

## MENSSANS: APP TO PRACTICE MINDFULNESS FOR WOMEN WITH BREAST CANCER

MensSans: aplicativo para prática do *mindfulness* direcionado a mulheres com câncer de mama

MensSans: aplicación para la práctica del *mindfulness* dirigida a mujeres con cáncer de mama

Leandro Santiago da Silva<sup>1</sup>, Livânia Beltrão Tavares<sup>2</sup>, Diana Sampaio Braga<sup>3</sup>

### How to cite this article:

Silva LS, Tavares LB, Braga DS. MensSans: app to practice mindfulness for women with breast cancer. Rev Fun Care Online. 2020 jan/dez; 12:676-681. DOI: <http://dx.doi.org/0.9789/2175-5361.rpcfo.v12.9188>.

### ABSTRACT

**Objective:** present the development of a prototype software (MensSans) to assist women diagnosed with breast cancer in performing the therapeutic treatment with Mindfulness. **Methods:** the methodological process was based on the prototyping model and in this work the project was elaborated considering the steps of bibliographic survey, definition of requirements, design of the system and implementation. **Results:** The application provides the Mindfulness program following the eight-week model, in which a sequence of text and audio materials is presented to the user to use during the week, issuing alert notifications at the preset times for sessions. **Conclusion:** this tool promotes a healthy interaction with technology that can bring instant and lasting benefits at different times of cancer treatment through a schedule that collaborates with the integral and continuous exercise of full attention.

**Descriptors:** Breast cancer; Mindfulness; App; Technology; Mental health.

### RESUMO

**Objetivo:** apresentar o desenvolvimento de um protótipo de *software* (MensSans) para auxiliar mulheres com diagnóstico de câncer de mama na realização do tratamento terapêutico com *Mindfulness*. **Métodos:** o processo metodológico se fundamentou no modelo de prototipação e neste trabalho o projeto foi elaborado considerando as etapas de levantamento bibliográfico, definição de requisitos, projeto do sistema e implementação. **Resultados:** o aplicativo fornece o programa do *Mindfulness* seguindo o modelo de oito semanas, no qual uma sequência de materiais em texto e áudio é apresentada ao usuário para utilizar durante a semana, emitindo notificações de alerta nos horários previamente estabelecidos para as sessões. **Conclusão:** esta ferramenta promove uma interação saudável com a tecnologia podendo trazer benefícios instantâneos e duradouros em diferentes momentos do tratamento oncológico por meio um cronograma que colabora com o exercício integral e contínuo da atenção plena.

**Descritores:** Câncer de mama; Atenção Plena; Aplicativo; Tecnologia; Saúde mental.

- 1 Analysis and systems development by Unopar, Graduation, Director of the company Ellis Agência Web, Campina Grande-Paraíba-Brazil.
- 2 Psychology at the Catholic University of Pernambuco, PhD in Psychology at UCES - Buenos Aires, Professor at UEPB, Campina Grande-Paraíba-Brazil.
- 3 Psychology at UEPB, PhD from the Federal University of Paraíba, Professor at UEPB, Campina Grande-Paraíba-Brazil.

## RESUMÉN

**Objetivo:** presentar el desarrollo de un prototipo de software (MensSans) para ayudar a las mujeres con diagnóstico de cáncer de mama a realizar el tratamiento terapéutico con Mindfulness. **Métodos:** el proceso metodológico se basó en el modelo de prototipación y en este trabajo el proyecto se elaboró considerando las etapas de estudio bibliográfico, definición de requisitos, diseño del sistema y la implementación. **Resultados:** la aplicación proporciona el programa del Mindfulness siguiendo el modelo de ocho semanas, en el que se presenta una secuencia de texto y audio al usuario para su uso durante la semana, emitiendo notificaciones de alerta en los horarios previamente establecidos para las sesiones. **Conclusión:** esta herramienta promueve una interacción saludable con la tecnología y puede aportar beneficios instantáneos y duraderos en diferentes momentos del tratamiento oncológico a través de un cronograma que colabora con el ejercicio completo y continuo de la atención plena.

