

ANALYSIS OF MOBILE APPLICATIONS IN USE IN BRAZIL FOR TREATMENT OF MENTAL DISORDERS

ANÁLISE DE APLICATIVOS MÓVEIS EM USO NO BRASIL PARA TRATAMENTOS DE TRANSTORNO MENTAL

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ABSTRACT

This research sought to evaluate the available applications with free mental health content available in the two largest online stores in Brazil. This is an evaluative and descriptive study, which analyzed applications in the Apple Store® and Play Store® virtual stores. The results initially identified were 150 applications and, after applying the exclusion criteria, the sample was consolidated into 23 applications. It was concluded that the vast majority of programs analyzed were in non-compliance with Brazilian legislation, did not have a theoretical framework and were not fully aligned with the scientific content of mental health.

Keywords: Health education; Health technology; Mental health.

RESUMO

Esta pesquisa buscou avaliar os aplicativos disponíveis com conteúdo de saúde mental gratuito disponíveis nas duas maiores lojas virtuais no Brasil. Trata-se de um estudo avaliativo e descritivo, que analisou os aplicativos nas lojas virtuais Apple Store® e Play Store®. Os resultados identificados inicialmente foram 150 aplicativos e, após aplicar os critérios de exclusão, a amostra consolidou-se em 23 aplicativos. Concluiu-se que a grande maioria dos programas analisados estava em desconformidade com a legislação brasileira, não dispunha de referencial teórico e não estava totalmente alinhada ao conteúdo científico de saúde mental.

Palavras-chave: Educação em saúde; Saúde mental; Tecnologia em saúde.

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INTRODUCTION

The use of electronic devices related to people's health has been a reality for several decades, such as in the field of imaging diagnostics. In fact, many science fiction fantasies from the past are now everyday banalities: it is possible to consider that a significant number of humans are technically cyborgs, such as those who use pacemakers, implants, prosthetics or corneal lenses (Gavério, Lourenção, 2020). In fact, interactions between biological structures and cybernetic interfaces are rapidly deepening, as human connections (for consumption, entertainment, social relationships, health control and regulation, etc.) are increasingly mediated by technological devices (Haraway, Kunzru, Tadeu, 2020; Pinto, Canuto, Canuto, 2024).

In this scenario, with the advent of 4G and 5G networks, which promoted significant improvements in mobile internet, making it increasingly reliable, the process of technological intensification also reached the health field, thus configuring itself into a multi-million dollar market with a growing number of users around the world (Godoy, 2024).

It is within this context that this article aims to evaluate the free mobile applications with mental health content available in the two largest online stores in Brazil. In addition to this introduction, the article has a section dedicated to methodological procedures, another with results and discussion, which contains a descriptive and comparative table of the applications analyzed, with subsequent analysis, highlighting the implications, advantages, disadvantages and limitations of the applications. And, at the end, considerations by way of conclusion.

METHODOLOGY

This study was designed according to a cross-sectional and descriptive methodological procedure, that is, a type of observational study that uses analysis and evaluation through observation, without the direct interaction of the researcher with a specific sample population.

If, on the one hand, an operational methodological limitation is established by not allowing causality to be established between the variables analyzed, on the other hand, it offers as its main advantage a potential methodological precision to signal gaps found in relation to the effectiveness of applications for the well-being of users.

To carry out the research, mobile devices compatible with the Android and iOS operating systems were used, on which applications available in the search engines of the online stores Play Store® (compatible with the Android operating system) and Apple Store® (compatible with the iOS operating system) were installed, using the keyword "mental health" to identify such applications which, once installed on the devices, were analyzed according to the research parameters indicated in Table 1.

Data collection and navigation in the applications were updated between January and July 2024, by three researchers separately. In an initial survey, 151 application records were collected. After filtering according to the inclusion and exclusion criteria, 23 applications remained, which were analyzed based on the recommendations of the National Health Surveillance Agency (Brazil, 2020).

The inclusion criteria were as follows: (i) being available in Portuguese, (ii) having free access and (iii) addressing the topic of mental health. And the exclusion criteria were: (i) difficulty in downloading the application or opening the application and, following general regulations governing the development and commercialization of health technology (Brazil, 2020), (ii) the provision of information only in audio or video.

