



## Mobile applications in the prevention of suicidal behavior\*


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Objective: to identify cell phone applications used in the prevention and/or support of suicidal behavior published in international scientific productions and their functionalities. Method: this is an integrative review of the literature that followed the Ganong method. An adaptation of the method was made in which inclusion and exclusion criteria were included for the cellular applications found in the productions. The applications were selected and analyzed individually to map their functionalities. Results: seven applications found from the literature review were studied. 71 functionalities were mapped. It can be evaluated that there are still no specific methods and protocols for the development of applications for the prevention of suicidal behavior. Conclusion: it was possible to know which existing applications contribute to the prevention of suicidal behavior, as well as their main functionalities. It is necessary that studies are done to evaluate the impact of these applications in the prevention of suicidal behavior, enabling the development of research and devices that prevent suicidal behavior in Brazil.

Descriptors: Suicide; Mobile Applications; Mental Health; Technology.

\* This article refers to the call "Self-inflicted violence: nonsuicidal self-injury and suicidal behavior".

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## **Aplicativos de celular na prevenção do comportamento suicida**

Objetivo: identificar aplicativos de celulares utilizados na prevenção e/ou apoio à pessoa com comportamento suicida publicados em produções científicas internacionais e suas funcionalidades. Método: trata-se de uma revisão integrativa da literatura que seguiu o método de Ganong. Foi realizada uma adaptação de método em que foram incluídos critérios de inclusão e exclusão para os aplicativos de celular encontrados nas produções. Foram selecionados os aplicativos e os mesmos foram analisados individualmente para serem mapeadas as suas funcionalidades. Resultados: foram estudados sete aplicativos encontrados a partir da revisão de literatura. Foram mapeadas 71 funcionalidades. Pode-se avaliar que ainda não existem métodos específicos e protocolos para o desenvolvimento de aplicativos para a prevenção do comportamento suicida. Conclusão: foi possível conhecer quais os aplicativos existentes que contribuem na prevenção do comportamento suicida, bem como suas principais funcionalidades. Vê-se a necessidade de que estudos sejam feitos para avaliar o impacto desses aplicativos na prevenção do comportamento suicida, possibilitando o desenvolvimento de pesquisas e dispositivos que previnam o comportamento suicida no Brasil.

Descritores: Suicídio; Aplicativos Móveis; Saúde Mental; Tecnologia.

## **Aplicaciones de celular en la prevención del comportamiento suicida**

Objetivo: identificar aplicaciones de celulares utilizados en la prevención y/o apoyo a la persona con comportamiento suicida publicados en producciones científicas internacionales y sus funcionalidades. Método: se trata de una revisión integrativa de la literatura que siguió el método de Ganong. Se realizó una adaptación de método donde se incluyeron criterios de inclusión y exclusión para las aplicaciones de celular encontradas en las producciones. Se seleccionaron las aplicaciones y los mismos fueron analizados individualmente para asignar sus características. Resultados: se estudiaron 7 aplicaciones encontradas a partir de la revisión de literatura. Se asignaron 71 funcionalidades. Se puede evaluar que aún no existen métodos específicos y protocolos para el desarrollo de aplicaciones para la prevención del comportamiento suicida. Conclusión: fue posible conocer cuáles las aplicaciones existentes que contribuyen en la prevención del comportamiento suicida, así como sus principales funcionalidades. Se ve la necesidad de que los estudios se realicen para evaluar el impacto de estas aplicaciones en la prevención del comportamiento suicida. Habilitando el desarrollo de investigaciones y dispositivos que previenen el comportamiento suicida en Brasil.

Descriptores: Suicidio; Aplicaciones Móviles; Salud Mental; Tecnología.

## Introduction

Suicide is one of the main causes of death in the world, especially among young people, and is configured as a serious public health problem<sup>(1)</sup>. According to the World Health Organization (WHO), it is estimated that in the year 2012 there were about 800,000 suicide deaths somewhere in the world, that is, one death every 45 seconds<sup>(2)</sup>.

