovation or hinder high-quality care, which is why it is important to strike a healthy balance between ethical considerations and legal requirements on the one hand and innovative care on the other hand.

4 Recommendation development

For the development of the recommendations, the literature reviewed detailed above was followed by a nominal group technique. This structured face-to-face group session (Delbecq et al, 1975) is conceptually linked to the Delphi technique. It aims to achieve group consensus and action planning on a chosen topic. The chosen topic and key question provided to the members of the working group was *“If we want to improve the use and maximise the potential of digital interventions and apps within MHC and, more broadly, for mental health, which actions should policy makers, especially at the national level, undertake?”*

Two nominal group technique sessions were organized with a subset of the working group’s experts based on a concrete approach detailed by Varga-Atkins et al (2011). During both sessions, participants were first introduced to the topic. Afterwards, in a first step, they were instructed to individually write down up to five potential recommendations which they thought were key, after which they each read their responses out loud one by one (and clarified them if needed). In a second step, the group tried to further clarify and consolidate (i.e., merge) different recommendations. In a third and final step, they were asked to create a first, preliminary ranking of the resulting recommendations. The first group formulated and ranked 11 recommendations, the second group 9.

Following these two sessions, a final consolidation phase was set up. In a first step, the recommendations from both groups were merged by the working group’s chair, which resulted in 13 recommendations. In a second step, using an online survey, the resulting recommendations were presented to the whole working group asking them 1) to assess whether these recommendations were sufficiently clear in order to be able to rank them by importance later on and 2) if there were any recommendations missing and if so, which ones. Finally, in a third step, after removing one recommendation which was considered redundant

based on feedback from the working group, 12 possible recommendations were presented. Participants were allowed to (only) allocate points to five statements, ranging from 5 (most important) to 1 (less important). It was emphasized that despite the fact that participants would not be able to assign points to 7 of the 12 statements, it would not imply these were irrelevant, only that they were deemed of lower priority. An overview of the resulting recommendations, their overall points and the percentage of experts who casted their votes for a particular recommendation can be found in Table 1.

Table 1
Overview of (a summary of) consolidated recommendations, including the evaluation by working group experts (N = 17)

	Score	% of experts
Assure digital interventions and apps are not implemented in isolation.	40	76
Make sure that MHC professionals can rely on sufficient digital skills.	33	59
Allow for structural financing of cost-effective digital interventions and apps.	31	53
Emphasize the importance of starting the development of digital interventions and apps with patients in mind.	26	47
Build a network to position digital interventions and apps within integrated care.	25	47
Provide adequate research funding to safeguard quality.	21	35
Facilitate further interoperability and connectivity.	18	41
Support developers of digital interventions and apps.	15	29
Digital interventions and apps should be mobile-first.	14	29
Focus additionally on working mechanisms.	13	29
Facilitate national upscaling of expertise.	8	12
Formulate minimum expectations for MHC professionals.	5	24

IV SUMMARY AND RECOMMENDATIONS

Despite having a relatively well-developed MHC system, access to treatment is suboptimal for many. This gap between demand and supply of care is linked to a wide variety of causes, e.g., lack of services and waiting lists, but also to stigma and negative attitudes towards mental health care. One part of the solution to help address these challenges and strengthen our MHC system, could be the use of technology.

As an overarching national framework for digital mental health is currently lacking in Belgium, this advisory report set out to formulate a first set of recommendations that can help shape such a framework and guide further developments on this domain, based on available research data and existing international guidelines applied to the Belgian situation. We also paid specific attention to children and young people, a target group that is particularly vulnerable in terms of mental health problems, and might be prone to use these technologies.

Nevertheless, the domain of digital mental health is rapidly evolving and very broad. It was therefore decided to narrow down the scope of this report to the most frequently studied technologies, which are programmes on computers, smartphones or cross-platform digital environments. These are also the solutions most frequently found in national repositories. A distinction was made between different uses in clinical practice: stand-alone self-help interventions, guided interventions with minimal professional support, and blended interventions in which technology is combined with conventional practice. A narrative review of literature found that a variety of digital interventions and apps have already been developed, tested in research, and sometimes also implemented in routine clinical practice. Overall, research suggests that digital interventions and apps can be as effective as face-to-face

psychotherapies for psychiatric disorders such as depression, anxiety and sleep disorders, and that these treatments may also be effective in clinical practice. The evidence available to date therefore suggests that these technological solutions could help to fill the current gaps in care provision. By increasing the coverage of mainstream care services and promoting access to people for whom mainstream treatments are inaccessible, these solutions help to alleviate the health and economic burden of these disorders. Their accessibility, acceptability, innovative and scalable format, and perceived anonymity contribute to this potential. Although evidence of effectiveness is found across different levels of human support, guided or blended interventions seem to lead to larger overall effect sizes.

However, the uptake in clinical practice faces a several challenges which are found at the patient level, among MHC professionals, and within the broader organisational context of MHC organisations. A particularly pressing matter seems to be the legal and ethical challenges associated with the development and use of digital interventions and apps.