**Descriptor:** Cáncer de mama; Atención completa; Aplicación; Tecnología; Salud mental.

## INTRODUCTION

Breast cancer is a type of malignant neoplasm that mainly affects women. According to the National Cancer Institute (INCA) in 2018, 59,700 new cases of breast cancer were found in Brazil.<sup>1</sup> When detected at an early stage, less aggressive treatment with better success rates is possible. However, there is a delay of women in the search for the diagnosis, as they ignore or do not notice the first symptoms of the disease, which are often subtle.

Historically, cancer is a disease very mystified by society, has been linked to several possible causes without proof and has acquired meanings related to guilt, punishment, deterioration, pain and death,<sup>2</sup> attributions that were little softened with the clarifications arising from the advance of medicine. The initial diagnosis of cancer can be interpreted by the patient as a threat of death.<sup>3</sup> And when the woman receives confirmation of the diagnosis of breast cancer, she faces stages of internal confrontation, such as denial of the disease itself.<sup>4</sup> These feelings that involve Psychological barriers created by fear develop loads of insecurity that aggravate patients' psychological distress, making it difficult to accept the disease and to engage in treatment.

Cancer is diagnosed by biopsy, an exam used to identify breast lesions. It is a minimally invasive procedure, but however minor it may be accompanied by experiences of anxiety, pain and fear of the unknown.<sup>5</sup> Treatment may involve chemotherapy, causing hair loss, which can have even more psychological impacts on women, as well as Mastectomy, which is the main treatment for breast cancer. According to data from the Brazilian Society of Mastology (SBM), 70% of women who were diagnosed with breast cancer in Brazil needed to have total breast removal.<sup>6</sup>

The breast represents for the woman several intimate factors in which the lived or desired experience of motherhood is included. Therefore, the mutilations and disfigurements that breast cancer treatment can cause in the body can raise fears<sup>2</sup> and harmful effects on the woman's self-esteem in the face of the impossibility of exercising

her role. In addition to the affective bonds between mother and child, the breast represents the woman's identity, her femininity, her relationships, her experiences, and her roles in society. Breast cancer treatment interferes with this identity, often leading to feelings of low self-esteem, inferiority, and fear of partner rejection.<sup>2</sup>

Complementary treatments are being employed to care for the mental health of people with cancer. Meditation Therapies and Cognitive Behavioral Therapy (CBT) -based interventions have been shown to be effective in improving the psychological quality of these patients.<sup>3-7</sup> Mindfulness has been widely used for significant improvements in quality of life<sup>8</sup>. Therefore, the objective of this paper is to present the development of a software prototype (MensSans) to assist women with breast cancer diagnosis in the therapeutic treatment with Mindfulness, in order to provide greater user involvement with breast cancer. practice and the session schedule.

## The Mindfulness importance for mental health

Coming from the Buddhist tradition Mindfulness uses meditation techniques as a way to provide acceptance of the present, leading to experience each moment in an integral way, being aware of the events that are taking place in the mind and the activities that are taking place at every moment. Mindfulness encourages breaking with the habits of thought and behavior that prevent us from enjoying life to the full, for much of self-criticism and inner judgment arises from the way we usually think and act.<sup>9</sup>

The main Mindfulness-based intervention program focused on anxiety and stress is Mindfulness-Based Cognitive Therapy (MBCT), which originated from the original Mindfulness-Based Stress Reduction (MBSR) program. Stress Reduction), created in the 1970s.<sup>10</sup> The different techniques included in this program enable the practitioner to perform quick sessions lasting from 3 to 8 minutes, helping to avoid uncomfortable situations of tension, anxiety or stress in the midst of routine daytime activities. The full implementation of the program lasts eight weeks and may contain one or more daily sessions, leaving the practitioner free to organize their schedules. Throughout the program and improvement of techniques the practitioner may have developed a self-control that enables the visualization of thoughts that are happening in the mind without judging them, and can choose whether to dive into them and feel them, or just observe them, so it is. It is possible to avoid reliving stressful experiences or leading to unexpected low self-esteem.