In the late 1960s, the WHO defined suicidal behavior as "multifactorial, multi-determined and transactional", which happens because of complex but identifiable factors<sup>(2)</sup>. It is understood, therefore, that there is not a single cause for suicide, since it can be the result of a combination of personal, social and health factors of the person<sup>(3)</sup>. Suicidal behavior, in turn, is the act by which the person causes injury to himself, regardless of lethal intention and motivation. It can be defined as continuity between self-destructive thoughts through gestures and threats and suicide attempts and, finally, suicide itself<sup>(2)</sup>.

Although the reasons for suicide are complex and multifactorial, identifying suicidal behavior is crucial to prevent it. It is known that 66% of the people who committed suicide sought care in some health service in the month before their death, however, the probability of completing the suicide act was not detected by the professionals who performed their care<sup>(3)</sup>.

Suicide prevention is a challenge that will require systemic approaches, with public health strategies and screening of people, seeking to perform interventions, both in accompanying people at risk of suicide and survivors and those bereaved by a loss of suicide<sup>(3)</sup>. In this sense, scholars in the field of suicide and suicide prevention consider that the gaps in health services can be filled through technological advances and also that further research on the subject is needed in order to understand what are the best practices to prevent, making it possible to save more lives<sup>(4)</sup>.

In the United States, Human Services Organizations (HSO) recognize that applications can be their allies in trying to deal with social and individual issues, opening a new and important channel through technologies. For HSOs, the use of technologies, including applications, can be a valuable component of service delivery<sup>(4)</sup>. It is known that, in fact, the understanding of the best practices for applications and technologies in this field is not yet available in the literature and, also, that publications on the subject are scarce and often unspecific<sup>(4)</sup>, which may slow down the process of creating new technologies and/or measures to prevent suicidal behavior.

In addition, for WHO, application-based interventions can be useful in developing countries where support for people at risk of suicide may be limited. Thus, it makes recommendations about the use of mobile devices, considering them an option for support and treatment of people at risk of suicide, since it is known that mobile applications have the potential to reach a large number of people through the use of devices<sup>(5)</sup>.

In December 2019, the world witnessed the first cases of infection by a new Coronavirus, the Severe Acute Respiratory Syndrome Coronavirus 2 (Sars-Cov-2), causing the Coronavirus Disease 2019 (COVID-19)<sup>(6)</sup>. Due to the global spread of the virus, the WHO declares the COVID-19 pandemic and directs the general population to achieve social distancing to avoid transmission<sup>(7)</sup>. Several restrictions to the functioning of commerce, educational institutions and leisure areas were created by the authorities to reduce contagion and avoid overburdening the health systems. In this context, the time of use of smartphones has grown markedly and, in several places, the holding of teleconsultations was one of the measures proposed, demonstrating the undeniable relevance of the devices in the daily life of the population<sup>(8)</sup>.

Due to these events, a new scenario is presented, which allows greater contact with users without the need for a physical encounter with the professional, expanding the possibilities of health services, which can take care of the user regardless of geographic limitations<sup>(9)</sup>, the company's goal is to provide the best possible applications for synchronous health care and pre-written or recorded guidance. Besides extinguishing physical access barriers, it is possible to circumvent the issue of service hours, allowing for 24/7 care<sup>(8)</sup>.

It is known, considering the urgency of the user with suicidal behavior in crisis and the need for follow-up, that the use of applications that prevent and support the person with suicidal behavior can be of great value, especially in the context of the COVID-19 pandemic.

