Digital Mental Health Interventions for Children and Youth

Alexandra Machado
School of Health, Polytechnic of Porto, Portugal
Bianca Ferreira
School of Health, Polytechnic of Porto, Portugal
Carolina Carrola
School of Health, Polytechnic of Porto, Portugal
Catarina Ye Pereira
School of Health, Polytechnic of Porto, Portugal
Bruno Bastos Vieira de Melo
https://orcid.org/0000-0002-1543-6582
School of Health, Polytechnic of Porto, Portugal
Carlos Campos
https://orcid.org/0000-0002-5966-4050
School of Health, Polytechnic of Porto, Portugal

ABSTRACT

The period from childhood to adolescence is critical for mental health promotion, as it is estimated that, worldwide, approximately 10% to 20% of individuals in this age group have mental health problems that may lead to mental disorders that may persist throughout adulthood (Dray et al., 2017; Kessler et al., 2005; World Health Organization, 2021). Furthermore, recent studies show that mental health problems during childhood and adolescence contribute to a decrease in academic performance and an increase of risk-taking behaviors, self-injury and suicide, with consequences into adulthood. Thus, preventing mental health problems in children and adolescents is essential to promote positive lifelong outcomes for young people (Dray et al., 2017). Schools are a privileged context for creating favorable environments for the implementation of mental health promotion programs, effectively and with long-term benefits (Tomé & Matos, 2012). This context allows for an early intervention during the phase of development of socioemotional skills, thus enhancing the results of the programs themselves, contributing to the healthy development of children and youth and to a higher academic achievement of students (Lima-Serrano & Lima-Rodríguez, 2014; Sakellari et al., 2021).

Keywords: mental disorders; mental health; children and youth; digital programs; community interventions; school-based intervention.

INTRODUCTION

The present chapter will address the relevance and benefits of digital mental health programs for school-age children and adolescents to promote a healthy child and adolescent development and prevent mental disorders in adulthood. These programs, when applied in schools, allow for a large-scale implementation and they are generally effective in preventing risky behaviors and reducing mental distress. Moreover, these have been shown to be even more effective in managing anxiety, improving depressive symptoms and emotion regulation, and increasing academic performance (Castillo et al., 2019; Dray et al., 2017; Sakellari et al., 2021).

This chapter will also address the relevance of the topic of mental health, as it encompasses and impacts the state of well-being of individuals, influencing their development and functioning in everyday life (WHO, 2004). This theme gains even more

importance when it comes to the child and adolescent population, as this stage of development is a critical period for mental health promotion (Keles et al., 2020), with about 10% to 20% of children and adolescents experiencing mental illness problems that may persist into adulthood, impacting a large part of the individual's life course, in several key areas of development (Raven et al., 2017) (Dray et al., 2017; Kessler et al., 2005; World Health Organization (WHO), 2016).

The COVID-19 (Corona Virus Disease) pandemic brought repercussions on the well-being of youth and adolescents, which led to a worsening of symptoms associated with mental illness (Listernick and Badawy, 2021).

Prior to the pandemic, community-based approaches for social and mental health problem solving already existed, with schools being the best context for implementing mental health promotion programs for children and youth, especially when combined with a cognitive-behavioral component (Castillo et al 2019; Tomé & Matos, 2012).

The pandemic and technological evolution have allowed for increased forms of communication for young people, in addition to enabling the availability of computer technologies, artificial intelligence and mobile applications (apps) (Keles et al, 2020; McIntyre et al, 2021; Sander & Lobo, 2015; Shah et al, 2019). Thus, eHealth has also evolved, facilitating community access to online medical information and digital health-related tools (Ghorbanian Zolbin et al., 2022). Thus, throughout the chapter, it is possible to understand how digital mental health interventions have shown promise for bridging gaps in service delivery in the child and youth mental health sector, which include internet-based programs, mobile devices and computers, as well as cell phone apps (Gan et al., 2021; McIntyre et al., 2021; Wozney et al., 2018).

I. MENTAL HEALTH IN CHILDHOOD AND ADOLESCENCE

According to World Health Organization (2004), mental health should not be understood only as the "absence of illness", but rather as a full state of well-being, in which the individual fully develops his or her skills, copes with the stresses of daily life, performs productive work, and contributes to the improvement of his or her community.

In contrast, mental illness occurs when there is an inherent condition that affects cognition, emotion, and behavior (Manderscheid et al., 2010).

In the case of children and adolescents, these developmental stages are critical periods for mental health promotion, as they have a limited capacity for self-regulation and are more vulnerable to peer pressure and peer influence on their person and their day-to-day choices (Keles et al., 2020). It is estimated that, worldwide, about 10% to 20% of children and adolescents experience mental health problems, resulting in reported mental disorders between the ages of 12 to 24 years that, in most cases, persist throughout adulthood, presenting a profound and lasting impact on the individual and on the society (Dray et al., 2017; Kessler et al., 2005; World Health Organization, 2016).

In a systematic review done by Piao and colleagues (2022), the incidence and prevalence rates of mental disorders were assessed on a global scale, between 1990 and 2019, particularly in the child and youth population, in the following four age groups: 0 to 4 years old, 5 to 9 years old, 10 to 14 years old, and 15 to 19 years old. This study concluded that major depressive disorder was the one with the highest incidence, followed by conduct disorders and anxiety disorders, respectively. Compared to 1990, in 2019 the incidence of mental disorders grew by 6.8%, with depressive disorders, eating disorders and conduct disorders having the highest growth. In this study, Piao and his collaborators (2022) also specified that in children under the age of 5, depressive disorder has the highest occurrence, followed by dysthymia; in both the 5 to 9 years old range and the 10 to 14 years old range, bulimia nervosa was the most prevalent, followed by depressive disorder, and finally, in the 15 to 19 years old range, bulimia and anorexia nervosa were found to have the highest incidence.

In another but smaller-scale systematic review conducted by the Gulf Cooperation Council, the prevalence of mental health disorders in children and adolescents in the countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates was investigated (Chan et al., 2021). In the analysis by Chan and his collaborators (2021), it was observed that the pooled prevalence of depressive symptoms ranged from 6.12% to 45.09%, anxiety in children and adolescents in the Gulf Cooperation Council ranged from 17.27% to 57.04%, and the prevalence of eating disorders was 31.55%. When compared to global prevalence, it can be seen that the Gulf Cooperation Council values seem to exceed the global prevalence values, so it can be deduced that the sociocultural context in which the child and adolescent population lives can have a determining impact

on the development of conditions that affect their mental health (Chan et al., 2021). In addition to sociocultural factors, in a research conducted by Fledderjohann and colleagues (Fledderjohann et al., 2021), factors such as low socioeconomic status, family instability, and parental distress were highlighted as conditioning factors for the mental health of children and young people. In addition, it was observed that migrant, physically disabled, or lesbian, gay, bisexual, transgender and queer children tend to have greater mental health instability (Fledderjohann et al., 2021).

Recent studies show that mental health problems during childhood and adolescence contribute to decreased academic performance and increased risk-taking behaviors, self-injury, and suicide (Arnow, 2004; Dray et al., 2017). In a meta-analysis conducted by Gillies and colleagues (2018), 172 datasets on 597 548 participants from 41 countries, and whose ages were between 12 and 18 years, were analyzed, and in which it was found that the lifetime prevalence of self-harm among these young people is 16.9%. Mental health problems in children and young people have been shown to contribute to lower educational achievement and higher rates of adherence to general health risk behaviors, self-harm and suicide, which persist into adulthood (Arnow, 2004; Dray et al., 2017). Therefore, prevention of mental health problems in children and adolescents is essential to promote positive lifelong outcomes for young people (Dray et al., 2017).

Depressive disorder can be understood as a general symptom of low mood, an emotional reaction to a problem, characterized by depressed mood, moodiness, anhedonia, and decreased energy (Arrarás & Manrique, 2019; World Health Organization, 2017). In a recent meta-analysis, whose population encompassed young people aged from 10 to 19 years old, the overall prevalence rate of occasional depressive symptoms was found to be 34%, self-reported between 2001 and 2020 (Shorey et al., 2022). In addition to these data, the prevalence of depressive disorders and dysthymia were also found to be around 8% and 4%, respectively, with a higher incidence in female adolescents (Shorey et al., 2022). This long-term disorder has a considerable impact on functionality, since it is accompanied by psychophysiological changes, loss of hygiene habits, slower speech and thinking, as well as reduced self-esteem and self-confidence, deficits in executive functions, memory and attention, feelings of guilt and pessimistic perspectives of the future (American Psychiatric Association, 2013; Belmaker & Agam, 2008; Hao et al., 2020; Lannigan & Noyes, 2019; Penninx et al., 2013; Lapolla et al., 2015; Matias et al., 2016)

Anxiety disorders are among the most common and harmful mental health disorders in children and adolescents and they are characterized by excessive and/or persistent anxiety and worry about several areas, such as work and education, which are difficult to control (American Psychiatric Association, 2013). The manifestation of the symptoms can occur at the physical level, through a feeling of restlessness, tiredness, fatigue, difficulty in concentrating, irritability, muscle tension and changes in sleep (American Psychiatric Association, 2013). The prevalence of these disorders in younger populations is estimated to be between 10% and 20%, with a higher incidence in females (American Psychiatric Association, 2013; Kieling et al., 2011). The excessive fear, worry and negative beliefs presented in this condition can result in feelings of distress and functional difficulties in social, school and family participation (Vizard et al., 2020).

In the case of eating disorders, according *to Diagnostic and Statistical Manual of Mental Disorders - V (DSM-V)* (2013) these are characterized by a persistent disturbance in eating-related behaviors, resulting in changes in food intake or absorption that have a significant impact on the individual's physical health or psychosocial functioning. The most common eating disorders are pica, rumination disorder, avoidance/restriction of food intake disorder, anorexia nervosa, bulimia nervosa, and compulsive eating disorder (American Psychiatric Association, 2013). In children and youth, these disorders have a prevalence of about 4.4%, being more common in females, although according to the new DSM-V diagnostic criteria, eating disorders have increased by about 28% in males, which shows that there is an undervaluation of this disease in males (Vo et al., 2016). People who live with these disorders experience feelings of self-rejection, emotional difficulties and exhibit overly controlled or out of control eating patterns, severely impacting their occupations, roles, responsibilities, and relationships (American Psychiatric Association, 2013; Brown et al., 2019; Ciarma & Mathew, 2017; Treasure et al., 2020).