The program follows instruction on the practices to be performed and relaxing music audios to be heard during training, the outcome of the sessions being dependent on the individual's involvement and commitment. When the practitioner is cautious about participating in the program, it is recommended rather than getting involved that he or she initially learn about the intensity of the program and the challenges of committing to the practice along with its benefits.<sup>3</sup> In one of the techniques the individual

directs your attention to specific parts of the body such as feet, hands, abdomen or foci of pain, stimulating the perception of these regions. In this way, it is possible to reconnect oneself and establish a more intimate connection of mind and body, stimulating a visualization that better analyzes past or future situations, and interpreting them with external factors that do not alter or interfere with the now. Mindfulness invites you to experience each moment and offers a new way to relate to trauma and distress by learning to be present in your emotional experiences.<sup>3</sup>

The benefits of mindfulness are demonstrated in several studies, including: open and controlled intervention study,<sup>5</sup> review of empirical studies and randomized controlled trials,<sup>11</sup> systematic reviews and meta-analyses.<sup>12-13</sup> These studies demonstrate the effectiveness of mindfulness in empowering the individual to deal with remaining thoughts and difficult-to-accept situations, thus contributing to the reduction of suffering and the achievement of higher levels of life satisfaction. Important and long-term health benefits can be seen that are demonstrated by changes in mood, increased creativity and physical and mental vigor<sup>9</sup>, as well as a reduction in psychological symptoms such as rumination, thought suppression, fear of one's emotions and difficulties with emotional regulation.<sup>11</sup>

The use of this therapy has been shown to be beneficial in women with breast cancer, because in addition to its contribution to self-esteem, this therapeutic practice strengthens the immune system for a better treatment recovery. When used in surgical patients before procedures, it improves recovery time and reduces postoperative pain.<sup>14</sup> Mindfulness can be used to treat anxiety and the onset of depression in patients during or after cancer treatment when it can be difficult to resume normal life. Working in the latter case as a recuperator of psychological effects, improving well-being, preventing recurrent depression, and helping to deal with future problems.

### Using the application as a therapeutic alternative

Technology has been advancing strongly, and the number of smartphone purchases in Brazil is increasing. According to research by the Getúlio Vargas Foundation of São Paulo (FGV-SP), one smartphone per inhabitant was found in 2018.<sup>15</sup> User demand for these devices has stimulated the development of different startups, which are technology-based start-ups in general that make their apps available on a network, providing facilities and new life experiences. According to a survey by the Brazilian Startup Association (ABStartups), the market for these technologies has doubled in six years in Brazil. In 2012 there were 2,519 startups registered in the association, and in 2017 this number reached 5,147 companies.<sup>16</sup> In healthcare, innovative applications have become indispensable for patients by bringing their treatment routines closer to the physician's care. But this practice of health in mobile devices that use wireless technologies, such as phones, cell phones and other devices, is still an emerging field,<sup>17</sup>

and needs tools in the mental health area to address specific difficulties of individuals.

There are numerous applications that commit to mental health promotion, which despite informing its features and functionality, do not exactly fulfill its purpose. A survey by Mani et al.,<sup>17</sup> targeting applications that indicated Mindfulness practice found that only 4% of the 700 applications identified in the survey provided mindfulness training and education, and although many applications claimed to offer Mindfulness practice to Most of them did not have this purpose. The same research also found that there was only one randomized trial involving a single English therapeutic application, Headspace. Thus, it is necessary to make available technologies that perform this therapy in its entirety, and that collect results during its course. For while there is growing evidence of the positive effects of face-to-face training programs, it is not clear whether Mindfulness applications can really deliver benefits.<sup>17</sup>

### METHODOLOGY

The MensSans application project that aims to apply Mindfulness techniques to women with breast cancer was built using the methodological process based on the prototyping model defined by Pressman, 18 in which the prototype may go through refinement steps in case of emergence of new needs.