In a recent study conducted in Brazil, the results demonstrated effects on the mental health of the participants during the COVID-19 pandemic that were related to their increased exposure to news and information about the deaths and sequelae of the disease, which would enable an increase in the demand for mental health services<sup>(9)</sup>. Faced with this finding, the use of applications could facilitate access to users, inform scientific knowledge in order to reduce possible psychological damage and provide guidance on places that provide emergency psychological care. It is also important to emphasize that,

in the face of the reality of social crisis and the urgency of mental health care, one of the possibilities of great value that can be realized is that health professionals perform online interventions and services. There is also a need to instrumentalize the health professionals who will attend these patients and train them to approach, focusing on attending the most vulnerable groups<sup>(10)</sup>.

Given the above, the objective of this study was to identify the cell phone applications used in the prevention and/or support to the person with suicidal behavior published in international scientific productions and their functionalities.

## Method

It is a study developed from an Integrative Literature Review, understood as a research method that enables the systematic organization and synthesis of available evidence on the subject to be studied. The analysis of the studies included in this review was done dynamically and included theoretical and empirical studies and allowed to gather them so that a general conclusion could be constructed from the results of each study<sup>(11)</sup>.

For the development of this study, an adapted protocol for the integrative literature review was elaborated and the steps of the review were followed<sup>(11-12)</sup>: selection of the research question; definition of inclusion and exclusion criteria for studies; sample selection; representation of selected studies in table format, considering common characteristics; critical analysis of results, identifying differences and conflicts; discussion and interpretation of results; clear presentation of evidence found. Adotaram-se como recomendações PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyse)<sup>(13)</sup> - according to the flowchart presented in the results and recommended in review studies on evidence-based models.

The articles were identified from a bibliographic search carried out from December 2016 to July 2020 in the following databases: MEDLINE/PubMed® (via National Library of Medicine); SCOPUS® (Elsevier); Web of Science® (Thomson Reuters Scientific); PsycINFO® (APA); CINAHL® (EBSCO Host); Academic Search Premier (EBSCO Host); LILACS® (via Virtual Health Library).

The capture of the articles was done in each database individually, not being predefined a base for beginning and/or end, that is, the search was done randomly. All the papers found, meeting the search criteria, were submitted to the next stage of the protocol.

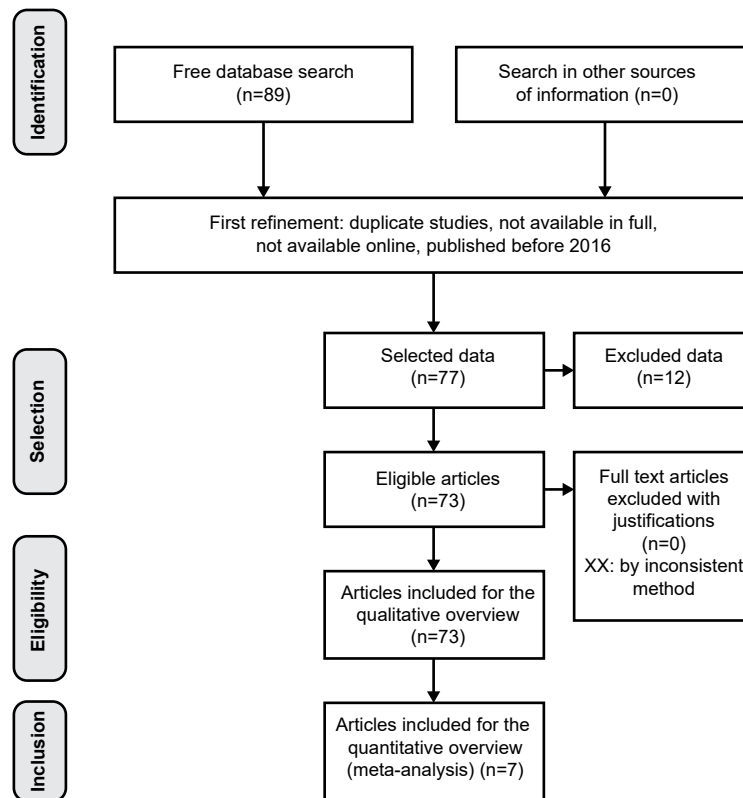
The study included articles published in English, Spanish and Portuguese, not limiting the date of publication, that presented abstracts and information about the use of mobile applications for suicide prevention.