It is also important to note that depression and anxiety disorders often occur simultaneously, with one in three adolescents experiencing symptoms of anxiety that are considered clinically significant (Mccarthy, 2020). Depressive and anxiety disorders also occur simultaneously with eating disorders. Many individuals with eating disorders report the presence of anxiety disorder or symptoms prior to the onset of the eating disorder (American Psychiatric Association, 2013). Thus, challenges are beginning to emerge for public health facilities to meet the needs of users and for which prevention and treatment countermeasures are urgently needed (Piao et al., 2022).

According to Listernick and Badawy (2021), there is preliminary data to suggest that the COVID-19 pandemic had a significant impact on the psychosocial well-being of the pediatric population, causing an increase in cases of adolescents with anxiety symptoms. COVID-19 brought implications for the general population, but had a greater emphasis on the pediatric population who, still with little sense of reality, saw the closure of educational facilities, had a reduction in the process of socialization and peer play, had to subjugate themselves to sedentary lifestyles, make a greater use of social networks for connection, deal with family members infected with the virus and possible deaths, among other salient events (Hossain et al., 2022; Listernick & Badawy, 2021). In another survey conducted by Patrick and his collaborators (2020), in which they questioned parents about their children's mental health, about 14% of parents reported that their emotional symptoms worsened during the pandemic. Also a study conducted in the United Kingdom, which contemplated 168 participants, reiterates that there was an increase in depressive symptoms in 75% of assessments given to children with average ages between 7.6 and 11.6 years during the lockdown, when compared to the period before the pandemic (Bignardi et al., 2020). Therefore, with the mental health crisis emerging from the pandemic, it has become even more pertinent to create psychosocial services and programs to mitigate the imprints of the pandemic on the mental health of children and young people (Hossain et al., 2022).

Technological developments and the pandemic have revolutionized the ways in which young people communicate, given that these population now uses social media on a daily basis to keep in touch with peers (Shah et al., 2019; Keles et al., 2020). As technological devices and social media become an increasingly large and more significant part of young people's daily lives, the benefits and drawbacks of digital equipment and social platforms and their impact on young people's psychosocial development are increasingly a cause for concern (Shah et al., 2019). Particularly during the pandemic period, with this increase in young people's use of social media, the consequences resulting from the potentially adverse effects of social media have also increased, namely the increased likelihood of them developing problems related to mental illness (Keles et al., 2020). In a study conducted in the year of 2019, it sought to ascertain what the risks of excessive use of digital technologies were, with a greater focus on social media, and the two conditions that were most frequently reported were cyberbullying and depression. However, there were other symptoms related to mental illness such as obesity, eating disorders,

personality disorders, anxiety disorders, phobias, and social isolation (Souza & Ximenes Carneiro da Cunha, 2019).

A study by Kor and Shoshani (2023) evaluated the feasibility and effectiveness of a Positive Psychology Addiction Prevention intervention in a school setting, whose goal was to reduce substance and digital media use and, consequently, increase the mental health of school-aged children during the COVID-19 pandemic. The sample consisted of 1,670 children and adolescents from six primary and secondary schools in Israel, whose average age was approximately 13 years. A three-year longitudinal repeated measures randomized control design was used to examine changes in substance use, digital media use, and psychological symptoms in the intervention and control groups. These were assessed at pre-test in September 2019, at post-test about eight months later, and at 12-month follow-up. The prevalence of tobacco, alcohol and marijuana use decreased significantly between the pre-test and the follow-up period in the intervention group and increased significantly in the control group. Daily digital media use increased in both groups during the pandemic period. The intervention group reported a significant reduction in psychological symptoms and negative emotions, as well as an increase in positive emotions and life satisfaction after the intervention compared to the control group. Thus, this study shows that wellness and addiction prevention interventions can be effective in improving the mental health of school children during pandemics or crisis periods (Kor & Shoshani, 2023).

Most mental illnesses in adulthood have their onset and manifestation of symptoms during adolescence or early adulthood, interfering with essential areas of development, such as education, social relationships and the transition to work (Raven et al., 2017). Several studies and systematic reviews suggest that adversities experienced during childhood can have long-term consequences on the physical and mental health of an individual (Najman et al., 2022). Some of these consequences may include heart disease, cancer, alcohol and substance use, depression, and early death (Najman et al., 2022). The presence of mental health conditions in children and adolescents can also have consequences for their educational development and later work-related aspects (López-López et al., 2020).

Despite the high prevalence of mental health problems in children and young people, evidence shows that this is the population that is most afraid of seeking help and that, on the other hand, parents and teachers have difficulties in identifying and distinguishing the

signs. Studies suggest that the lack of information on the topic of mental health is one of the major obstacles to early intervention in this issue, thus it is important to have programs that promote literacy and the detection of warning signs in school-aged young people (National Youth Council of Ireland, 2013; Ozer & Schotland, 2011).

II. MENTAL HEALTH PROGRAMS IN SCHOOL SETTINGS

Community-based approaches (which are interventions that target individuals in that community and are provided in community settings) appear to help address social and mental health problems, thus promoting well-being. Some reviews justifies the success of this type of intervention due to the identification of socioecological facilitators or barriers, which include individual, interpersonal, organizational/institutional, community and political factors, that can have a positive or negative impact on mental health (Anderson et al., 2015; McLeroy et al., 1988). Community-based interventions also allow for providing resources and information that can address the individuals' problems, desires, needs, and expectations (Castillo et al. 2019).

Schools are a privileged context for the creation of favorable environments for the implementation of mental health promotion programs, in an effective way and with long-term benefits (Tomé & Matos, 2012). This context allows for an early intervention during the phase of development of socioemotional skills, thus enhancing the outcomes of the programs themselves, contributing to an healthy child and adolescent development and higher academic achievement of students (Lima-Serrano & Lima-Rodríguez, 2014; Sakellari et al., 2021).

The World Health Organization (2013) advocates the implementation of prevention programs that promote people's capabilities, acting before symptoms manifest. In the case of mental health interventions for children and adolescents, school-based programs are advantageous, since in this context it is possible to reach virtually all school-aged children and youth, as well as their parents, teachers, and assistants, regardless of their resources, making it possible to implement prevention interventions on a large scale (García-Carrión et al., 2019; Sakellari et al., 2021; Weist & Murray, 2008).

These interventions are based on the premise that the problems experienced by children and adolescents are determined by the interaction of individual, environmental and family factors. Therefore, these interventions often aim to promote general mental

health, encourage physical activity, improve nutritional habits, and prevent substance use (Champion et al., 2013; Sakellari et al., 2021).

Within the school community, it is also important to note that there seems to be greater effectiveness in approaches that include the whole school and its community and that use models of promoting social skills. It is also important that education is used among peers, fostering student participation and initiative, and that it is continuous over time so that it becomes a school culture (Jané-Llopis & Barry, 2005). The World Health Organization (2013) also supports the implementation of programs that include strategies to reduce stigma, social exclusion, discrimination, and unequal opportunities, involving the entire school community, so that the effect produced is broader. To this end, there seems to be evidence that promoting interactions between children and adolescents, involving them in dialogues with their parents, teachers and community members, and health professionals, contributes to better long-term outcomes (García-Carrión et al., 2019).

Single session interventions are specific, structured programs that involve only one treatment session, but should the client deem it necessary, may require more sessions (Ghosh et al., 2023). Single session interventions have been developed based on various treatment approaches, including cognitive-behavioral therapy and solution-focused psychodynamics. Single session interventions have been shown to be effective for various health conditions, including mental health problems and stress. In the case of digital single session interventions, these have been shown to be adequate and successful in both school and out-of-school settings (Ghosh et al., 2023).

According to current scientific evidence, these mental health programs applied in school settings, when they include a cognitive-behavioral therapy component, demonstrate positive outcomes on emotional regulation, anxiety management and problem solving, as well as on internalizing problems and general psychological distress (Castillo et al., 2019). However, these conventional interventions have a high cost and associated stigma, resulting in barriers to accessing them, with studies finding that only a minority of children and young people with experience of mental illness have access to support and treatment, with only an estimated 2% receiving specialist and evidence-based interventions (Jennings et al., 2016; Reardon et al., 2020).

Authors such as Schoen-Ferreira, Aznar-Farias and Silvares (2003) argue that it is necessary that schools also give importance to relationships among students and not only

to the contents inherent to the school path. Understanding students, children and adolescents, as biopsychosocial beings with their own needs opens intervention windows that go beyond the school syllabus. Furthermore, peers can contribute to the observation of the characteristic symptoms of depression, if they are sensitized to the topic (Bahls & Bahls, 2002). According to Baggio, Palazzo and Aerts (2009), it is in the school environment that patterns of behavior and relationships that can be considered harmful to the physical and mental health of children and adolescents are reproduced. When talking about mental health programs for children and young people, it is necessary to understand that the school should not be transformed into a "psychologist's office" but to affirm its important role in raising awareness of the school community about the issue of "mental health" (Silva & Barros, 2021).

III. eHEALTH, eMENTAL AND DIGITAL PROGRAMS FOR INTERVENTION IN MENTAL HEALTH

Technological advances in recent decades have led to unexpected and large-scale transformations in our community, increasing the availability of computer technologies, artificial intelligence and mobile applications (McIntyre et al., 2021; Sander & Lobo, 2015). Given the technological era in which we currently live, the healthcare field has also been undergoing a constant digitization of health services, implementing eHealth-based service options, such as fitness apps, relaxation and depressive symptom screening apps or digital health wallets, such as, for example, SNS24 (Caillaud et al., 2022; Han et al., 2020; McCloud et al., 2020; McDonald, 2022). This large-scale increase in digital health apps, websites and programs is a result of the global spread of cell phone use, which is mostly free and fast to download these apps, showing itself to the population as an effective alternative to the absence of professional help, or due to the delayed response of health systems (McCloud et al., 2020; McIntyre et al., 2021).

The emergence of these eHealth services facilitates community access to online medical information and digital health-related tools (Ghorbanian Zolbin et al., 2022). There is evidence of the use of digital apps, for example, developed with the goal of providing health literacy and behavior change counseling and using gamification, for young students to improve their levels of physical activity (Caillaud et al., 2022). In addition, there is also the use of program-based school interventions to promote digital health literacy as well as healthy lifestyle adoption in young people, which addresses

topics such as physical activity, nutrition, sleep hygiene, stress management and social connectedness (Hyman et al., 2020).

Also in mental health, digital interventions have shown promise for bridging gaps in mental health service delivery as an alternative model of care that increases person engagement in treatment and reduces barriers to treatment seeking due to associated stigma (Gan et al., 2021; McIntyre et al., 2021). Electronic mental health (eMental) technologies, which include web-based programs, mobile devices and computers, and cell phone apps, improve access and availability to mental health (Wozney et al., 2018). Currently, a plethora of mental health apps already exist on commercial platforms such as the Apple Store or the Google Play Store (McIntyre et al., 2021). However, several authors claim that few mental health apps have undergone rigorous and controlled validation (Lehtimaki et al., 2021; McCloud et al., 2020; McIntyre et al., 2021).

