

# Mobile application technology integration to manage anxiety in children and adolescents

Integração da tecnologia de aplicativos móveis para gerenciamento da ansiedade em crianças e adolescentes

Integración de tecnología de aplicación móvil para el gestión de la ansiedad en niños y adolescentes

## RESUMO

Os aplicativos de saúde móvel (mHealth) disponíveis para o autogerenciamento de sintomas ou transtornos mentais, possuem finalidades específicas para dar suporte ao tratamento e engajamento dos usuários nas atividades propostas. Objetivo: analisar as contribuições dos aplicativos móveis no auxílio de crianças e adolescentes a compreenderem e gerenciarem sua condição de ansiedade. Método: as buscas foram realizadas nas bases de dados Pubmed, SciELO e Science Direct usando os descritores aplicativos móveis, ansiedade, adolescentes e crianças, sendo encontrados 176 artigos entre os anos de 2015 a 2021. Resultados: através dos critérios de inclusão e exclusão, a amostra total envolvendo o tema proposto foi de cinco artigos. Conclusão: evidencia-se que os aplicativos podem reduzir as barreiras para a busca de ajuda presencial, como o estigma ou o desconforto de discutir a própria saúde mental, promovendo a consistência entre as habilidades desenvolvidas em uma sessão de tratamento e aquelas praticadas em situações do cotidiano.

**DESCRIPTORES:** Aplicativos Móveis; Ansiedade; Adolescentes; Crianças.

## ABSTRACT

Mobile health applications (mHealth) are available for resource applications or automatic management devices, specific purposes to give treatment and user engagement in proposed activities. Objective: to analyze how to contribute to the application of movements to help children and adolescents to understand and manage their anxiety condition. Method: as presented in the Pubmed, SciELO and Science Direct databases using the mobile apps, anxiety, adolescents and found, 176 articles were found between the years 2015 to 2021. Results: through the inclusion and exclusion criteria, the sample total found the proposed theme faith of five articles. Conclusion: there is evidence of reduction as barriers to the search for treatment applications, such as stigma or the discomfort of mental help itself, promoting consistency between the practices learned in a treatment session and in everyday treatment situations.

**DESCRIPTORS:** Anxiety; Teenagers; Children; Mobile apps.

## RESUMEN

Las aplicaciones móviles de salud (mHealth) están disponibles para aplicaciones de recursos o dispositivos de gestión automática, propósitos específicos para dar tratamiento y participación del usuario en las actividades propuestas. Objetivo: analizar cómo contribuir con la aplicación de los movimientos para ayudar a los niños y adolescentes a comprender y manejar su condición de ansiedad. Método: según lo presentado en las bases de datos Pubmed, SciELO y Science Direct utilizando las aplicaciones móviles, ansiedad, adolescentes y encontró, se encontraron 176 artículos entre los años 2015 a 2021. Resultados: a través de los criterios de inclusión y exclusión, el total de la muestra encontró lo propuesto tema fue de cinco artículos. Conclusión: hay evidencias de reducción como barreras a la búsqueda de aplicaciones de tratamiento, como el estigma o el malestar de la propia ayuda mental, promoviendo la concordancia entre las prácticas aprendidas en una sesión de tratamiento y en situaciones cotidianas de tratamiento.

**DESCRIPTORES:** Ansiedad; Adolescencia, Niños; Aplicaciones móviles.

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## INTRODUÇÃO

**M**ental health is closely intertwined with physical health, and physical and psychological illness result from the interaction of several biological, psychological and social factors.<sup>1</sup> Anxiety-related issues are among the most common psychiatric disorders in childhood, with prevalence rates of up to 25% and are associated with substantial impairment in the individual's normal functioning, are highly comorbid with other psychiatric disorders and can often persist into adulthood.<sup>2,3</sup>

Issues related to anxiety and depression can be substantially increased in children and adolescents.<sup>4</sup> Data suggest that up to 20% of children and youth up to 18 years of age have a diagnosable mental health problem that causes distress and negatively impacts social relationships, schooling, oc-

cupational performance, and physical health. Although evidence-based interventions are available, treatment services are limited and many of these individuals cannot or do not have access to adequate help.<sup>5</sup>

Information and Communication Technologies (ICTs) have been incorporated into all fields of human activity, mainly through the widespread use of mobile devices and portable devices, with high-speed wireless internet access.<sup>6</sup> For these devices, some apps are being offered for all industries, whether for entertainment use, supporting everyday tasks, as well as including healthcare.<sup>7</sup>