The search strategies used were:

1. *MEDLINE/PubMed*: ("Suicide"[Mesh] OR suicide\*) AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
2. *SCOPUS*: suicide\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
3. *Web Of Science*: suicide\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
4. *PsycINFO*: suicide\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
5. *CINAHL*: suicide\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
6. *Academic Search Premier*: suicide\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps") AND (phone\* OR mobile\* OR cellphone\*);
7. *LILACS*: suicid\* AND ("Mobile Applications" OR "Mobile Application" OR "app" OR "apps" OR aplicativ\* AND phone\* OR mobile\* OR cellphone\* OR celular\* OR move\*).

The capture and organization of the studies were carried out from file folders named with the titles of the databases. The studies were selected and stored from the reading of the titles and abstracts in order to determine the objects of in-depth analysis. This first stage is called the "first sieve" and made it possible to recognize the studies targeted for analysis according to the scope of this protocol. From this first stage on, as indicated by the Integrative Review<sup>(11-12)</sup>, the data was systematized in tables with the respective careful reading of the studies and organization of the data by means of numbering and title.

Thus, the initial search presented 89 publications, and after reading the title and abstract, duplicate studies in the different databases, articles unavailable for download and studies that did not answer the guiding question of the research were excluded. At this stage, 73 articles were selected for full in-depth reading. Of these, 66 studies were excluded for not responding to the scope of the research, resulting in a final sample of seven articles for analysis.



Source: Prisma (2020)<sup>(11)</sup>

Figure 1 - Integrative Literature Review Flowchart

The pre-selected materials were re-read with critical evaluation and systematization of the data in category, proceeding to the Content Analysis<sup>(14)</sup>, defined as a set of communications analysis techniques that uses an objective system of content description. The information extracted from the studies were: title of the article; authors; year of publication; complete reference of the article; objective of the research; methodology; reflection of the articles on the subject; applications analyzed in the study and results of the research.

## Results

Seven articles were selected that met the inclusion criteria proposed for this Integrative Review. The databases that had the largest number of publications included were Academic Search Premier and SCOPUS, with three articles. It is reported that 100% of the selected studies were published in English and the publication period was between 2013 and 2017, with three studies published in 2017, one in 2016, one in 2014 and two in 2013. The studies were published in four countries: Australia (3); the United States of America (2); Belgium (1) and Denmark (1). In Figure 2, the selected articles are presented.

Regarding the types of research, A1 was a descriptive methodology study; A2, A3 and A4 were qualitative studies - A3 being a randomized clinical

trial. Article A1 considered as different the applications that were developed for the two development platforms (IOS® and Android®), having a total of 49 applications; A2 presented 27 applications without specifying differences between the development platforms; A3 presented only one application since it brought, in its study, the proof-of-concept of the use of the app to evaluate its viability in a sample of American war veterans. The A4 article did not present the name of the application, since the study approached the development of the app to evaluate its effectiveness in preventing suicide in young Australian Aboriginal people and is in the recruitment phase for testing. The A5 article brought the name of the application and talked about its creation, two tests of use and the launch in September 2015. In approximately six months after the launch of the A5 article application, it had about 1500 downloads and several positive reviews and in 2017 was updated to include new features. Article A6 is the report of the test with eight indigenous communities of the application, which has the development reported in article A4 and shows expressive results in decreasing suicide rates and acute psychic suffering, requiring intervention by health professionals in these communities. A7 is a randomized clinical trial that included 546 participants in which half of them received access to the application and the other half had access to the content of the application,

but in the physical paper version, after six weeks of use of the application, it was evaluated by test users. The data collected demonstrated greater effectiveness

of the application through its instantaneous availability and new functionalities would be implemented after evaluation and suggestion by the users.