In a systematic review by Gan and colleagues (2021), it was found that greater engagement was significantly associated with improvements in mental health following the intervention. This association was also consistent regardless of intervention type (unguided/guided), diagnosis, or mental health status of participants. Thus, this systematic review provides evidence that engagement in digital mental health interventions is associated with therapeutic gains (Gan et al., 2021).

The study by Cross and colleagues (2023) also highlighted evidence of the effectiveness of the combined use of digital mental health technologies alongside face-to-face clinical care, which has been improving the efficiency of mental health services and young people's relationship with clinicians. In this study, the effectiveness of combined care was verified, as well as the mental health technology platforms currently in use, such as the case of moderated online social therapy and also the impact of virtual reality on anxiety disorders and psychotic cases, which have been shown to be highly effective (Cross et al., 2023).

Unstructured digital mental health services were also analyzed, such as the case of “ReachOut”. “ReachOut” provides psychoeducational information, personal stories, quizzes, videos and audio recordings, in addition to apps and tools, peer support and trained moderators, pathways to clinical support, and recommendations personalized to each user. In a study by Khal et al. (2020) which examined the effectiveness of this intervention, 1982 participants residing in Australia and ranging in age from 14 to 25 were

collected to participate in this 3-month study, with 81.18% of the participants completing the program. The purpose of this study was to examine the effectiveness of “ReachOut” in reducing depression, anxiety, stress, and suicide risk, and the results showed that over the 12-week study period, youth who used this self-directed, unstructured form of intervention reported modest but significant reductions in symptoms of depression, anxiety, stress, and suicide risk (Kahl et al., 2020).

Monitoring specific mental health indicators through smart and portable electronic devices has also shown promise compared to intrusive traditional approaches for the same purpose (Fazeli et al., 2022). In a study by Fazeli and collaborators (2022), which aimed to evaluate and create a system for continuous monitoring of primary physiological signals through a smartwatch, it was possible to investigate perceived stress and better understand patient behavior, in order to promote a more personalized intervention.

Although it is still under-reported, it appears that eHealth is also trying to reach out to acute admissions in adult psychiatry, with studies such as Sharma and colleagues (2022) attempting to evaluate the effectiveness of an app called "MindShift Cognitive Behavioral Therapy" to help patients manage their anxiety symptoms through digitized Cognitive Behavioral Therapy. However, due to user turnover, it was only possible to ascertain the acceptability of users to participate in the study, and further research in this area is required (Sharma et al., 2022).

Currently, there are also apps for momentary assessment of depressive symptoms for adults, such as "Mind.me", which assesses symptoms based on the Patient Health Questionnaire 9 demonstrating predictive accuracy and effectiveness in screening for depressive symptoms (McIntyre et al., 2021).

Finally, one mHealth area in youth that could benefit from further study is Digital game-based learning, which uses digital games for educational purposes. The evaluation of the effectiveness of Digital game-based learning programs and user engagement in it has been little explored. The study by Huen and colleagues (2016), aimed to describe and evaluate a Digital game-based learning program called "Professor Gooley and the Flame of Mind," which aimed to promote adolescent mental health through the positive psychology approach and foundations of cognitive-behavioral therapy. Thus, 498 high school students were collected, of whom 192 completed all 8 modules of the program, which lasted 3 months, with weekly sessions lasting 45 minutes. In this study, evidence

was reported that the participants engaged appropriately in the program activities and that this resulted in learning throughout the modules, which consequently improved their psychological well-being. Thus, this study provides evidence that the digital technologies and innovations of Digital game-based learning can contribute to the mental health of young people (Huen et al., 2016).

IV. ONLINE MENTAL ILLNESS PREVENTION PROGRAMS FOR CHILDREN AND YOUNG PEOPLE

In the case of children and young people, digital mental health interventions have also shown promising and optimized outcomes, as this population increasingly tends to be more comfortable and familiar with processing information and engaging with content through digital means (Office of Communications, 2020). These interventions include web-based or computer-based programs, rely on cognitive-behavioral therapy-based techniques and have been shown to be effective in reducing the severity of anxiety symptoms and overcoming the barriers of access, cost and stigma associated with conventional cognitive behavioral therapy (Andrews et al., 2018; Ebert et al., 2015; Fulmer et al., 2018; Garbutt et al., 2019; Hill et al., 2018; Hollis et al., 2017; Kretzschmar et al., 2019; Pennant et al., 2015; Shafran et al., 2009).

Domhardt and colleagues (2021) conducted a systematic review, which aimed to evaluate studies on mediators and mechanisms of change in different Digital health interventions, for common mental disorders in children and adolescents. A total of 25 studies were included in the review, with the majority being conducted in the United States. Most participants were female and their mean age was 18.49 years, with the lowest mean age being 5.4 years and the highest being 21.02 years, and the mean dropout rate was 18%. Study participants were recruited from educational or health-related settings and most interventions were based on cognitive-behavioral therapy, relaxation strategies, and elements of social learning theory were implemented. Other interventions considered were acceptance and commitment therapy, components of family therapy, problem solving and communication training, cognitive restructuring, and alternative family roles. It was also found that the importance of emotion regulation may be underestimated in digital psychotherapeutic interventions for children and adolescents (Domhardt et al., 2021).

An example of a digital approach in mental health is the creation of self-help apps for cell phones to improve access to support and enable reliable and affordable care (Han et al., 2020). In Khanna and Carper's (2022) review, a variety of approaches for intervening with youth with anxiety that incorporate digital technology into the treatment process are mentioned. There are web-based programs with online digital resources that encompass training for parents and preventive interventions that are shown to be effective in reducing anxious and depressive symptoms in youth. In addition, with the use of smartphones, mental health apps for anxiety disorders have also been developed, some serving as stand-alone interventions and others as monitoring apps, such as "Anxiety Coach" or "SmartCAT", designed to complement the treatment of this type of disorder. Another intervention mentioned by these authors is Virtual Reality in a youth context, which facilitates exposure to situations that cause anxiety and promotes adherence to treatment, and its effectiveness has been reported in several studies that aimed to improve anxiogenic symptoms associated with phobias (Khanna & Carper, 2022).

Han and colleagues (2020) even conducted a study to evaluate the effectiveness of the app called "LifeBuoy," an app designed for young people with lived experience of suicidal thoughts and incorporating positive psychology and psychoeducation principles, as well as strategies for emotional regulation, grief tolerance, relaxation exercises, games, and even a "help" button with links to hotlines (Han et al., 2020). The use of the cognitive behavioral therapy based mobile app "Feel Stress Free" to treat symptoms of depression and anxiety has also been studied in young people, in this case college student (McCloud et al., 2020). Similar to "LifeBuoy", the app incorporated relaxation activities, mood monitoring and regulation, mini games, among others, and this app may also be promising, although it needs further research (Han et al., 2020; McCloud et al., 2020).

Another example of this type of intervention is Brief Digital Interventions (BDIs), referred to in the review by Cwinn et al. (2022). In this review, BDIs and a protocol for mental health prevention in schools in response to the mental health crisis stemming from the pandemic are described. The protocol described involved digital psychoeducation and skills modules based on the principles of cognitive-behavioral therapy (iCBT) transmitted over the Internet, which help young people identify specific areas where they can apply skills to resolve psychosocial difficulties. According to the authors, there are several iCBT programs developed for implementation in school settings, and these are shown to be a

useful tool for promoting mental health in children and youth, as evidence confirms reductions in symptoms of anxiety and depression (Cwinn et al., 2022).

In a systematic review by Lehtimaki and colleagues (2021), aimed at synthesizing the current evidence on digital health interventions for adolescents and youth with mental health problems, systematic reviews and meta-analyses on digital mental health interventions were analyzed, with participants whose ages ranged from 10 to 24 years. Most of the systematic reviews and meta-analyses included in this review had a greater focus on anxiety, depression, or anxiety and depression concurrently, and evidence was found on the benefits of digital mental health interventions for these conditions. It should be noted, however, that the effectiveness of digital mental health interventions such as therapeutic video games, mobile apps, or social networking sites remains inconclusive, at least in the systematic reviews reviewed (Lehtimaki et al., 2021). Lehtimaki and colleagues (2021) also concluded that digital interventions appear to have additional benefits for supporting adolescents and youth where access to real-world health care is limited or when waiting times are long.

Currently, research is continuing into the implementation of digital mental health programs in schools. This is the case with the "Smooth Sailing" service developed by the Black Dog Institute, which consists of a web-based mental health service for students in secondary schools. As explained in the study developed by Bridianne O'Dea and her collaborators (2019), "Smooth Sailing" is run through a website with a screening service for anxiety and depression, in addition to interventions grounded with the Australian Clinical Practice Guidelines, which includes self-directed psychoeducation and cognitive behavioral therapy services, as well as a direct access link to face-to-face care from a school counselor, when in the screenings the student is identified with moderate to severe symptoms; in the most severe cases, when the student reports through the website that he or she has thoughts of self-harm or suicidal ideation, the school counselor receives an automatic notification. In this way, the goal of “Smooth Sailing” is to facilitate access to psychological help, as well as to reduce anxiety and depressive symptoms in high school students. Bridianne O'Dea and her collaborators (2019) reported how successful this intervention was in a pilot study conducted in 4 secondary schools in New South Wales in 2017, in which 59 students participated who reported significant improvements in their initial symptoms and rated "Smooth Sailing" as an easy to learn, access and help (O’Dea et al., 2019).

A study conducted by Shroff et al. (2023) in San Antonio, Texas, aimed to culturally adapt and evaluate the acceptability and usefulness of a digital mental health platform called Project Youth Empowerment and Support (YES), an anonymous platform with 3 30-minute self-guided interventions (SSIs) to promote the mental health of youth with lived experience of depression and anxiety. The YES Project was culturally adapted to be carried out by people whose language was Spanish or English and was disseminated throughout the community and schools. The project initially had 1,801 youth in San Antonio between the ages of 11 and 17 and ended with 894 youth completing the YES Project. The results described in this study indicate that Project YES was perceived by youth as an acceptable, affordable mental health support worth recommending to others, reporting short-term improvements in hopelessness, agency, perceived control, and self-hate (Shroff et al., 2023).