In this work the project was elaborated considering the following steps: i) bibliographic survey, in which we obtained a more detailed knowledge of Mindfulness techniques and their health benefits to women affected by breast cancer, this understanding made available the course of mindfulness following the 8-week model interactively; ii) definition of requirements, which used knowledge acquired in the previous phase to assess project needs and indicate its functionalities; iii) system design, in which demonstration screens were created for data inputs and outputs, considering its usability in order to obtain a better user interaction with the application; iv) implementation, which defined the technology for software development, including programming languages, databases, and development environments.

The application has a hybrid feature in which part of the content is included in the complicated version and another part is remotely loaded from a web service, which is a file hosting server with database service. Its screens were designed with elements that made it intuitive, making it easier to use. In its structuring and programming were used the HTML (HyperText Markup Language), CSS (Cascading Style Sheets) and JavaScript. The compilation of the application was done through the Apache Cordova tool, where you can get versions to run on Android and iOS operating systems, which are enabled to work on smartphones, tablets, and other compatible mobile devices.

The storage of some information such as the schedule of established practice hours is done through the database available on the user's device, and the data of users who

register for use of the tool, as well as the questionnaires completed by them, are sent to a web service, where remote queries of JavaScript Object Notation (JSON) files are performed to obtain data allocated to it.

This project did not require the approval of the Ethics Committee, as it did not involve research with human beings.

## RESULTS

The app provides the Mindfulness program following the eight-week model, in which a sequence of text and audio materials is presented to the user for use in the sessions that will be held throughout the week. During the application of this program in person, without the aid of any tool, practitioners face difficulties in meeting the schedule, because as the sessions progress and the user feels better ends up forgetting to perform therapy sessions. The app issues notifications that alert the user to previously set times for their sessions, and the relatively close proximity to the smartphone makes it possible not to be restricted in places and times to practice.

The patient's poor attention to the program is also due to the individual's involvement in many external thoughts such as work, studies, concerns, and stressful situations such as cancer treatment itself. It is important to note that the course must be taken in its entirety so that lasting benefits can be gained, since "The mind may take time to fully reconnect with the body as countless networks in the brain must be reprogrammed and strengthened".<sup>9</sup>

In the application's home screen (Figure 1) the user has a summary of the activities being executed, and quick access links to practice. The user will have the freedom to choose daily which session to practice or even repeat, as well as opt for quick sessions that help relieve stress immediately. So you can also choose to follow the schedule week by week with sequential sessions set by the app itself.

**Figure 1** - Application Home Screen, as a summary of practices performed. Self elaboration.

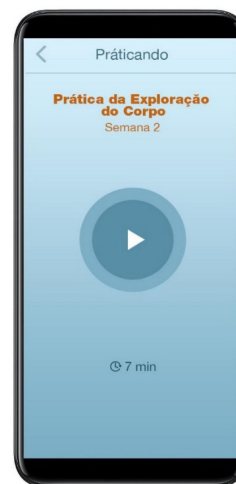


For each week of the Mindfulness course a new activity script is proposed (Figure 2), containing text and audio materials to perform during the sessions (Figure 3). The user is led to each session sequentially, and by selecting the "practice" option, they will have access to the textual material for understanding Mindfulness concepts and understanding the technique that will be performed at that stage. At the end of the reading, the user can practice with accompanying relaxing audio specific to the current session.