Identification Article	Complete reference
A1	Larsen ME; Nicholas J; Christensen H. <i>A Systematic Assessment of Smartphone Tools for Suicide Prevention</i> . Public Library of Science, PLoS One. [Internet]. 2016;11( 4):1-14. Public Library of Science (PLOS). [cited Jan 27 2017]. Available from: < <a href="http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0152285">http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0152285</a> >. DOI: 10.1371/journal.pone.0152285 <sup>(1)</sup>
A2	Aguirre RTP, McCoy, MK, Roan M. <i>Development Guidelines from a Study of Suicide Prevention Mobile Applications (Apps)</i> . J Technol Hum Serv. [Internet]. 2013; 31(3), 269–93. Available from: <a href="https://www.tandfonline.com/doi/abs/10.1080/15228835.2013.814750">https://www.tandfonline.com/doi/abs/10.1080/15228835.2013.814750</a> DOI: 10.1080/15228835.2013.814750 <sup>(4)</sup>
A3	Bush NE, Dobscha SK, Crumpton R, Denneson LM, Hoffman JE, Crain A et al. <i>A Virtual Hope Box Smartphone App as an Accessory to Therapy: Proof-of-Concept in a Clinical Sample of Veterans</i> . <i>Suicide And Life-threatening Behavior</i> . [Internet]. 2014;45(1):1-19. [cited Jan 27 2017]. Available from: < <a href="http://onlinelibrary.wiley.com/doi/10.1111/sltb.12103/abstract">http://onlinelibrary.wiley.com/doi/10.1111/sltb.12103/abstract</a> >. DOI: <a href="http://dx.doi.org/10.1111/sltb.12103">http://dx.doi.org/10.1111/sltb.12103</a> <sup>(15)</sup>
A4	Shand FL, Ridani R, Tighe J, Christensen H. <i>The effectiveness of a suicide prevention app for indigenous Australian youths: study protocol for a randomized controlled trial</i> . <i>Trials</i> . [Internet]. 2013;14(1):3961-403. [cited Jan 27 2017]. Available from: < <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC422891/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC422891/</a> >. DOI: <a href="http://dx.doi.org/10.1186/1745-6215-14-396">http://dx.doi.org/10.1186/1745-6215-14-396</a> <sup>(16)</sup>
A5	Auwels K; Aerts S; Muijzers E; Jaegere E, Heeringen K, Portzky G. <i>BackUp: development and evaluation of a smart-phone application for coping with suicidal crises</i> . Plos One. [Internet] 2017;12( 6):1-16. [cited Jan 27 2017]. Available from: <a href="https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0178144">https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0178144</a> . DOI: 10.1371/journal.pone.0178144 <sup>(17)</sup>
A6	Tighe J, Shand F, Ridani R, Mackinnon A, La Mata N de, Christensen H. <i>Ibobbly mobile health intervention for suicide prevention in Australian Indigenous youth: a pilot randomised controlled trial</i> . <i>Bmj Open</i> . [Internet] 2017;7(1):013518-013528 [cited Aug 03 2020]. Available from: <a href="https://bmjopen.bmj.com/content/7/1/e013518">https://bmjopen.bmj.com/content/7/1/e013518</a> . DOI: <a href="http://dx.doi.org/10.1136/bmjopen-2016-013518">http://dx.doi.org/10.1136/bmjopen-2016-013518</a> <sup>(18)</sup>
A7	Andreasson K, Krogh J, Bech P, Frandsen H, Buus N, Stanley B et al. <i>MYPLAN –mobile phone application to manage crisis of persons at risk of suicide: study protocol for a randomized controlled trial</i> . <i>Trials</i> . [Internet] 2017;18(1):1-7. [cited Aug 03 2020]. Available from: <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5387214/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5387214/</a> DOI: <a href="http://dx.doi.org/10.1186/s13063-017-1876-9">http://dx.doi.org/10.1186/s13063-017-1876-9</a> <sup>(19)</sup>