An exploratory trial was also conducted by Moltrecht and colleagues (2021), which lasted 3 months, with the purpose of studying the relevance, implementation and use of an app for children's emotional regulation in schools, in which 144 children aged between 10 and 12 years participated. The results of this study showed that although 40.1% of children did not access the app, 57.5% of those who used it said it was useful for calming down and relaxing, recognizing it as a useful and easily accessible tool. However, teachers mentioned some difficulties in the access and lack of content, which could be reasons why not all students used the app. Thus, the study by Moltrecht and colleagues (2021) has shown that mental health apps *for* children and youth, which can be used in and out of school settings, can have a beneficial and promising impact on mental health promotion and mental illness prevention.

In 2021, Keinonen and his collaborators conducted a study in which they applied an online Acceptance and Commitment Therapy program in a school setting, which aimed to increase the state of well-being and decrease the manifestation of depressive symptomatology in the participants, and effectively demonstrated a positive contribution for about two-thirds of the adolescents regarding their depressive symptomatology and the prevention of health-related risk behaviors (Keinonen et al., 2021).

A Scopus review was also conducted by Ito-Jaeger and colleagues (2022), with the aim of investigating the existence and effectiveness of interventions using digital videos (animations, films, videos, digital stories, etc.). These videos were intended to promote mental health literacy in young people and seventeen studies were reviewed, of which

three had a multiple video approach and the rest consisted of only one video. In this review, it was found that participants who were subjected to the digital video intervention reported increased knowledge regarding mental illness, symptoms, and help-seeking, leading to the conclusion that these types of interventions are effective in promoting mental health and illness literacy in young people (Ito-Jaeger et al., 2022).

Schleider and co-workers (2022) conducted a study, during the pandemic period, in which they applied SSI's digitally, in adolescents aged 13 to 16 years, and it was found that, in 3 months, these experimental interventions allowed the reduction of depressive symptoms and hopelessness, proving to be a good ally in promoting mental health in young people.

Since childhood anxiety can also be triggered by family factors, SSI's directed at parents to improve interaction with their children are also a possibility to prevent anxiety in young people (Sung et al., 2021). In this regard, a randomized study conducted by Sung and colleagues (2021), evaluated the effectiveness of the EMPOWER project, an online SSI designed to reduce parental accommodation, a parental behavior that tends to increase the risk of anxiety in their children. Some examples of parental accommodation include, for example, the caregiver telecommuting to reduce fear of separation from their child or allowing the child to stay home because they don't want to go to school. The EMPOWER project takes between 20 and 30 minutes to complete, and the intervention encompasses five main elements: 1) Psychoeducation about the child's anxiety and avoidance and how accommodation promotes feelings of anxiety; 2) Psychoeducation about identifying avoidance patterns and promoting "courageous behavior"; 3) Personalized action plan to promote courageous behavior in children; 4) Psychoeducation to normalize parental distress responses in response to anxiety; 5) Practical exercise with demonstration of an example of other parents with parental accommodation. Following the completion of this online project, parents, who had children between the ages of 4 and 10, reported significant reductions in their accommodation to child anxiety. In addition, 54.28% of parents who completed the intervention reported feeling "a little more prepared" to help their children and 30% reported feeling "much more prepared," which demonstrates the effectiveness of an online SSI project for parents to reduce feelings of anxiety in their children (Sung et al., 2021).

In a systematic review of Digital Health Interventions, conducted to improve mental health literacy, help-seeking behavior or access to mental health services among parents

of 2- to 12-year-old children with behavioral and emotional problems, 4 articles were analyzed. Through this analysis, it was concluded that Digital Health Interventions can indeed improve mental health literacy, highlighting the need for further research to evaluate digital programs that promote parents' help-seeking behavior or access to mental health services for their children (Peyton et al., 2019).

In another systematic review, conducted by Sakellari et al (2021), to identify interventions to promote mental health and well-being in primary school settings using digital methods, three digital interventions targeting teachers and three targeting students were identified. In the studies analyzed, it was possible to find that the interventions for teachers included methods such as web-based interactive psychoeducation, text and video-based education, online tools for mental health role-play simulation, discussion forums, assessments and web links. For students, on the other hand, the studies reviewed consisted of intervention through digital game-based programs with stories, dialogues, problem solving, and mini-games, in addition to cognitive behavioral therapy programs for developing anxiety management strategies (Sakellari et al., 2021).

Thus, the study by Sakellari et al (2021) also showed a positive effect on the use of mental health and wellness promotion interventions conducted in a school setting. This study identified several interventions that contributed not only to increased teacher knowledge and improved attitudes, but also to behavioral improvements in children. Furthermore, digital interventions in elementary school students with anxiety disorders are known to show positive results, not only in identifying students at high risk for these problems, but also for other behavioral and emotion regulation problems. Behavioral therapy is associated with significant improvements in anxiety after the intervention and during follow-up. For the child, these interventions are met with great satisfaction (Sakellari et al 2021).

Finally, in another study, conducted by McDonald (2022), in which an art therapy intervention for children: ACTIVe Art Therapy for Children in the community, was used to improve outcomes for children with socioemotional and mental health difficulties following adverse childhood experiences. In this study, the "Person-Based Approach" served to identify barriers, facilitators, and suggested solutions, highlighting that the digital health intervention enables psychoeducation in a more engaging and persuasive way through interactive workshops for young people (McDonald, 2022).

V. BARRIERS AND CHALLENGES TO THE IMPLEMENTATION OF DIGITAL INTERVENTIONS

In general, despite the potential of digital interventions, researchers have identified several limitations that influence their applicability, the main ones being the impossibility of customizing the intervention to the needs of each young person, the difficulties in managing comorbidities and acute crises, which may lead to a possible decrease in the involvement of these users and, consequently, to the dropout of young people who find it more difficult to have their needs met in this area. In addition to these factors, the cautious attitudes of health professionals towards digital interventions are also a challenge to their use and viability, and therefore their acceptance in health systems is still limited (Liverpool et al., 2020; Wozney et al., 2018). Another disadvantage of this type of intervention may be digital inequality, in that it may make it impossible for young people with lower socioeconomic conditions to access health care or may not allow the expansion of these interventions to less developed countries (Liverpool et al., 2020).

In the case of applied games, young children have a positive opinion and show high levels of engagement; on the other hand, they do not seem to necessarily consider them relevant to their mental health issue. Regarding virtual reality, the literature suggests that young people adhere to interventions using this technology. However, virtual reality environments evoke feelings of anxiety (Halldorsson et al., 2021).

In addition, complexity factors such as slow system performance, difficult-to-use software and hardware, the need for extensive software modifications, the work involved in transferring records between two systems, the inability to provide real-time access, data manipulation, reliability, low speed, unplanned downtime, and connectivity issues influence the implementation of systems in healthcare settings (Boonstra & Broekhuis, 2010; Lu et al., 2005; McGinn et al., 2011; Police et al., 2010; Ross et al., 2016; Shekelle et al., 2006; Vreeman et al., 2006). Often, complexity issues are linked to the fact that healthcare professionals are unable to master the technologies implemented (Boonstra & Broekhuis, 2010; Gagnon et al., 2014; Ross et al., 2016). Therefore, it is recommended that eHealth system vendors aim to make the systems as user-friendly as possible,

involving end users in their design and development, providing guides for their use and technical assistance (Kilsdonk et al., 2011; Moxey et al., 2010; Ross et al., 2016; Stolee et al., 2010).

Most studies have also reported that the cost of these systems and the costs associated with their implementation are important factors, and some studies state that these cost-related factors are the main barrier to implementation (Studer, 2005; Police et al., 2010; Ross et al., 2016). High setup costs, including acquisition and installation costs, are the main barriers to the initial adoption of eHealth systems (Police et al., 2010; Ross et al., 2016). Concerns about ongoing costs have also been reported as barriers to the adoption and implementation of these digital tools (Benavides-Vaello et al., 2013; Police et al., 2010; Ross et al., 2016). Thus, to overcome cost-related barriers, it is important that there are financial incentives from insurers and government agencies, which will facilitate the adoption and implementation of these tools, and the establishment of cost-effectiveness through formal evaluations, funding of services on a larger scale, and redesigning business models (Ross et al., 2016).

The absence or inadequacy of legislation and policies and liability issues can also hinder the implementation of eHealth systems at the organizational and health professional level (Benavides-Vaello et al., 2013; Boonstra & Broekhuis, 2010; Ross et al., 2016; Saliba et al., 2012). That said, the creation of standards can serve to reduce healthcare professionals' concerns about patient data security and professional accountability, as well as facilitate the exchange of electronic health information between systems and organizations while maintaining data integrity (Benavides-Vaello et al., 2013; Police et al., 2010; Ross et al., 2016).

Another barrier highly described in the literature includes the implementation climate, that is, the overall compatibility or fit between the eHealth intervention and the organization (Ross et al., 2016). A frequent reason for unsuccessful implementation is that information systems are not a good fit with work practices or daily clinical work (Gagnon et al., 2012; Ross et al., 2016). Health professionals' perceptions that eHealth systems disrupt workflows and care delivery are a barrier to both the implementation and use of these systems (Ross et al., 2016). On the other hand, when there is a good fit, or a perceived fit, between eHealth systems and workflows, and when systems positively influence workplace efficiency, this significantly facilitates their use (McGinn et al., 2011; Ross et al., 2016).

Also with regard to the changes in workflows created by the introduction of eHealth systems, sometimes these tools can also disrupt established professional roles, responsibilities, and work styles (Boonstra & Broekhuis, 2010; Ross et al., 2016). Physicians' resistance to eHealth implementation is reported by several studies, relating it to fear of, dissatisfaction with, and uncertainty about new roles and responsibilities, created by the introduction of these systems (Boonstra & Broekhuis, 2010; Moxey et al., 2010; Ross et al., 2016). Thus, quality project management during the implementation period, careful study of the after effects of implementation on workflow, additional training, adaptability of technologies to fit roles, tasks, and workflows, and the provision of a technical support team are suggested as strategies to reduce barriers related to workflow disruptions (Boonstra & Broekhuis, 2010; Lluch, 2011).

That said, thorough implementation planning is recommended for its success, as the lack of a strategic plan is reported as a crucial barrier to implementing digital interventions. This planning should include delineation of roles and responsibilities, ensuring time to invest in system selection and procurement, evaluation of other concomitant policy and process changes, needs assessment and analysis, as well as development of a business plan, communication of the strategy to all employees, and development of protocols for system use (Ross et al., 2016). In addition, a systematic review emphasized the need for continued effort after the initial phase (Gruber et al., 2009).