**Figure 2** - Schedule of activities to perform during one week. Self elaboration.



**Figure 3** - Audio playing during a session. Self elaboration.



In order to evaluate the quality of the therapeutic practice and to know the user's mental state during the program, a self-reported depression, anxiety and stress self-report questionnaire, DASS-21 (Depression, Anxiety and Stress) was applied at the end of each week. Scale), which is in the public domain and is commonly used to measure symptoms of depression and anxiety.<sup>19</sup> The user should indicate levels 0,1,2 or 3 for each item requested, as shown in figure 4. Check the Figure 5 The full DASS-21 questionnaire.



**Figure 4** - Questionnaire for evaluation of the week. Self elaboration.



**Figure 5** - Depression, anxiety and stress self-report questionnaire (DASS-21). Self elaboration.

DASS-21

Nome \_\_\_\_\_ Data \_\_\_\_/\_\_\_\_/\_\_\_\_

Por favor leia cada uma das afirmações abaixo e assinale 0, 1, 2 ou 3 para indicar quanto cada afirmação se aplicou a si durante a semana passada. Não há respostas certas ou erradas. Não leve muito tempo a indicar a sua resposta em cada afirmação.

---

A classificação é a seguinte:

0 – não se aplicou nada a mim  
 1 – aplicou-se a mim algumas vezes  
 2 – aplicou-se a mim de muitas vezes  
 3 – aplicou-se a mim a maior parte das vezes

1 Tive dificuldades em me acalmar	0	1	2	3
2 Senti a minha boca seca	0	1	2	3
3 Não consegui sentir nenhum sentimento positivo	0	1	2	3
4 Senti dificuldades em respirar	0	1	2	3
5 Tive dificuldade em tomar iniciativa para fazer coisas	0	1	2	3
6 Tive tendência a reagir em demasia em determinadas situações	0	1	2	3
7 Senti tremores (por ex., nas mãos)	0	1	2	3
8 Senti que estava a utilizar muita energia nervosa	0	1	2	3
9 Preocupe-me com situações em que podia entrar em pânico e fazer figura ridícula	0	1	2	3
10 Senti que não tinha nada a esperar do futuro	0	1	2	3
11 Dei por mim a ficar agitado	0	1	2	3
12 Senti dificuldade em me relaxar	0	1	2	3
13 Senti-me desanimado e melancólico	0	1	2	3
14 Estive intolerante em relação a qualquer coisa que me impedisse de terminar aquilo que estava a fazer	0	1	2	3
15 Senti-me quase a entrar em pânico	0	1	2	3
16 Não fui capaz de ter entusiasmo por nada	0	1	2	3
17 Senti que não tinha muito valor como pessoa	0	1	2	3
18 Senti que por vezes estava sensível	0	1	2	3
19 Senti alterações no meu coração sem fazer exercício físico	0	1	2	3
20 Senti-me assustado sem ter tido uma boa razão para isso	0	1	2	3
21 Senti que a vida não tinha sentido	0	1	2	3

## DISCUSSION

The user interaction with the smartphone helps in the implementation of therapies like Mindfulness in breast cancer patients, because through the application the user can interact with the treatment in different environments and times, giving the freedom to organize a schedule in which it is. You can manage your schedules. Its use may be established during cancer treatment or when it has already been completed. However, the user-defined therapeutic program does not disregard the guidance of a healthcare professional, given that the purpose of the application is to

add qualities to treatment outcomes, and that it functions as an element that causes long-term changes in moods, happiness, and well-being.<sup>9</sup>

In a simple search for the word “Mindfulness” on PlayStore (Android App Store), you could identify just two free apps targeted at this practice. However, they do not conduct assessment questionnaires about users’ technology or mental state after applying the techniques or reading instructional materials, and the only source of information found about the quality of these applications is the ratings left on their app store page. In a simple search in the sources of articles available on the internet, no studies involving these applications were found. It is noteworthy that these searches were performed only for consultation merit, and to demonstrate the need for applications directed to the elements studied here.