The applications were evaluated descriptively, considering visual appearance and colors, type of language, content in relation to the target audience, indicated therapies, description of the main resources, presence of references to the theoretical content used, attractiveness and aspects related to the application creator: copyright and contact.

RESULTS AND DISCUSSION

The use of mobile technologies in the health area has been encouraged by the World Health Organization (WHO) as a tool for achieving health care objectives, considering that technological devices have the potential to bring about transformations in the form of self-care, in addition to being low cost and easy to access, especially in mental health care (Kannarkat *et al.*, 2020). Thus, the term *mHealth* was created to characterize mobile health, with the aim of helping to improve the quality of life of people living with chronic health problems, such as mental disorders. This field of mobile devices includes applications, websites, text messages, and disease intervention support (Lecomte *et al.*, 2020).

The use of smartphones for monitoring, personal digital assistants with voice, video, text and real-time geolocation tracking are some of the applications of *mHealth*. Smartphone applications have important functional characteristics such as global mobility, connectivity, 24-hour availability, ubiquity and a wide range of functionalities such as virtual and/or augmented reality, telemedicine, robotics, games, sensor-connected interfaces and social networks (WHO, 2017).

The availability of a large number of mobile health applications is a testament to their popularity, as many mobile phones now have the ability to combine health data collection, making inferences about mental health, with active user interaction (Ferrara, 2019). Smartphone technology has become increasingly prevalent for over a decade, offering a promising means of delivering healthcare to the general population. They encompass a range of digital technologies that can provide health interventions with great potential to reduce preventable deaths (Milne-Ives, 2020).

This technology has the potential to facilitate both adherence to treatment and communication between healthcare professionals and patients. However, there is a gap in the accuracy of the quality of the applications used in the Brazilian context, which can generate insecurity for both professionals and patients, as it can expose users to various risks due to the dissemination of incorrect information (Gonçales, Machado, 2013).

In the Brazilian context, although there is still no specific regulation for the mental health application technology market, resolutions 56/2001 (Brazil, 2001) and 423/2020 (Brazil, 2020) define some general standards for the marketing of technology-based medical and health products. Among the general specifications, they establish that the manufacturer must provide the consumer with the minimum requirements that prove the efficacy and safety of the health product, the compilation of the scientific bibliography of indexed publications that reference technical terms and that are designed not to compromise the clinical status and safety of the population.

As part of this research, a total of 150 applications were checked in the *Play Store*® and *Apple Store*® online stores. Of this total, 89 were found in the *Play Store*®, of which 83 were excluded. And in the *Apple Store*®, 61 were identified, of which 43 were excluded. Below in Table 1, there is a list of the selected applications.

Table 1 -Characteristics of applications listed in the *Play Store* ® and *Apple Store* ® virtual stores according to the characteristics of country of origin, target audience, main subject, date of last update, language, attractiveness, copyright, existence of sponsorship, actor contact and references present.

External layout			Internal Content					Author's input
Country of origin	Access the tools	Update	Attractiveness	Main Subject	Language Type	Available resources	References	Copyright and Author Contact Account
Brazil	Free	Apr/21	Easy handling	Environment/ Mental and general health	Lay Terminology	Chat with robot, texts	It does not have	Yes
Germany	Free	Apr/21	Easy to use	Mental Health and Symptom Assessment	Lay Terminology	Simple and interactive texts; AI chat	It does not have	Yes
Brazil	Free	Jun/21	Easy to use	Mental health	Lay Terminology	Appointment scheduling; information about women's health	It does not have	Yes
Brazil	Free	It doesn't have the period	Colorful; easy to use; interactive	Mental health	Lay Terminology	Various drawings to color	It does not have	Yes
Brazil	Free	Jul/20	Import photos and contacts into the app	Mental health	Lay Terminology	Breathing timer; sounds and calendar to record seizures	It does not have	Yes