The applications have been developed for the population with mental health problems, with specific actions and purposes, for example, to reduce errors in therapeutic prescriptions, encourage healthy behaviors, allow telemonitoring of users, as well as manage situations related to the behavior

of individuals in their daily lives.<sup>8</sup>

The advantages of mHealth include constant availability, greater access, equity of mental health resources, prompt support, anonymity, personalized content, lower cost, and increased service capacity and efficiency.<sup>9</sup> They can reduce the distance to seek help face-to-face, such as the stigma or discomfort of discussing one's mental health, as well as facilitate the involvement of young people who do not normally seek help in traditional ways.<sup>5</sup>

Intervention for the treatment and reduction of anxiety symptoms is a topic of great relevance for human development, as it generates important losses in the lives of individuals. Thus, the objective was to analyze the contributions of mobile applications in helping children and adolescents to understand and manage their level of anxiety.

## METHODS

The method adopted in the study was the integrative literature review, which allows the comparison of data on the subject, that is, it consists of the synthesis of data to gather information about the research opinion, allowing a set of summaries of the investigated theme. It directs to a source of current knowledge about a problem to, thus, allow advances in the health sector.<sup>10</sup>

The study carried out aimed to obtain an answer to the following question: what is the correlation of the benefits of using mobile applications for the management of anxiety in children and adolescents?

The guidelines used were according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which ensure that the systematic review with or without meta-analysis is formed

through a clinical questioning, under a structured and reproducible methodology by pairs.<sup>11</sup>

Then, a search was performed from the Pubmed databases - National Library of Medicine of the National Institutes of Health, Scientific Electronic Library Online (SciELO) and Science Direct. The elaborate search string was defined: (adolescents OR children) AND "anxiety disorders" AND self-management AND ("mobile health" OR app).

As an inclusion criterion, a time frame was carried out between the years 2015 and 2021, in Portuguese or English languages that included the theme in the title and/or abstract, involving the use of mobile applications and the management of anxiety in children and adolescents. As exclusion criteria, there were articles from literature reviews, dissertations, theses, duplicate articles among the electronic databases that

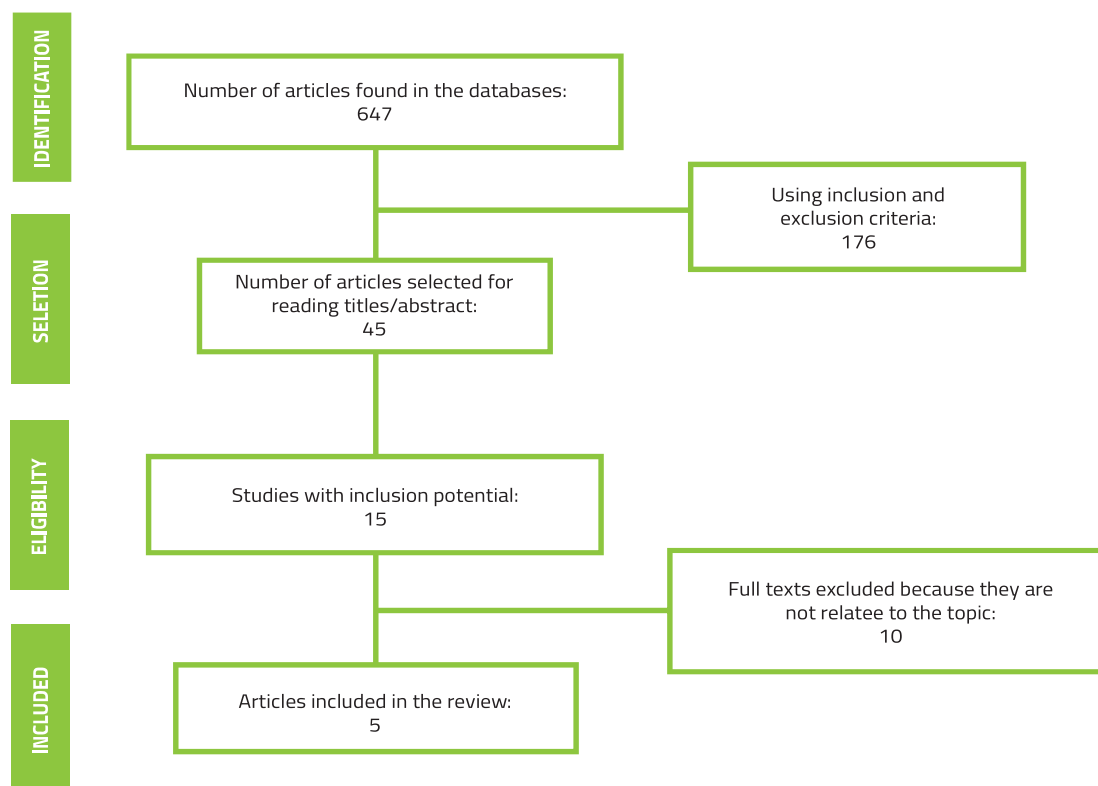
talked about mental disorders other than anxiety, case reports and articles that did not address the guiding question.