Figure 2 - Articles Found in the Integrative Literature Review

## Discussion

The use of Information and Communication Technologies (ICTs), regarding apps in the field of suicidal behavior prevention, proved to be broad. It is well known that the prevention of suicidal behavior involves a set of strategies to be offered to the user to access in moments of suffering or excessive preoccupation for him/her. To this end, it is considered the possibility of developing a mobile application with as many adequate resources as possible, which is based on studies or clinical experiences on the subject, as well as adequate to the cultural reality of the place where it is intended to be used. In this regard, it is important to note that there are differences in the types of suicide intent between countries or even between regions of the same country, and these distinct cultures play an important role and should be considered by the formulators of prevention strategies and public policies<sup>(19)</sup>.

Thus, understanding the cultural meanings of suicide, its risk and protective factors in different cultures, and even how suicide is understood by members of a specific culture is important for the development of interventions for these ethnically diverse people with different beliefs about suicidal behavior<sup>(20)</sup>.

Therefore, a team with knowledge and technical preparation related to the topic of prevention of suicidal behavior in apps seems fundamental, since the user

support tools should be developed with a theoretical basis as to what can actually provide the necessary support for the user to keep safe for resources that minimize suicidal behavior.

Thus, it is inferred that mobile applications for promotion, education and health care should be based on theories and scientific evidence, aiming to ensure that the information contained therein is serious, from content based on literature, to a change, in fact, in behavior and avoiding leaving users unprotected or even putting them at risk in their health treatment<sup>(21)</sup>. In this aspect, it is reinforced that, besides not having been found cellular applications for the prevention of suicidal behavior in Brazil in this review, there were also no studies in Brazil that contemplated clinical tests or validations of cellular applications under development for this purpose, which shows a gap in this field of knowledge.

Still in this sense, it is important to remember that, besides the theoretical and scientific basis in the development of the apps, it is fundamental that they are tested as to their usability and effectiveness, since, if properly developed, they reach a large public and become a tool usable in public health. It is seen that this situation opens space for health professionals to work in partnerships as mobile application developers, aiming to assist in the production of tools with evidence-based interventions that reduce risks, increase access



to services and improve social inclusion and interactivity with the use of apps<sup>(21)</sup>.

Studies show that there is, in fact, a lack of proof of usefulness, effectiveness and safety in the use of health applications<sup>(21)</sup>, leaving open questions about the effectiveness of applications already on the market and may thus generate insecurity about the indication of their use by health professionals, for example.

Another study brought the great turnover of mental health applications in the app store market. It was stated that, besides offering little information about the quality of the content of the app, few cite the source of this content and justify its effectiveness<sup>(22)</sup>.

Knowing the gaps found, we tried to reflect on the existing functionalities of the applications seen in this review, in order to know which of these prevention strategies are corroborated by scholars of the theme. About information resources on psychiatric signs and symptoms, it is known that informing about warning signs and symptoms can be fundamental for the protection of individuals at risk. The National Guidelines for Suicide Prevention brings, in its second article: "developing strategies for information, communication, and raising awareness in society that suicide is a public health problem that can be prevented"<sup>(23)</sup>, that is, information resources are considered relevant to the field of prevention and, therefore, should be present in an application for the prevention of suicidal behavior. The contacts of health and mental health services are fundamental, because professionals have observed that this filling of information about the user support network allows the user to have an overview of the people he/she can count on for critical situations, making him/her realize with whom he/she can talk about his/her suffering and his thoughts, for example<sup>(24)</sup>.

Online help/other online resources are ways that allow you, for example, to update and access your security plan wherever you are. In addition, the use of mobile applications, which are connected to the internet, allows intrinsic resources to be applied to the technologies, such as the continuous capacity of information transmission, use of multimedia elements and geolocation<sup>(5)</sup>. In addition, it is worth considering that "cloud" solutions allow the storage of data on the Internet, and can further improve the functions of the application<sup>(5)</sup>.