In this planning, support from the leadership of health organizations is also important, as their lack of involvement can be a barrier to the implementation of these digital tools in services (Boonstra & Broekhuis, 2010; Ross et al., 2016; Stolee et al., 2010). Several authors mention that there should be a concern to provide adequate infrastructure, which includes the provision of electricity, reliable internet connectivity, and access to computers and cell phones (Kilsdonk et al., 2011; Oluoch et al., 2012; Saliba et al., 2012). Prior to implementation, there must also be education of staff on the immediate and long-term benefits provided by the system, as lack of knowledge and limited understanding of the benefits provided by the systems often act as a barrier to the implementation of digital interventions (Police et al., 2010; Shekelle et al., 2006; Stolee et al., 2010). In addition, time must be available to learn how to use the new eHealth systems, implement them, and train staff to use them (Lluch, 2011; Police et al., 2010; Ross et al., 2016; Stolee et al., 2010). A transition period should also be established in which end users can become

familiar with and learn how to use new systems (Lluch, 2011; Police et al., 2010; Ross et al., 2016; Stolee et al., 2010).

Finally, another important factor, reported by many studies across eHealth domains, was the ability of the technology to be adapted to suit the local context (Kilsdonk et al., 2011; Ludwick & Doucette, 2009; Ross et al., 2016). Technologies that can undergo technical adjustments to meet the constantly changing environment may have greater acceptance and adoption (Ross et al., 2016). End-user input into the design and development of eHealth technologies should be considered as a way to overcome adaptability barriers (Goldstein et al., 2014; Ross et al., 2016).

CONCLUSION

According to statistical data obtained in 2019, the incidence of mental disorders increased by 6.8% on a global scale in the child and youth population, with major depressive disorder having the highest incidence, followed by conduct and anxiety disorders (Piao et al., 2022). Current literature also highlights that COVID-19 has left its mark on the mental health of our youth, with current studies showing that the pandemic may have led to worsening underlying conditions such as anxiety and depression in children and adolescents (Hossain et al., 2022; Listernick & Badawy, 2021). Thus, the need to develop services and programs that could mitigate and/or prevent the symptoms associated with mental illnesses became urgent (Hossain et al., 2022). As mentioned by McIntyre and collaborators (2021) and Sander and Lobo (2015), thanks to technological developments, there has been an increase in the variability of computer technologies, artificial intelligence, and mobile applications, causing the health sector itself to also undergo a digitization of services and increase eHealth offerings (Caillaud et al, 2022; Han et al., 2020; Hyman et al., 2020; McCloud et al., 2020; McDonald, 2022).

Fortunately, we are seeing an increasing repertoire of mental health help and prevention through digital mental health apps, websites, and programs that can be used in any setting, making them more enticing and comfortable for the young population, as this age group feels more familiar with digital media and this is an effective alternative to the time-consuming response of health systems to act in preventing mental illness (Lehtimaki et al., 2021; McCloud et al., 2020; McIntyre et al., 2021; Moltrecht et al., 2021).

Although there are still few apps aimed at mental health undergoing rigorous and controlled validation, there are already studies that prove the acceptability and potential benefits of intervention through online programs for the prevention of mental illness in the child and youth population (Lehtimaki et al., 2021; McCloud et al., 2020; McIntyre et al., 2021). One of the places where there is greater ease in implementing these digital programs for mental health promotion of children and youth is in schools, since it is possible to reach a comprehensive age group that is gathered in the same context, thus promoting the development of socioemotional skills and strategies, which will contribute to healthy child and youth development and higher academic achievement (Lima-Serrano & Lima-Rodríguez, 2014; García-Carrión et al., 2019; Sakellari et al., 2021a; Tomé & Matos, 2012; Weist & Murray, 2008).

In the current literature, there are programs using digital videos (animations, movies, videos, digital stories, mini-games, relaxation strategies), mental health role-play, to promote mental health literacy in young people, as well as programs targeting parents and teachers, which turn out to be an indirect way of working on mental illness prevention in children and adolescents (Ito-Jaeger et al., 2022; Sakellari et al., 2021; Sung et al., 2021). It is hoped that in this way children and young people can develop their mental health literacy and acquire tools that can help them throughout their lives to manage their emotions and feelings.

FUTURE RESEARCH DIRECTIONS

The long-term impact of anxiety and depression in children and adolescents includes significant interference with social relationships, academic performance, and daily functioning (Wozney et al., 2018). In addition to these consequences for the person themselves, the exponential growth of mental illness ultimately takes a toll on the cost of living and the economy of society (Merikangas et al., 2009; Christensen et al., 2020). Early intervention and the development of interventions that facilitate access to mental health for all is therefore critical (Gan et al., 2021; Hill et al., 2018; McIntyre et al., 2021).

In the past 5 years, several literature reviews have highlighted the increase in research and development activities in eMental health technologies for children and adolescents (Wozney et al., 2018). Although the conclusions about the effectiveness of the technologies vary depending on the review and the methodology used, the reviews

are unified when they state that eMental health technologies have potential in health systems. Despite the potential for improving the health of children and adolescents, eMental technologies are still not widely adopted in health systems (Wozney et al., 2018).

Distinguishing implementation effectiveness from a treatment effectiveness standpoint is critical to integrating eMental health technologies, that is, when acceptance efforts fail, it is important to know whether the failure occurred because the intervention was ineffective in the new environment (e.g., lack of cultural relevance) or whether an effective intervention was implemented ineffectively (e.g., clinicians failed to send reminder emails as the protocol indicated) (Wozney et al., 2018).

However, despite eMental health technologies lacking implementation frameworks, research has focused on developing broadly defined eHealth implementation, lacking a specific focus on mental health (McCloud et al., 2020); Wozney et al., 2018). Conceptualizing and evaluating implementation outcomes, that is, how the implementation of a program works in specific contexts, can advance understanding of implementation processes, at the level of, for example, its cost, training, service needed, infrastructure needed, or professionals needed, allow studies of the comparative effectiveness of strategies (Mair et al., 2012; Ross et al., 2016; Wozney et al., 2018).

Furthermore, as noted earlier, despite the increase in mental health apps available to the population, most have not undergone rigorous and controlled validation (Lehtimaki et al., 2021; McCloud et al., 2020; McIntyre et al., 2021). Therefore, more research is needed to validate these interventions during and after the interventions, that is, it is important to follow up in the short and long term to see if the improvements associated with these interventions are consistent or if there are fluctuations. To rule out digital placebo effects as an explanation for the results described in the literature, it is also important that studies compare the results obtained with mental health apps with an active, smartphone-based control (McCloud et al., 2020).

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association. https://doi.org/10.1176/appi.books.9780890425596

Anderson, L. M., Adeney, K. L., Shinn, C., Safranek, S., Buckner-Brown, J., & Krause, L. K. (2015). Community coalition-driven interventions to reduce health disparities among racial and ethnic minority populations. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.CD009905.pub2

Andrews, G., Basu, A., Cuijpers, P., Craske, M. G., McEvoy, P., English, C. L., & Newby, J. M. (2018). Computer therapy for the anxiety and depression disorders is effective, acceptable and practical health care: An updated meta-analysis. *Journal of Anxiety Disorders*, *55*, 70–78. https://doi.org/https://doi.org/10.1016/j.janxdis.2018.01.001

Arnow, B. A. (2004). Relationships between childhood maltreatment, adult health and psychiatric outcomes, and medical utilization. *The Journal of Clinical Psychiatry*, *65 Suppl 1*, 10–15.

Arrarás, J. I., & Manrique, E. (2019). How depression and its treatment are perceived. *Anales Del Sistema Sanitario de Navarra*, *42*(1), 5–8. https://doi.org/10.23938/ASSN.0591

Baggio, L., Palazzo, L. S., & Aerts, D. R. G. de C. (2009). Suicide planning among teenage students: Prevalence and associated factors. *Cadernos de Saúde Pública*, *25*(1), 142–150. https://doi.org/10.1590/S0102-311X2009000100015

Bahls, S.-C., & Bahls, F. R. C. (2002). Depressão na adolescência: Características clínicas. *Interação Em Psicologia*, *6*(1). https://doi.org/10.5380/psi.v6i1.3193

Belmaker, R. H., & Agam, G. (2008). Major depressive disorder. *New England Journal of Medicine*, *358*(1), 55–68. https://doi.org/10.1056/NEJMra073096

Benavides-Vaello, S., Strode, A., & Sheeran, B. C. (2013). Using technology in the delivery of mental health and substance abuse treatment in rural communities: a review. *The Journal of Behavioral Health Services & Research*, *40*(1), 111–120. https://doi.org/10.1007/s11414-012-9299-6

Bignardi, G., Dalmaijer, E. S., Anwyl-Irvine, A. L., Smith, T. A., Siugzdaite, R., Uh, S., & Astle, D. E. (2020). Longitudinal increases in childhood depression symptoms during the COVID-19 lockdown. *Archives of Disease in Childhood*, *106*(8), 791–797. https://doi.org/10.1136/ARCHDISCHILD-2020-320372

Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records

by physicians from systematic review to taxonomy and interventions. *BMC Health Services Research*, *10*, 231. https://doi.org/10.1186/1472-6963-10-231

Brown, C., Stoffel, V., & Muñoz, J. P. T. A.-T. T.-. (2019). *Occupational therapy in mental health: A vision for participation* (Second edi). F.A. Davis Company. https://doi.org/LK - https://worldcat.org/title/1073039694

Caillaud, C., Ledger, S., Diaz, C., Clerc, G., Galy, O., & Yacef, K. (2022). iEngage: A digital health education program designed to enhance physical activity in young adolescents. *PLOS ONE*, *17*(10), e0274644. https://doi.org/10.1371/journal.pone.0274644

Castillo, E. G., Ijadi-Maghsoodi, R., Shadravan, S., Moore, E., Mensah, M. O., Docherty, M., Aguilera Nunez, M. G., Barcelo, N., Goodsmith, N., Halpin, L. E., Morton, I., Mango, J., Montero, A. E., Rahmanian Koushkaki, S., Bromley, E., Chung, B., Jones, F., Gabrielian, S., Gelberg, L., … Wells, K. B. (2019). Community interventions to promote mental health and social equity. *Current Psychiatry Reports*, *21*(5), 35. https://doi.org/10.1007/s11920-019-1017-0

Champion, K. E., Newton, N. C., Barrett, E. L., & Teesson, M. (2013). A systematic review of school-based alcohol and other drug prevention programs facilitated by computers or the internet. *Drug and Alcohol Review*, *32*(2), 115–123. https://doi.org/10.1111/j.1465-3362.2012.00517.x

Chan, M. F., Al Balushi, R., Al Falahi, M., Mahadevan, S., Al Saadoon, M., & Al-Adawi, S. (2021). Child and adolescent mental health disorders in the GCC: A systematic review and meta-analysis. *International Journal of Pediatrics and Adolescent Medicine*, *8*(3), 134–145. https://doi.org/10.1016/j.ijpam.2021.04.002