European Union	Free	set/20	You can like other people's posts and interact if you are part of the social network	Mental health	Lay Terminology	Layout similar to Instagram; social network style; song quotes with photos posted by users	It does not have	Yes
Brazil	Free	May/21	Easy to use; dynamic	Mental health	Lay Terminology	Quick Q&A; videos; graphics; help contacts	It does not have	Yes
Brazil	Free	Mar/21	Emojis characterizing feelings; emotional record	Mental health	Lay Terminology	Mood log	It does not have	Yes
Brazil	Free	Feb/21	Easy handling, telephone support	Environment/ Mental Health	Lay Terminology	Diary, texts, telephone support	It does not have	Yes
Brazil	Free	It doesn't have the period	No attractiveness	Environment/ Mental Health	Lay Terminology	Online therapy; tools to find psychologists that fit the profile of the registered person	It does not have	Yes
Not informed	Free	May/21	Easy to handle, colorful	Mental health and meditation	Lay Terminology	Guided meditations	Yes, it has	Yes
Brazil	Free	Jun/22	No attractiveness	Mental health	Lay Terminology	No resources	It does not have	Yes
Portugal	Free	May/16	Colorful, quiz and easy to use	Mental health	Lay Terminology	Questions and Answers	It does not have	Yes
Brazil	Free	Apr/20	Easy handling	Mental health	Lay Terminology	Emotional thermometer; quick questions and answers; emotional diagnosis	It does not have	It has copyright, but does not provide the account
Brazil	Free	Jul/20	Freely to write whatever you want; be creative	Mental health	Lay Terminology	Journaling; making simple lists of the little everyday things that make life enjoyable	It does not have	Yes
Spain	Free with paid version	Jun/22	Dynamic; easy to use	Mental health	Lay Terminology	Simple questions and answers for registration; words of comfort; experiential reasons and support network	It does not have	Yes

Brazil	Free with paid version	Mar/22	Light-weight; easy to use; colorful; dynamic	Mental health	Lay Terminology	Quick Q&A; diary; charts	It does not have	Yes
USA	Free with paid version	May/22	No attractiveness	Mental health	Lay Terminology	Quick questionnaire; research to contribute to the scientific community (cognitive research)	It does not have	Yes
Brazil	Free with paid version	Apr/21	Easy navigation. Offers free service and social pricing	Mental health	Lay Terminology	Service with professionals and religious people	It does not have	Yes
Europe	Free with paid version	Dec/20	Highly dynamic; fun; interactive; relaxing	Mental health	Lay Terminology	Interaction with character; drawing and painting walls virtually; writing emotions	It does not have	Yes
Brazil	Free with paid version	Aug/19	Easy to use, telephone and chat support CVV	Mental health and suicide	Lay Terminology	Diary, CVV voice and chat help channel, texts,	It does not have	Yes
Brazil	Free with paid version	Jul/21	Colorful, easy navigation	Mental health	Lay and scientific terminology	Diary, guided activities,	Yes, it has	Yes
Brazil	Free with paid version	Feb/21	Dynamic, colorful and easy-to-use text	Mental Health and Changing Habits	Lay terminology with technical/scientific basis	AI Chat	It does not have	Yes

Source: Author's construction

The applications included in the study were easy to use, most of them with colorful and interactive graphics, audio and, in some cases, the presence of patient histories through diaries. Common characteristics were observed in all of them, but also some *User Experience (UX Design)* differences, such as colorful screens, chat and primary health assessment by artificial intelligence (AI). The applications analyzed deal with topics in the field of mental health with particular emphasis on neuroscience, psychology, personal development, meditation, well-being and suicide prevention.

Among the twenty-three applications analyzed, thirteen were Brazilian, four did not indicate the country of origin in their description and six were foreign with a translation into Portuguese. When specifying the theme, only one specified that it was intended for people with suicidal behavior and four had direct mechanisms for assessing symptoms of mental disorders intended for exclusive medical use.

Regarding the language used, seventeen applications used lay or non-scientific terminology, and six used technical-scientific language. Only one application presented bibliographic references of technical and theoretical information about the content made available. Regarding the update of the availability date, two updated in 2016 and 2019, thirteen in 2020, six had their last update carried out in 2021 and two applications did not present an update date in the records. Among the twenty-three applications, twenty-one provided some channel for contact with the author/creator.