Data were analyzed based on the relationship with the object of study. The analysis process involved translating and reading the articles, and filling in a table with all the article data, categorized and synthesized according to article title, authors, purpose of the application and conclusions.

## RESULTS

Initially, crossing the descriptors, 647 works were found. After searching for terms in the databases using inclusion and exclusion criteria, 176 articles were found. Titles and abstracts were identified and read to assess their suitability for eligibility criteria. After a meticulous reading of the 45 articles, only 15 articles were selected due to similarity with the objective and 5

Figure 01- Flowchart of the studies selected for the integrative review



Source: author (2022)

articles responded to the objectives of the review. The flowchart in Figure 1 describes the steps performed in the search process.

We analyzed 5 articles that met the inclusion criteria that are presented in table 1 below.

**DISCUSSION**

Characterization of childhood anxiety and harm to children and adolescents  
 The manifestations of anxiety disorders

in children and adolescents have three dimensions: behavioral, physiological and cognitive. The first is the most notorious, and consists of escape and avoidance behaviors, including crying, shaky voice and hands, nail biting, and even running. The

Table 1. Synthesis of bibliographic research included in the integrative review according to authors, publication title, objective and conclusions.

AUTHOR / TITLE	OBJECTIVES	CONCLUSION
Silk et al(2) Using a Smartphone App and Clinician Portal to Enhance Brief Cognitive Behavioral Therapy for Childhood Anxiety Disorders	Evaluate an application in an open trial to establish the usability, feasibility, acceptability, and preliminary effectiveness of combined brief CBT.	The app may increase the usefulness of brief CBT for childhood anxiety disorders; Reduction in symptom severity over time and also improvement from pre- to post-treatment in app-driven CBT skills; Improved identification of emotions and thinking challenges and reductions in avoidance.
Whiteside et al(12) An online- and Mobile-Based Application to Facilitate Exposure for Childhood Anxiety Disorders	To describe an integrated online and mobile application for the treatment of childhood anxiety disorders, using data from an implementation feasibility pilot to illustrate its potential.	Use of the app and the associated treatment approach was viewed positively by patients and parents. Future studies are indicated for access to evidence-based treatment.
Christie et al(13) Gamifying CBT to deliver emotional health treatment to young people on smartphones	Develop a gamified CBT intervention.	A number of positive impacts such as increased concentration, facilitation of learning and positive behavior change have been associated with the game.
Stoll et al(14) Usability of a Smartphone Application to Support the Prevention and Early Intervention of Anxiety in Youth. Cognitive and Behavioral Practice	To carry out an initial evaluation of a smartphone application in young people of prevention and early intervention aimed at anxiety.	The application was found to be relatively easy to use and to learn; the messages deployed by the technology were rated as helpful and clear.
Newton et al(15) A Mobile Phone-Based App for Use During Cognitive Behavioral Therapy for Adolescents With Anxiety (MindClimb): User-Centered Design and Usability Study	Develop and test an app for teens with anxiety to use between CBT sessions to plan and complete exposure activities using skills learned in treatment.	The approach resulted in a relevant mHealth application, accepted and used by adolescents during therapy for anxiety, being easy to handle and of great help in the therapeutic process.