Christensen, M. K., Lim, C. C. W., Saha, S., Plana-Ripoll, O., Cannon, D., Presley, F., Weye, N., Momen, N. C., Whiteford, H. A., Iburg, K. M., & McGrath, J. J. (2020). The cost of mental disorders: a systematic review. *Epidemiology and Psychiatric Sciences*, *29*, e161. https://doi.org/DOI: 10.1017/S204579602000075X

Ciarma, J. L., & Mathew, J. M. (2017). Social anxiety and disordered eating: The influence of stress reactivity and self-esteem. *Eating Behaviors*, *26*, 177–181. https://doi.org/10.1016/j.eatbeh.2017.03.011

Cross, S. P., Nicholas, J., Bell, I. H., Mangelsdorf, S., Valentine, L., Thompson, A., Gleeson, J. F., & Alvarez-Jimenez, M. (2023). Integrating digital interventions with clinical practice in youth mental health services. *Australasian Psychiatry*, *31*(3), 302–305. https://doi.org/10.1177/10398562231169365

Cwinn, E., Barry, E. A., Weisz, J. R., Bailin, A., Fitzpatrick, O. M., Venturo-Conerly, K., & Crooks, C. V. (2022). Brief digital interventions: An implementation-sensitive approach to addressing school mental health needs of youth with mild and emerging mental health difficulties. *Canadian Journal of Community Mental Health*, 1–19. https://doi.org/10.7870/cjcmh-2022-026

Domhardt, M., Engler, S., Nowak, H., Lutsch, A., Baumel, A., & Baumeister, H. (2021). Mechanisms of change in digital health interventions for mental disorders in youth: Systematic review. *Journal of Medical Internet Research*, *23*(11). https://doi.org/10.2196/29742

Dray, J., Bowman, J., Campbell, E., Freund, M., Wolfenden, L., Hodder, R. K., McElwaine, K., Tremain, D., Bartlem, K., Bailey, J., Small, T., Palazzi, K., Oldmeadow, C., & Wiggers, J. (2017). Systematic review of universal resilience-focused interventions targeting child and adolescent mental health in the school setting. *Journal of the American Academy of Child & Adolescent Psychiatry*, *56*(10), 813–824. https://doi.org/10.1016/j.jaac.2017.07.780

Ebert, D. D., Zarski, A.-C., Christensen, H., Stikkelbroek, Y., Cuijpers, P., Berking, M., & Riper, H. (2015). Internet and computer-based cognitive behavioral therapy for anxiety and depression in youth: A meta-analysis of randomized controlled outcome trials. *PLOS ONE*, *10*(3), e0119895. https://doi.org/10.1371/journal.pone.0119895

Fazeli, S., Levine, L., Beikzadeh, M., Mirzasoleiman, B., Zadeh, B., Peris, T., & Sarrafzadeh, M. (2022). Passive monitoring of physiological precursors of stress leveraging smartwatch data. *Proceedings - 2022 IEEE International Conference on Bioinformatics and Biomedicine, BIBM 2022*, 2893–2899. https://doi.org/10.1109/BIBM55620.2022.9995354

Fledderjohann, J., Erlam, J., Knowles, B., & Broadhurst, K. (2021). Mental health and care needs of British children and young people aged 6–17. *Children and Youth Services Review*, *126*. https://doi.org/10.1016/j.childyouth.2021.106033

Fulmer, R., Joerin, A., Gentile, B., Lakerink, L., & Rauws, M. (2018). Using psychological artificial intelligence (Tess) to relieve symptoms of depression and anxiety: Randomized controlled trial. *JMIR Ment Health*, *5*(4), e64. https://doi.org/10.2196/mental.9782

Gagnon, M.-P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N., & Légaré, F. (2012). Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. *Journal of Medical Systems*, *36*(1), 241–277. https://doi.org/10.1007/s10916-010-9473-4

Gagnon, M.-P., Nsangou, É.-R., Payne-Gagnon, J., Grenier, S., & Sicotte, C. (2014). Barriers and

facilitators to implementing electronic prescription: a systematic review of user groups' perceptions. *Journal of the American Medical Informatics Association : JAMIA*, *21*(3), 535–541. https://doi.org/10.1136/amiajnl-2013-002203

Gan, D. Z. Q., McGillivray, L., Han, J., Christensen, H., & Torok, M. (2021). Effect of engagement with digital interventions on mental health outcomes: A systematic review and meta-analysis. In *Frontiers in Digital Health* (Vol. 3). Frontiers Media S.A. https://doi.org/10.3389/fdgth.2021.764079

Garbutt, J., Sterkel, R., Ruecker, K., Dodd, S., Smith, E., & Plax, K. (2019). Ready for the challenge of depression care in the medical home. *Clinical Pediatrics*, *58*(7), 816–818. https://doi.org/10.1177/0009922819834280

García-Carrión, R., Villarejo-Carballido, B., & Villardón-Gallego, L. (2019). Children and adolescents mental health: A systematic review of interaction-based interventions in schools and communities. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00918

Ghorbanian Zolbin, M., Huvila, I., & Nikou, S. (2022). Health literacy, health literacy interventions and decision-making: A systematic literature review. *Journal of Documentation*, *78*(7), 405–428. https://doi.org/10.1108/JD-01-2022-0004

Ghosh, A., McDanal, R., & Schleider, J. L. (2023). Digital single-session interventions for child and adolescent mental health: Evidence and potential for dissemination across low- and middle-income countries. *Advances in Psychiatry and Behavioral Health*. https://doi.org/10.1016/J.YPSC.2023.03.016

Gillies, D., Christou, M. A., Dixon, A. C., Featherston, O. J., Rapti, I., Garcia-Anguita, A., Villasis-Keever, M., Reebye, P., Christou, E., Al Kabir, N., & Christou, P. A. (2018). Prevalence and characteristics of self-harm in adolescents: Meta-analyses of community-based studies 1990–2015. *Journal of the American Academy of Child & Adolescent Psychiatry*, *57*(10), 733–741. https://doi.org/10.1016/J.JAAC.2018.06.018

Goldstein, D. H., Phelan, R., Wilson, R., Ross-White, A., VanDenKerkhof, E. G., Penning, J. P., & Jaeger, M. (2014). Brief review: Adoption of electronic medical records to enhance acute pain management. *Canadian Journal of Anaesthesia = Journal Canadien d'anesthesie*, *61*(2), 164–179. https://doi.org/10.1007/s12630-013-0069-6

Gruber, D., Cummings, G. G., LeBlanc, L., & Smith, D. L. (2009). Factors influencing outcomes of clinical information systems implementation: a systematic review. *Computers, Informatics, Nursing : CIN*, *27*(3), 151–155. https://doi.org/10.1097/NCN.0b013e31819f7c07

Halldorsson, B., Hill, C., Waite, P., Partridge, K., Freeman, D., & Creswell, C. (2021). Annual research review: Immersive virtual reality and digital applied gaming interventions for the treatment of mental health problems in children and young people: the need for rigorous treatment development and clinical evaluation. *Journal of Child Psychology and Psychiatry*, *62*(5), 584–605. https://doi.org/10.1111/jcpp.13400

Han, J., McGillivray, L., Wong, Q. J. J., Werner-Seidler, A., Wong, I., Calear, A., Christensen, H., & Torok, M. (2020). A mobile health intervention (LifeBuoy App) to help young people manage suicidal thoughts: Protocol for a mixed-methods randomized controlled trial. *JMIR Research Protocols*, *9*(10). https://doi.org/10.2196/23655

Hao, F., Tan, W., Jiang, L., Zhang, L., Zhao, X., Zou, Y., Hu, Y., Luo, X., Jiang, X., McIntyre, R. S., Tran, B., Sun, J., Zhang, Z., Ho, R., Ho, C., & Tam, W. (2020). Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain, Behavior, and Immunity*, *87*, 100–106. https://doi.org/10.1016/j.bbi.2020.04.069

Hill, C., Creswell, C., Vigerland, S., Nauta, M. H., March, S., Donovan, C., Wolters, L., Spence, S. H., Martin, J. L., Wozney, L., McLellan, L., Kreuze, L., Gould, K., Jolstedt, M., Nord, M., Hudson, J. L., Utens, E., Ruwaard, J., Albers, C., … Kendall, P. C. (2018). Navigating the development and dissemination of internet cognitive behavioral therapy (iCBT) for anxiety disorders in children and young people: A consensus statement with recommendations from the #iCBTLorentz workshop group. *Internet Interventions*, *12*, 1–10. https://doi.org/https://doi.org/10.1016/j.invent.2018.02.002

Hollis, C., Falconer, C. J., Martin, J. L., Whittington, C., Stockton, S., Glazebrook, C., & Davies, E. B. (2017). Annual research review: Digital health interventions for children and young people with mental health problems – a systematic and meta-review. *Journal of Child Psychology and Psychiatry*, *58*(4), 474–503. https://doi.org/https://doi.org/10.1111/jcpp.12663

Hossain, K., Soon Lee, K. C., Abdul Ghani Azmi, I. B., Idris, A. B., Alam, M. N., Rahman, M. A., & Mohd Ali, N. (2022). Impact of innovativeness, risk-taking, and proactiveness on export performance in a developing country: Evidence of qualitative study. *RAUSP Management Journal*, *57*(2), 165–181. https://doi.org/10.1108/RAUSP-01-2021-0002

Huen, J. M., Lai, E. S., Shum, A. K., So, S. W., Chan, M. K., Wong, P. W., Law, Y., & Yip, P. S. (2016). Evaluation of a digital game-based learning program for enhancing youth mental health: A structural equation modeling of the program effectiveness. *JMIR Mental Health*, *3*(4), e46. https://doi.org/10.2196/mental.5656

Hyman, A., Stewart, K., Jamin, A.-M., Novak Lauscher, H., Stacy, E., Kasten, G., & Ho, K. (2020). Testing a school-based program to promote digital health literacy and healthy lifestyle behaviours in intermediate elementary students: The learning for life program. *Preventive Medicine Reports*, *19*, 101149. https://doi.org/10.1016/j.pmedr.2020.101149

Ito-Jaeger, S., Perez Vallejos, E., Curran, T., Spors, V., Long, Y., Liguori, A., Warwick, M., Wilson, M., & Crawford, P. (2022). Digital video interventions and mental health literacy among young people: a scoping review. *Journal of Mental Health*, *31*(6), 873–883. https://doi.org/10.1080/09638237.2021.1922642

Jané-Llopis, E., & Barry, M. M. (2005). What makes mental health promotion effective? *Promotion & Education*, *Suppl 2*. https://doi.org/10.1177/10253823050120020108

Jennings, L., Lee, N., Shore, D., Strohminger, N., Allison, B., Conserve, D. F., & Cheskin, L. J. (2016). U.S. minority homeless youth's access to and use of mobile phones: Implications for mHealth intervention design. *Journal of Health Communication*, *21*(7), 725–733. https://doi.org/10.1080/10810730.2015.1103331

Kahl, B. L., Miller, H. M., Cairns, K., Giniunas, H., & Nicholas, M. (2020). Evaluation of ReachOut.com, an unstructured digital youth mental health intervention: Prospective cohort study. *JMIR Mental Health*, *7*(10), e21280. https://doi.org/10.2196/21280

Keinonen, K., Puolakanaho, A., Lappalainen, P., Lappalainen, R., & Kiuru, N. (2021). Developmental trajectories of experiential avoidance and depressive symptoms and association to health behaviors among adolescents during brief guided online acceptance and commitment therapy. *Journal of Contextual Behavioral Science*, *22*, 24–31. https://doi.org/10.1016/j.jcbs.2021.08.002

Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents. *International Journal of Adolescence and Youth*, *25*(1), 79–93. https://doi.org/10.1080/02673843.2019.1590851

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, *62*(6), 593. https://doi.org/10.1001/archpsyc.62.6.593

Khanna, M. S., & Carper, M. (2022). Digital mental health interventions for child and adolescent anxiety. *Cognitive and Behavioral Practice*, *29*(1), 60–68. https://doi.org/10.1016/j.cbpra.2021.05.003

Kieling, C., Baker-Henningham, H., Belfer, M., Conti, G., Ertem, I., Omigbodun, O., Rohde, L.