Half of the applications were therapeutically based on changing habits or behaviors that are harmful to health. The use of chat and interactive texts was verified in more than eighty percent, and the same number also included a diary encouraging people to write down their emotions and record crises. More than half of the applications were assessed using analytical graphs of mood, emotions and anxiety attacks.

In the analysis of the variables that form the *internal content* item, the main theme was mental health and medication. Lay terminology was used in almost all of those selected in this study, and, in this context, it is important to highlight that, as most of the time people are in need of subsidies that involve health education, the applications may not have information consistent with the guidelines for mental health care (Pruitt *et al.*, 2019).

Another important fact is that only three of the identified applications had bibliographical references. The lack of scientific references, as well as quality control of the information used to create the device, is an important weakness that calls into question the validity of the application (Brasil, 2020). Most of the applications considered in this study had videos, texts and images, and were attractive and easy to operate. The attractiveness, design and aesthetics of the application can influence the user's decision-making, since they are directly related to the perception of this tool's functionality and its usefulness (Coelhoso *et al.*, 2019).

The use of digital technologies has emerged as an alternative to help prevent and treat mental illnesses in a wide range of population groups around the world (Weitzel, 2021). Access to a psychotherapist is not always easy due to several factors, such as the shortage of specialized professionals in regions far from large urban centers, the cost of therapies, and the high demand for professionals to meet the most diverse human needs today (Fuhr *et al.*, 2024;GBD 2019)

In this context, the use of smartphones has proven to be a tool that, despite its limitations, can generate therapeutic opportunities, whether as sole form of intervention or to support traditional psychotherapy in a hybrid system. To this end, in several countries, technologies have been developed and validated based on scientific evidence, such as the application developed to help teachers manage challenging behaviors in children on the autism spectrum (Palermo *et al.*, 2023) and Internet-based exercise interventions that have produced significant improvements in symptoms of depression and anxiety (Chen *et al.*, 2024).

Digital interventions can also help the therapist to provide counseling or follow-up treatment remotely (Fuhr *et al.*, 2024). Examples are or use of *chatbot*-type technology in postpartum that has

already shown positive results in preventing depression (Suharwardy *et al.*, 2023) and the digital assistant for people with moderate traumatic brain injury that aims to assist in the cognitive process of treatment with memory recovery and assisting in the completion of complex tasks (Velikonja *et al.*, 2023).

However, there needs to be a more robust and in-depth discussion about how current and future technologies can and should be used to promote social participation and clinical practice with the creation and use of guidelines regarding the use of technologies (Fuhr *et al.*, 2024; Ludewig *et al.*, 2021). Using as a basis the content of guides and manuals already validated by reference health associations or institutions may be one of the ways to use them. *smartphones* with scientific evidence and more reliable (Induct, 2023).

In the context of technology as a support for treatment, researchers evaluated in a randomized clinical trial the satisfaction of people with depression in behavioral activation psychotherapy, which was carried out in the office and at home via videoconference, and found that patient satisfaction was very high, with no significant difference between the two modalities, which is indicative of a comparable quality of care, and a satisfactory level of therapeutic alliance between patients and doctors (Huberty *et al.*, 2019). They concluded that both treatment modalities have several strengths and weaknesses: face-to-face treatments offer an environment for communication, both verbal and nonverbal, when compared to the other; however, home treatments can provide greater comfort due to the ability of subjects to relax in a familiar environment.

However, other studies still point out that caution is needed when using applications based on the principle of mindfulness and attention regulation, pointing out that, even with great potential to improve users' mental health, these technological mechanisms still do not achieve comprehensive care for mental illnesses (DiCarlo *et al.*, 2021; Lau *et al.*, 2021). Although applications are increasingly used, few studies show significant differences between users and support groups, pointing to the need for more studies that accurately evaluate the effectiveness of technological devices related to mental health and behavior changes (Brasil, 2020).

It is important to highlight the need for applications developed in academic spaces to also be available for download in large stores for access by the general population (Reyes *et al.*, 2021). Of the applications analyzed in this study, only one was developed at a public university. This inclusion is of fundamental importance, since the content highlighted in these tools are approaches to transdisciplinary studies and, therefore, have the technical competence to provide technical support to the public looking for mental health applications (Weitzel *et al.*, 2021; Neto *et al.*, 2021).