Based on a nominal group technique procedure, 12 recommendations were subsequently determined to further improve the use and maximise the potential of digital interventions and apps for mental health(care) in Belgium. These are first and foremost targeted at policy makers, but can be of relevance to all stakeholders in MHC. Despite strong consensus that each recommendation has value, they are presented in terms of priority, as determined by the working group.

1. **Assure digital interventions and apps are not implemented in isolation.**
   Digital interventions and apps are proving to be promising instruments in the toolbox of MHC professionals. They should therefore be used and implemented in a safe and secure healthcare context and not in isolation. Assure easy access in routine care, allow the patient's support network to be involved and provide human support if requested (either online guided or blended). Involvement of MHC professionals is key as they act as ambassadors of these digital tools: they can motivate and recommend them to patients and can assure sufficient (digital) support is available from the very onset.

2. **Make sure that MHC professionals can rely on sufficient digital skills.**
   Not all MHC professionals are currently (sufficiently) knowledgeable regarding the use of technology. Assure therefore that appropriate use of technology is part of curricula, as well as continuous education (including workplace support, if need be). As a starting point, defining standards and guidelines regarding essential competences for (future) MHC professionals may be key.

3. **Allow for structural financing of cost-effective digital interventions and apps.**
   This can entail financing for anonymous online care, for prescribed apps (following the necessary accreditation steps, cfr. mHealthBelgium), and also for (the time spent by) MHC professionals making use of them. Ensure that funding is allocated not only for the development of digital tools, but also for their ongoing upkeep and maintenance in order to facilitate sustainable implementation.

4. **Emphasize the importance of starting the development of digital interventions and apps with patients in mind.**
   Aim for inclusion by design: patient involvement is key when conceptualizing and developing digital interventions and apps. End users should be involved at every stage of development to ensure future adoption. Essential design principles should be kept in mind (i.e., design-for-all, which is for example operationalised in Web Content Accessibility Guidelines) to assure that people with disabilities can benefit from the innovations as well.

Similarly, it is key to pay sufficient attention to marginalized and underserved populations, e.g., ethnic and racial minorities, rural populations, individuals experiencing homelessness, and sexual and gender minorities. Only then, digital interventions and apps have the potential to increase the accessibility of MCH, rather than contributing to the digital divide.

5. **Build a network to position digital interventions and apps within integrated care.** This network should involve all parties and stakeholders, i.e., universities, clinicians, hospitals, social organisations, peers, and community, to position digital interventions and apps as a part of integrated care and to ensure equal access to evidence-based knowledge, resources and tools.

6. **Provide adequate research funding to safeguard quality.**
   Quality should be guaranteed by continuing research on the efficacy, acceptability, usability, accessibility, and (cost-) effectiveness of digital interventions and apps, also in vulnerable populations. Such research not only helps to build evidence, but can also encourage future use in practice.

7. **Facilitate further interoperability and connectivity**.
   Digital interventions and apps should be able to connect to "basic" digital services such as the eHealth platform, Vitalink, *E-santé Wallonie*. Make it easy for patients to gain full ownership and access to their personal medical data. Collaborate with adjacent sectors (e.g., social and welfare services) on (digital) referrals and the utilization of patient records.

8. **Support developers of digital interventions and apps.**
   As technology rapidly evolves, allow sufficient room for experimentation. If academic research is being conducted on digital interventions and apps, acknowledge the need to disseminate evidence-based solutions to practice and the additional funding for time and effort required to do so. Furthermore, increase communication and collaboration with organisations such as the Federal Agency for Medicines and Health Products to assist MHC organisations and developers in navigating existing rules and regulations (e.g., GDPR, MDR). Concurrently, the agency should also have the means to proactively enforce these rules and regulations.

9. **Digital interventions and apps should be mobile-first.**
   Smartphones have not only already overtaken all other technological devices in terms or relative importance in the general population, they also allow for additional functionalities (e.g., intervening at the right place and time). Smartphone-based interventions therefore have the potential to further enhance and enrich conventional care and facilitate the generalisation of treatment effects.

10. **Focus additionally on working mechanisms.**
    When assessing the impact of digital interventions and apps, do not focus only on treatment effects for particular symptoms or disorders: focus additionally on underlying working mechanisms, overall well-being and improved quality of life (QoL) as key outcomes.

11. Facilitate national upscaling of expertise.

There are currently clear disparities between the different Belgian communities concerning the support for and implementation of online initiatives. These discrepancies highlight the need for a more coherent and unified strategy at national level, to ensure a balanced development of digital apps and interventions for mental health across the whole country. Adopting such an approach would enable us to ensure that all Belgians benefit from equal access to quality digital mental health services. This is not only limited to identifying and upscaling specific good practices or interventions, but also applies to the practice of screening and disseminating relevant digital interventions and apps, e.g., initiatives like *www.onlinehulp-apps.be*.