A., Srinath, S., Ulkuer, N., & Rahman, A. (2011). Child and adolescent mental health worldwide: Evidence for action. *The Lancet*, *378*(9801), 1515–1525. https://doi.org/10.1016/S0140-6736(11)60827-1

Kilsdonk, E., Peute, L. W. P., Knijnenburg, S. L., & Jaspers, M. W. M. (2011). Factors known to influence acceptance of clinical decision support systems. *Studies in Health Technology and Informatics*, *169*, 150–154.

Kor, A., & Shoshani, A. (2023). Moderating the impact of the COVID-19 pandemic on children's and adolescents' substance use, digital media use, and mental health: A randomized positive psychology addiction prevention program. *Addictive Behaviors*, *141*, 107660. https://doi.org/10.1016/j.addbeh.2023.107660

Kretzschmar, K., Tyroll, H., Pavarini, G., Manzini, A., & Singh, I. (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. *Biomedical Informatics Insights*, *11*, 1178222619829083. https://doi.org/10.1177/1178222619829083

Lannigan, E. G., & Noyes, S. (2019). Occupational Therapy Interventions for Adults Living With Serious Mental Illness. *The American Journal of Occupational Therapy*, *73*(5), 7305395010p1-7305395010p5. https://doi.org/10.5014/ajot.2019.735001

Lapolla, T., Saltiel, P., & Silvershein, D. (2015). Major depressive disorder: mechanism-based prescribing for personalized medicine. *Neuropsychiatric Disease and Treatment*, 875. https://doi.org/10.2147/NDT.S73261

Lehtimaki, S., Martic, J., Wahl, B., Foster, K. T., & Schwalbe, N. (2021). Evidence on digital mental health interventions for adolescents and young people: Systematic overview. *JMIR Ment Health 2021;8(4):E25847 Https://Mental.Jmir.Org/2021/4/E25847*, *8*(4), e25847. https://doi.org/10.2196/25847

Lima-Serrano, M., & Lima-Rodríguez, J. S. (2014). Impact of school-based health promotion interventions aimed at different behavioral domains: A systematic review. *Gaceta Sanitaria*, *28*(5), 411–417. https://doi.org/10.1016/j.gaceta.2014.05.003

Listernick, Z. I., & Badawy, S. M. (2021). Mental Health Implications of the COVID-19 Pandemic Among Children and Adolescents: What Do We Know so Far? *Pediatric Health, Medicine and Therapeutics*, *Volume 12*, 543–549. https://doi.org/10.2147/PHMT.S315887

Liverpool, S., Mota, C. P., Sales, C. M. D., Cus, A., Carletto, S., Hancheva, C., Sousa, S., Cerón, S. C., Moreno-Peral, P., Pietrabissa, G., Moltrecht, B., Ulberg, R., Ferreira, N., & Edbrooke-Childs, J. (2020). Engaging children and young people in digital mental health interventions:

Systematic review of modes of delivery, facilitators, and barriers. *Journal of Medical Internet Research*, *22*(6). https://doi.org/10.2196/16317

Lluch, M. (2011). Healthcare professionals' organisational barriers to health information technologies-a literature review. *International Journal of Medical Informatics*, *80*(12), 849–862. https://doi.org/10.1016/j.ijmedinf.2011.09.005

López-López, J. A., Kwong, A. S. F., Washbrook, E., Pearson, R. M., Tilling, K., Fazel, M. S., Kidger, J., & Hammerton, G. (2020). Trajectories of depressive symptoms and adult educational and employment outcomes. *BJPsych Open*, *6*(1), 1–8. https://doi.org/10.1192/bjo.2019.90

Lu, Y.-C., Xiao, Y., Sears, A., & Jacko, J. A. (2005). A review and a framework of handheld computer adoption in healthcare. *International Journal of Medical Informatics*, *74*(5), 409–422. https://doi.org/10.1016/j.ijmedinf.2005.03.001

Ludwick, D. A., & Doucette, J. (2009). Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries. *International Journal of Medical Informatics*, *78*(1), 22–31. https://doi.org/10.1016/j.ijmedinf.2008.06.005

Mair, F. S., May, C., O'Donnell, C., Finch, T., Sullivand, F., & Murray, E. (2012). Factores que promueven o dificultan la implementación de los sistemas de telemedicina: Revisión sistemática explicativa. *Bulletin of the World Health Organization*, *90*(5), 357–364. https://doi.org/10.2471/BLT.11.099424

Manderscheid, R. W., Ryff, C. D., Freeman, E. J., McKnight-Eily, L. R., Dhingra, S., & Strine, T. W. (2010). Evolving Definitions of Mental Illness and Wellness. *Preventing Chronic Disease*.

Matias, A. G. C., Fonsêca, M. de A., Gomes, M. de L. de F., & Matos, M. A. A. (2016). Indicators of depression in elderly and different screening methods. *Einstein (São Paulo)*, *14*(1), 6–11. https://doi.org/10.1590/S1679-45082016AO3447

Mccarthy, B. C. (2020). *Anxiety in Teens is Rising : What ' s Going On ? What ' s causing the rise in teenagers with severe anxiety ? How did we get here ? 3*, 1–4.

McCloud, T., Jones, R., Lewis, G., Bell, V., & Tsakanikos, E. (2020). Effectiveness of a Mobile App Intervention for Anxiety and Depression Symptoms in University Students: Randomized Controlled Trial. *JMIR MHealth and UHealth*, *8*(7), e15418. https://doi.org/10.2196/15418

McDonald, A. (2022). Art therapy for children following adverse childhood experiences: An

intervention development study. *The Arts in Psychotherapy*, *77*, 101880. https://doi.org/10.1016/j.aip.2022.101880

McGinn, C. A., Grenier, S., Duplantie, J., Shaw, N., Sicotte, C., Mathieu, L., Leduc, Y., Légaré, F., & Gagnon, M.-P. (2011). Comparison of user groups' perspectives of barriers and facilitators to implementing electronic health records: a systematic review. *BMC Medicine*, *9*(1), 46. https://doi.org/10.1186/1741-7015-9-46

McIntyre, R. S., Lee, Y., Rong, C., Rosenblat, J. D., Brietzke, E., Pan, Z., Park, C., Subramaniapillai, M., Ragguett, R. M., Mansur, R. B., Lui, L. M. W., Nasri, F., Gill, H., & Berriah, S. (2021). Ecological momentary assessment of depressive symptoms using the mind.me application: Convergence with the patient health Questionnaire-9 (PHQ-9). *Journal of Psychiatric Research*, *135*, 311–317. https://doi.org/10.1016/j.jpsychires.2021.01.012

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, *15*(4), 351–377. https://doi.org/10.1177/109019818801500401

Merikangas, K. R., Nakamura, E. F., & Kessler, R. C. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience*, *11*(1), 7–20. https://doi.org/10.31887/DCNS.2009.11.1/krmerikangas

Moltrecht, B., Patalay, P., Deighton, J., & Edbrooke-Childs, J. (2021). A school-based mobile app intervention for enhancing emotion regulation in children: Exploratory trial. *JMIR Mhealth Uhealth 2021;9(7):E21837 Https://Mhealth.Jmir.Org/2021/7/E21837*, *9*(7), e21837. https://doi.org/10.2196/21837

Moxey, A., Robertson, J., Newby, D., Hains, I., Williamson, M., & Pearson, S.-A. (2010). Computerized clinical decision support for prescribing: provision does not guarantee uptake. *Journal of the American Medical Informatics Association : JAMIA*, *17*(1), 25–33. https://doi.org/10.1197/jamia.M3170

Najman, J. M., Clavarino, A. M., McGee, T. R., Middeldorp, C. M., Williams, G. M., & Scott, J. G. (2022). Do adversities experienced over the early life course predict mental illness and substance use behaviour in adulthood: A birth cohort study. *Journal of Psychiatric Research*, *155*(September), 542–549. https://doi.org/10.1016/j.jpsychires.2022.09.020

National Youth Council of Ireland. (2013). *A practice manual promoting health in the youth sector*. www.youth.ie

O'Dea, B., King, C., Subotic-Kerry, M., Anderson, M., Achilles, M. R., Parker, B., Mackinnon,

A., Anderson, J., Cockayne, N., & Christensen, H. (2019). Evaluating a web-based mental health service for secondary school students in Australia: Protocol for a cluster randomized controlled trial. *JMIR Res Protoc*, *8*(5), e12892. https://doi.org/10.2196/12892

Office of Communications. (2020). Children and parents: Media use and attitudes report 2019. *Ofcom*, *February 2020*, 220. https://www.ofcom.org.uk/research-and-data/media-literacy-research/childrens/children-and-parents-media-use-and-attitudes-report-2019

Oluoch, T., Santas, X., Kwaro, D., Were, M., Biondich, P., Bailey, C., Abu-Hanna, A., & de Keizer, N. (2012). The effect of electronic medical record-based clinical decision support on HIV care in resource-constrained settings: a systematic review. *International Journal of Medical Informatics*, *81*(10), e83-92. https://doi.org/10.1016/j.ijmedinf.2012.07.010

Ozer, E. J., & Schotland, M. (2011). Psychological empowerment among urban youth. *Health Education & Behavior*, *38*(4), 348–356. https://doi.org/10.1177/1090198110373734