The trade and large-scale access to various possible treatments, as well as to mental health content, have undergone paradigm reforms that extend from the deinstitutionalization model through official policy measures and changes in laws, to movements in civil society involving mental health workers, families and caregivers. Thus, technology moves between care based on dialogued reception, and research based on narratives that contrast with evidence-based research,

thus complementing the possibilities of using technological devices in mental health in a broad and rational way (Davies *et al.*, 2020).

In the interdisciplinary field, experts indicate that mobile health (mHealth) applications, when focused on promoting emotional health and adaptive coping, must take care in the production of the application regarding accessibility, geographic location and financial restrictions, since these are tools that, in general, will be used by people with generalized anxiety, stress and adaptive coping (Reyes *et al.*, 2020). And in this sense, the application requires, in many cases, self-management and active control by the user.

In an integrative review to assess the effectiveness of mobile applications in improving health behaviors and outcomes and examining the inclusion and effectiveness of behavior change techniques, it was concluded that the body of literature is not cohesive and that there is no strong evidence to support the effectiveness of mobile applications in improving behaviors or mental health outcomes because few studies found significant differences between the application and control groups (Williams; Pykett, 2022)

Germany's Digital Health Act, approved by the Federal Institute for Drugs and Medical Devices, provides the legal framework for the use of health apps in routine care in Germany. Recent studies have shown that effective online interventions have been developed in this context for a variety of mental health disorders and that overall acceptance of such programs by patients and professionals is high (State Of Mobile, 2021).

In comparison, in Brazil, health surveillance does not yet have specific regulations for applications intended for use in mental health. Devices sold in Brazil are subject to general manufacturing, safety, and efficacy criteria, with no specific rules guiding patients or health professionals (Esperidião *et al.*, 2020). Thus, it is important to at least follow technical standards related to marketing, safety, and efficacy, since issues related to usability, design, and technical components of the systems constitute factors directly related to therapeutic success and barriers to the adoption of these technological tools.

Based on the research that gave rise to this article, it can be considered that there is a pressing need to examine the bioethics and neuroethics of technologies linked to mHealth in the Brazilian context, including taking into account the manufacturer's responsibility regarding the universalization of health services (Brasil, 2020). In other words, more energy and attention should be devoted to the social practices of self-monitoring enabled by technology and the ways in which these frame mental health as a form of individualized emotional regulation (Williams; Pykett, 2022).

CONCLUSION

Despite the widespread use of mHealth technologies in Brazil, specifically with regard to the use of mobile applications in mental health, the team that conducted this study did not find any

scientific studies that investigated the accuracy of information on the quality of information intended to support the treatment of mental illnesses in the Brazilian context. This finding prompted the initiation of this study. This information is made available and accessed without restrictions, which is noteworthy due to the impact it can have on the decision of any adult to adhere to its regular use. For this reason, the interest in investigating the Brazilian reality regarding the content related to mental health that is available in applications for tablets and smartphones is justified.

This study provided an opportunity to evaluate the main mental health applications available from the largest online stores in Brazil. In particular, it was found that the self-administered mobile applications for tablets and smartphones in Portuguese for treating mental disorders focus mainly on behavior change processes. The applications use lay language, are not updated regularly, and have features that make them attractive for use. As for therapeutic techniques, most focus on behavior changes, medication, and emotional control.

Only one application presented a theoretical reference for the information provided. This indicates an important ethical implication for all the others, since the lack of scientific evidence can lead to biases and false hopes regarding the prognosis, indicating low efficacy and suggesting little confidence in the application (and in the respective monitoring/treatment).

The gaps identified in the research indicate not only a concrete social problem related to the applications, which may have no or even negative effect on the user (depending on their expectation of improvement), but also point to the need for future studies, with a broader and deeper scope, from an inter and multidisciplinary perspective, involving the areas of health, education and technology, but which may also encompass dimensions of the social sciences and law, in order to promote accessible digital solutions focused on the well-being of users.

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