12. Formulate minimum expectations for MHC professionals.

The extent to which all MHC professionals should make use of digital interventions and apps could be made more explicit (e.g., to achieve certain goals by 2030). Also giving them the mandate to do so, would facilitate structural use in all settings. Nevertheless, caution is warranted here. MHC it is still very broad and diverse field, where determining what may best suit the needs of individual patients is still the responsibility of the (autonomous) MHC professionals. In addition, for several mental health conditions, evidence for the (cost-)effectiveness of digital interventions and apps is still lacking.

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VI COMPOSITION OF THE WORKING GROUP

The composition of the Committee and that of the Board as well as the list of experts appointed by Royal Decree are available on the following website: About us.

All experts joined the working group ***in a private capacity***. Their general declarations of interests as well as those of the members of the Committee and the Board can be viewed on the SHC website (site: conflicts of interest).

The following experts were involved in drawing up and endorsing this advisory report. The working group was chaired by **Tom VAN DAELE**; the scientific secretary Sylvie GERARD.

BELMONT Angélique	Psychology	*Centre Alfa*
BOCKLANDT Philippe	Social Work	Artevelde University of Applied Sciences
CROMBEZ Geert	Psychology	*UGent*
CRUNELLE Cleo	Psychiatry	VUB
DE JAEGERE Eva	Psychology	Flemish Centre of Expertise in Suicide Prevention
DE WILDE Joke	Orthopedagogy	HOGENT University of Applied Sciences and Arts
DE WITTE Nele	Psychology	Thomas More University of Applied Sciences
DESMET Ann	Psychology	ULB
DOM Geert	Psychiatry	*UAntwerpen*
GODDERIS Lode	Occupational and environmental medecine	*KU Leuven* / IDEWE
HOORELBEKE Kristof	Psychology	*UGent*
MATTHYS Frieda	Psychiatry	VUB
NIJS Davy	Orthopedagogy	IMEC
OSWALD Pierre	Psychiatry	CHJT
PHILIPPOT Pierre	Psychology	*UC Louvain*
SCHEVENEELS Sara	Psychology	*KU Leuven*
SERVAIS Olivier	Anthropology	*UC Louvain*
VAN AUDENHOVE Chantal	Psychology	*KU Leuven*
VAN DAELE Tom	Psychology	Thomas More University of Applied Sciences
VAN DEN BOSSCHE Maarten	Psychiatry	*KU Leuven*
VANCAMPFORT Davy	Physiotherapy	*KU Leuven*

The following associations were heard:

AVCI Burcu	Ups & Downs
CLAEYS Herwig	*OnlinePsyHulp*
COLEMONT Patrick	*Vlaamse Patientenplatform*
DEWIT Koen	Zenjoy
KAESEMANS Gorik	*Zorgnet Icuro*

The following experts were heard but did not take part in endorsing the advisory report:

DELESPAUL Philippe	Psychology	Maastricht University

The standing working group Mental Health has endorsed the advisory report. The standing working group was chaired by **Olivier Luminet & Frieda Matthys**; the scientific secretary was Sylvie Gerard.

About the Superior Health Council (SHC)

The Superior Health Council is a federal advisory body. Its secretariat is provided by the Federal Public Service Health, Food Chain Safety and Environment. It was founded in 1849 and provides scientific advisory reports on public health issues to the Ministers of Public Health and the Environment, their administration, and a few agencies. These advisory reports are drawn up on request or on the SHC's own initiative. The SHC aims at giving guidance to political decision-makers on public health matters. It does this on the basis of the most recent scientific knowledge.

Apart from its 25-member internal secretariat, the Council draws upon a vast network of over 500 experts (university professors, staff members of scientific institutions, stakeholders in the field, etc.), 300 of whom are appointed experts of the Council by Royal Decree. These experts meet in multidisciplinary working groups in order to write the advisory reports.

As an official body, the Superior Health Council takes the view that it is of key importance to guarantee that the scientific advisory reports it issues are neutral and impartial. In order to do so, it has provided itself with a structure, rules and procedures with which these requirements can be met efficiently at each stage of the coming into being of the advisory reports. The key stages in the latter process are: 1) the preliminary analysis of the request, 2) the appointing of the experts within the working groups, 3) the implementation of the procedures for managing potential conflicts of interest (based on the declaration of interest, the analysis of possible conflicts of interest, and a Committee on Professional Conduct) as well as the final endorsement of the advisory reports by the Board (ultimate decision-making body of the SHC, which consists of 30 members from the pool of appointed experts). This coherent set of procedures aims at allowing the SHC to issue advisory reports that are based on the highest level of scientific expertise available whilst maintaining all possible impartiality.

Once they have been endorsed by the Board, the advisory reports are sent to those who requested them as well as to the Minister of Public Health and are subsequently published on the SHC website (www.hgr-css.be). Some of them are also communicated to the press and to specific target groups (healthcare professionals, universities, politicians, consumer organisations, etc.).

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