Patrick, S. W., Henkhaus, L. E., Zickafoose, J. S., Lovell, K., Halvorson, A., Loch, S., Letterie, M., & Davis, M. M. (2020). Well-being of Parents and children during the COVID-19 pandemic: A national survey. *Pediatrics*, *146*(4), e2020016824. https://doi.org/10.1542/PEDS.2020-016824

Pennant, M. E., Loucas, C. E., Whittington, C., Creswell, C., Fonagy, P., Fuggle, P., Kelvin, R., Naqvi, S., Stockton, S., & Kendall, T. (2015). Computerised therapies for anxiety and depression in children and young people: A systematic review and meta-analysis. *Behaviour Research and Therapy*, *67*, 1–18. https://doi.org/https://doi.org/10.1016/j.brat.2015.01.009

Penninx, B. W., Milaneschi, Y., Lamers, F., & Vogelzangs, N. (2013). Understanding the somatic consequences of depression: biological mechanisms and the role of depression symptom profile. *BMC Medicine*, *11*(1), 129. https://doi.org/10.1186/1741-7015-11-129

Peyton, D., Hiscock, H., & Sciberras, E. (2019). *Do digital health interventions improve mental health literacy or help-seeking among parents of children aged 2-12 years? A scoping review*. https://doi.org/10.3233/SHTI190788

Piao, M. Y., Jeong, E. J., & Kim, J. A. (2022). Mental health of parents and their children: A longitudinal study of the effects of parents' negative affect on adolescents' pathological gaming. *Healthcare*, *10*(11), 2233. https://doi.org/10.3390/healthcare10112233

Police, R. L., Foster, T., & Wong, K. S. (2010). Adoption and use of health information technology in physician practice organisations: systematic review. *Informatics in Primary Care*, *18*(4), 245–258. https://doi.org/10.14236/jhi.v18i4.780

Raven, D., Jörg, F., Visser, E., Oldehinkel, A. J., & Schoevers, R. A. (2017). Time-to-treatment

of mental disorders in a community sample of dutch adolescents. A TRAILS study. *Epidemiology and Psychiatric Sciences*, *26*(2), 177–188. https://doi.org/10.1017/S2045796016000226

Reardon, T., Harvey, K., & Creswell, C. (2020). Seeking and accessing professional support for child anxiety in a community sample. *European Child & Adolescent Psychiatry*, *29*(5), 649–664. https://doi.org/10.1007/s00787-019-01388-4

Ross, J., Stevenson, F., Lau, R., & Murray, E. (2016). Factors that influence the implementation of e-health: A systematic review of systematic reviews (an update). *Implementation Science*, *11*(1), 1–12. https://doi.org/10.1186/s13012-016-0510-7

Sakellari, E., Notara, V., Lagiou, A., Fatkulina, N., Ivanova, S., Korhonen, J., Kregar Velikonja, N., Lalova, V., Laaksonen, C., Petrova, G., & Lahti, M. (2021). Mental health and wellbeing at schools: Health promotion in primary schools with the use of digital methods. *Children*, *8*(5), 345. https://doi.org/10.3390/children8050345

Saliba, V., Legido-Quigley, H., Hallik, R., Aaviksoo, A., Car, J., & McKee, M. (2012). Telemedicine across borders: a systematic review of factors that hinder or support implementation. *International Journal of Medical Informatics*, *81*(12), 793–809. https://doi.org/10.1016/j.ijmedinf.2012.08.003

Sander, A., & Lobo, M. (2015). *O uso das TICs como ferramenta de ensino-aprendizagem no ensino superior*. *44*. https://doi.org/10.5752/p.2318-2962.2015v25n.44p.16

Schleider, J. L., Mullarkey, M. C., Fox, K. R., Dobias, M. L., Shroff, A., Hart, E. A., & Roulston, C. A. (2022). A randomized trial of online single-session interventions for adolescent depression during COVID-19. *Nature Human Behaviour*, *6*(2), 258–268. https://doi.org/10.1038/s41562-021-01235-0

Schoen-Ferreira, T. H., Aznar-Farias, M., & Silvares, E. F. de M. (2003). A construção da identidade em adolescentes: Um estudo exploratório. *Estudos de Psicologia (Natal)*, *8*(1), 107–115. https://doi.org/10.1590/S1413-294X2003000100012

Shafran, R., Clark, D. M., Fairburn, C. G., Arntz, A., Barlow, D. H., Ehlers, A., Freeston, M., Garety, P. A., Hollon, S. D., Ost, L. G., Salkovskis, P. M., Williams, J. M. G., & Wilson, G. T. (2009). Mind the gap: Improving the dissemination of CBT. *Behaviour Research and Therapy*, *47*(11), 902–909. https://doi.org/https://doi.org/10.1016/j.brat.2009.07.003

Shah, J., Das, P., Muthiah, N., & Milanaik, R. (2019). New age technology and social media: Adolescent psychosocial implications and the need for protective measures. *Current Opinion in Pediatrics*, *31*(1), 148–156. https://doi.org/10.1097/MOP.0000000000000714

Sharma, G., Schlosser, L., Jones, B. D. M., Blumberger, D. M., Gratzer, D., Husain, M. O., Mulsant, B. H., Rappaport, L., Stergiopoulos, V., & Ishrat Husain, M. (2022). Brief app-based cognitive behavioral therapy for anxiety symptoms in psychiatric inpatients: Feasibility randomized controlled trial. *JMIR Formative Research*, *6*(11). https://doi.org/10.2196/38460

Shekelle, P. G., Morton, S. C., & Keeler, E. B. (2006). Costs and benefits of health information technology. *Evidence Report/Technology Assessment*, *132*, 1–71. https://doi.org/10.23970/ahrqepcerta132

Shorey, S., Ng, E. D., & Wong, C. H. J. (2022). Global prevalence of depression and elevated depressive symptoms among adolescents: A systematic review and meta-analysis. *British Journal of Clinical Psychology*, *61*(2), 287–305. https://doi.org/10.1111/BJC.12333

Shroff, A., Roulston, C., Fassler, J., Dierschke, N. A., Todd, J. S. P., Ríos-Herrera, Á., Plastino, K. A., & Schleider, J. L. (2023). A digital single-session intervention platform for youth mental health: Cultural adaptation, evaluation, and dissemination. *JMIR Mental Health*, *10*, e43062. https://doi.org/10.2196/43062

Silva, M. M. da, & Barros, L. da S. (2021). A contribuição da escola para a promoção da saúde mental de adolescentes no combate à depressão e ao suicídio. *Brazilian Journal of Development*, *7*(3), 21078–21095. https://doi.org/10.34117/bjdv7n3-017

Souza, K., & Ximenes Carneiro da Cunha, M. (2019). Impactos do uso das redes sociais virtuais na saúde mental dos adolescentes: uma revisão sistemática da literatura. *Revista Educação, Psicologia e Interfaces*, *3*(3), 204–2017. https://doi.org/10.37444/issn-2594-5343.v3i3.156

Stolee, P., Steeves, B., Glenny, C., & Filsinger, S. (2010). The use of electronic health information systems in home care: facilitators and barriers. *Home Healthcare Nurse*, *28*(3), 161–167. https://doi.org/10.1097/01.NHH.0000369769.32246.92

Studer, M. (2005). The effect of organizational factors on the effectiveness of EMR system implementation--what have we learned? *Healthcare Quarterly (Toronto, Ont.)*, *8*(4), 92–98.

Sung, J. Y., Mumper, E., & Schleider, J. L. (2021). Empowering anxious parents to manage child avoidance behaviors: Randomized control trial of a single-session intervention for parental accommodation. *JMIR Ment Health 2021;8(7):E29538 Https://Mental.Jmir.Org/2021/7/E29538*, *8*(7), e29538. https://doi.org/10.2196/29538

Tomé, G. M. Q., & Matos, M. G. de. (2012). *Aventura social: Promoção de competências e do capital social para um empreendedorismo com saúde na escola e na comunidade*. Placebo Editora. https://novaresearch.unl.pt/en/publications/aventura-social-promoção-de-

competências-e-do-capital-social-para

Treasure, J., Willmott, D., Ambwani, S., Cardi, V., Clark Bryan, D., Rowlands, K., & Schmidt, U. (2020). Cognitive interpersonal model for anorexia nervosa revisited: The perpetuating factors that contribute to the development of the severe and enduring illness. *Journal of Clinical Medicine*, *9*(3). https://doi.org/10.3390/jcm9030630

Vizard, T., Sadler, K., Ford, T., Newlove-Delgado, T., McManus, S., Marcheselli, F., Davis, J., Williams, T., Leach, C., Mandalia, D., & Cartwright, C. (2020). *Mental health of children and young people in England*. *July*, 1–50. https://files.digital.nhs.uk/AF/AECD6B/mhcyp_2020_rep_v2.pdf%0Ahttps://files.digital.nhs.uk/CB/C41981/mhcyp_2020_rep.pdf

Vo, M., Lau, J., & Rubinstein, M. (2016). Eating disorders in adolescent and young adult males: Presenting characteristics. *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*, *59*(4), 397–400. https://doi.org/10.1016/j.jadohealth.2016.04.005

Vreeman, D. J., Taggard, S. L., Rhine, M. D., & Worrell, T. W. (2006). Evidence for electronic health record systems in physical therapy. *Physical Therapy*, *86*(3), 434–439.

Weist, M. D., & Murray, M. (2008). Advancing school mental health promotion globally. *Advances in School Mental Health Promotion*, *1*(sup1), 2–12. https://doi.org/10.1080/1754730X.2008.9715740

World Health Organization. (2004). *Promoting Mental Health: Concepts, Emerging Evidence, Practice: Summary Report. Geneva, World Health Organization*. http://www.who.int/mental_health/evidence/en/promoting_mhh.pdf

World Health Organization. (2013). *Mental health action plan 2013-2020*. who.int/iris/bitstream/10665/89966/1/9789241506021_eng.pdf

World Health Organization. (2016). *WHO| Child and Adolescent Mental Health*. http://www.who.int/mental_health/maternal-child/child_adolescent/en/.

World Health Organization. (2017). *Depression and other common mental disorders: global health estimates.*

World Health Organization. (2021). *Mental health of adolescents*. https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health

Wozney, L., McGrath, P. J., Gehring, N. D., Bennett, K., Huguet, A., Hartling, L., Dyson, M. P., Soleimani, A., & Newton, A. S. (2018). EMental healthcare technologies for anxiety and

depression in childhood and adolescence: Systematic review of studies reporting implementation outcomes. *JMIR Mental Health*, *5*(2). https://doi.org/10.2196/mental.9655