The video and image features, in turn, allow the user to store items such as favorite music, family photos or souvenirs of good times. The purpose of this space is to provide a means for the user to remember their reasons for living in moments of distress and discouragement, when they may be susceptible to suicidal behavior. The use of these elements can also serve as a resource for distraction, seeking to reinforce stress tolerance skills, for example<sup>(25)</sup>.

The Security Plan or Crisis Card is an already known strategy in the field of mental health, especially when it comes to users with risk of self-injury or suicide. In this aspect, it is known that in some countries, such as the Netherlands, for example, the crisis plan is executed in organizations that make available, among other resources, a consultant who is responsible for following the entire process with the user. In some cases, the plan can be accessed on the Internet, if allowed by the user, being available to the entities and people previously agreed upon<sup>(24)</sup>. These resources are used as guidelines and part of the treatment in suicide prevention clinics, and patients are encouraged to develop their own safety plans. The main advantage of the electronic safety plan, therefore, is that the user will take it with him/her most of the time<sup>(5)</sup>.

The strong theoretical and empirical basis underpinning the resources of security plans is stressed, since they have validated strategies in the prevention of suicide in adults, especially in the cognitive-behavioral lines<sup>(26)</sup>. Resources for relaxation, physical activities and mindfulness can be justified as part of the content of apps, since studies have shown that performing physical activities has a positive impact on the lives of people with psychic suffering<sup>(24)</sup>. They also indicated that this can be a useful tool in treating people who have experienced suicidal behavior in the past, as it helps them acquire skills that will allow them to respond to crises more quickly and skillfully<sup>(23)</sup>. As for relaxation, it is known that when combined with other care and treatment strategies, it can help to reduce depressive and anxiety symptoms, for example<sup>(25)</sup>.

Thus, among the categories of features listed, which can contribute to the prevention of suicidal behavior, it can be seen that the contact resources of health and mental health services; resources for online help/other online resources and resources with videos and images have some basis when compared to the strategies for the prevention of suicidal behavior studied. The resources Security Plan or Crisis Card, relaxation, physical activities and mindfulness, in particular, seem to bring important benefits to people with some mental suffering. It must be considered that these are already strategies used independently of the electronic medium and propose activities that can help the user to relax and shift the focus of their attention to other things<sup>(27)</sup>.

## Conclusion

It was possible to identify which mobile applications for suicide prevention are available in the market and which are in the testing phase by means of scientific productions, as well as to know their main functionalities and what resources are available for the prevention of suicidal behavior. Promoting and connecting users

to services and programs supporting people at risk of suicide is a strategy that can collaborate in times of crisis and risk for suicidal behavior, considering that these services offer specialized support to the suffering user.

It was observed that strategies, such as the Safety Plan, can be useful in suicidal behavior and have a theoretical basis, since they are already widely used in the treatment of mental health users with risk for suicidal behavior. Meditation and relaxation measures also bring benefits to suffering people, since they have the capacity to improve depressive symptoms and anxiety, reflecting in an improvement of their general condition.

These functionalities have a theoretical and empirical basis and, therefore, cannot fail to be present in mobile applications for the prevention of suicidal behavior. However, it is clear that research should be carried out to evaluate the impact of cell phone applications on the prevention of suicidal behavior, since there is little scientific production on the subject and, especially, proof of their effectiveness for users of mental health in times of suffering.

In addition, no Brazilian studies have been found on the subject, which points to a knowledge gap among scholars on the subject in the country, as well as no applications that have been developed in Brazil. In this way, the creation of interdisciplinary projects and studies that propose and evaluate the development of research and devices that prevent suicidal behavior must be encouraged, collaborating with the scientific production on this important and still little diffused theme in Brazil. The use of smartphones in the context of the COVID-19 pandemic demonstrates how much the health area can use these devices for patient care.

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