Source: author (2022)

physiological aspects, on the other hand, reproduce the activity of the ANS (Autonomous Nervous System) and are composed of nausea, vomiting, palpitation, sweating, feeling of suffocation or drowning, waves of cold or heat, among others. While the third dimension, the cognitive one, includes anxious thoughts, such as worries about what will happen and about the judgment of others.<sup>16</sup>

Childhood anxiety disorders are a huge public health problem. In the United States alone, estimates indicate that anxiety is the most prevalent class of mental disorders and is among the first to become established, with the average age occurring at six years. In fact, nearly one in ten preschoolers suffer from an anxiety disorder before age 5, and nearly a third of teens experience the onset of an anxiety disorder before age 18.<sup>17</sup>

The disorders can begin in childhood and can progress to chronic conditions that negatively affect an individual's relationships, development, and daily functioning. These disorders are associated with functional impairment, increased risk of depression and suicide, and long-term substance abuse issues. As a result, internalizing disorders carry the potential for high social burdens.<sup>18</sup>

Daily interference and impairment in those who experience anxiety are high, and the nature of anxiety symptoms is linked to deficits in several domains of functioning, such as school absenteeism, poorer social skills, sleep problems, lower levels of peer acceptance, high substance use and greater victimization among colleagues.<sup>17</sup>

During the youth development phase, associated with poor mental health, it ends up seriously affecting the chances of future life, mainly with a significant long-term impact on education, socialization and career management. As a consequence, there is a call for rapid and practical improvement in the primary prevention of mental health problems and the promotion of well-being.<sup>19</sup>

CBT and the use of mobile applications in the mental health of children and ado-

lescents

Cognitive behavioral therapy (CBT) has received the most support in clinical trials and is considered the "gold standard" of psychosocial intervention for anxiety disorders in children and adolescents.<sup>17</sup> Other important CBT ingredients for childhood anxiety include: psychoeducation, self-monitoring (where the child or parents observe and keep records of their anxiety patterns, behaviors and thoughts); contingency management (the child is rewarded and reinforced for courageous behavior); problem solving (child learns to identify problems, select and evaluate solutions) and challenging thinking/cognitive restructuring (ie child learns to identify and modify anxious "inner dialogue") although relaxation training was once considered an important element of anxiety treatment.<sup>20</sup>

According to Davidson et al<sup>21</sup>, mobile apps may have the potential to effectively support already evidence-based treatments, as in the case of CBT. They can allow for the opportunity for personalized learning, through learning methods (therapist-guided) and procedures (in-session content, put into practice at home). In addition, they can help deliver difficult-to-conduct treatment components for therapists. Touch screen learning, interactive games and video demonstrations are examples of activities that can improve children's ability to engage in the treatment process.<sup>18</sup>

As children and teens are constantly in the process of communicating today, they may find this mode of engagement with therapy content more appealing than traditional pencil-and-paper approaches.<sup>2</sup> An app can provide a framework for practicing socioemotional skills, promote consistency between skills developed in a treatment session and those practiced in everyday situations, as well as calendar reminders that help adolescents to put into practice what they have learned and to engage in activities that encourage self-care.<sup>15</sup>

According to Stoll et al<sup>14</sup>, scaling up the dosage of anxiety prevention intervention components could be achieved through mHealth tools because these can offer: (a) on-demand access to review strategies, (b)

notifications designed to promote practice, (c) gamification to increase engagement and appropriate use of strategies to manage anticipated anxiety-provoking situations, (d) customized and tailored intervention regimens, and (e) data-based corrective feedback.

According to Newton et al.,<sup>15</sup> In a clinical practice setting, using the app in a format that is accepted and used by adolescents has increased access to evidence-based CBT skills outside of formal therapy sessions. That is, the app helps encourage teens to use these skills more often.

In terms of acceptability, the apps in general are particularly suitable and familiar for teenagers as they are regular users of technology.<sup>18</sup> While adolescents may have positive attitudes towards mHealth, this does not necessarily mean that they would prefer it to face-to-face intervention. It is worth mentioning the trust and affinity that people have for their cell phones, the expectations placed on them positively influence clinical results and user satisfaction. Information on long-term usage is scarce, but making mHealth apps more engaging is a strategy to increase long-term engagement.<sup>5</sup>

## CONCLUSION

Given the high prevalence, early onset, stability and impairment associated with childhood anxiety disorders, and considering that children, adolescents and families today are more digitally connected than any previous generation, the self-management of anxiety symptoms through mobile platforms may represent an opportunity in association with the treatment already established.

The use of mobile technology can integrate clinical care and provide therapists with access to real-time, contextualized data on how patients experience and deal with anxiety, it can improve the dissemination of evidence-based approaches in community settings such as schools and primary care practices.

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