## CONCLUSION

The publication of this app is a breakthrough within technologies for therapies for women with breast cancer that are exposed to the impact factors on physical and mental health presented here. Using Mindfulness, the app promotes healthy interaction with technology through quick and dynamic access to materials that provide instruction on treatment steps and practice follow-up audios. Its intuitive structure enables the elaboration of a schedule that collaborates with the full and continuous exercise of mindfulness, which can bring instant and lasting benefits at different times of cancer treatment.

The Mindfulness program in its face-to-face version has shown significant results in cancer-affected individuals, but there are few ways to attest to its benefits when practiced with the aid of an application. Thus, the presence of a questionnaire to be completed after each week of mindfulness practice that aims to evaluate reports of symptoms of anxiety, depression and stress, allows to verify if during the development of the meditation sessions the user presented improvement of his / her own subjective state.

Thus, with the spread of the use of this tool it will be possible to identify how each user applied Mindfulness, time spent in sessions, treatment abandonment, disease stage, among others. The results obtained through the app can contribute to the implementation of new content and new ways of interacting with the tool, and corroborate MensSans as a beneficial and easily accessible therapeutic alternative for breast cancer patients.

## REFERENCES

1. Instituto Nacional de Câncer (INCA). Tipos de Câncer. Ministério da Saúde. *Câncer de Mama. Versão para pacientes* [Internet]. 2018 [acesso em 2018 ago 8]. Disponível em: <https://www.inca.gov.br/tipos-de-cancer/cancer-de-mama>
2. Silva LC. *Câncer de mama e sofrimento psicológico: aspectos relacionados ao feminino*. Psicologia em Estudo [Internet]. 2008 abr/jun [acesso em 2018 nov 5]; 13(2): 231-237. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1413-73722008000200005](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-73722008000200005)
3. Bartley T. *Mindfulness-Based Cognitive Therapy for Cancer*. Reino Unido: John Wiley & Sons, Ltd; 2012.

4. Maluf MF, Mori LJ, Barros AC. *O impacto psicológico do câncer de mama*. Rev. Bras. Cancerol. [Internet]. 2005 abr [acesso em 2018 set 23]; 51(2): 149-154. Disponível em: [https://rbc.inca.gov.br/site/arquivos/n\\_51/v02/pdf/revisao1.pdf](https://rbc.inca.gov.br/site/arquivos/n_51/v02/pdf/revisao1.pdf)
5. Coelho BA. *Impacto do Mindfulness em mulheres submetidas a biópsia de mama: avaliação de parâmetros quantitativos e qualitativos dos marcadores de estresse* [tese]. Lisboa: Universidade Estadual Botucatu; 2018 [acesso em 2019 fev 12]. Disponível em: [https://repositorio.unesp.br/bitstream/handle/11449/153762/coelho\\_ba\\_dr\\_bot.pdf](https://repositorio.unesp.br/bitstream/handle/11449/153762/coelho_ba_dr_bot.pdf)
6. Sociedade Brasileira de Mastologia (SBM). IG São Paulo. *Demora no diagnóstico resulta na retirada da mama em 70% dos casos de câncer*. [Internet]. 2018 mai [acesso em 2018 jul 15]. Disponível em: <https://saude.ig.com.br/minhasaude/2018-05-07/cancer-de-mama-mastectomia.html>
7. Shennan C, Payne S, Fenlon D. *What is the evidence for the use of mindfulness-based interventions in cancer care? A review*. Psycho-oncol. [Internet]. 2011 jun [acesso em 2019 fev 10]; 20(7): 681-97. Disponível em: [https://www.researchgate.net/publication/45509491\\_What\\_is\\_the\\_evidence\\_for\\_the\\_use\\_of\\_mindfulness-based\\_interventions\\_in\\_cancer\\_care\\_A\\_review](https://www.researchgate.net/publication/45509491_What_is_the_evidence_for_the_use_of_mindfulness-based_interventions_in_cancer_care_A_review)
8. Ledesma D, Kumano H. *Mindfulness-based stress reduction and cancer: a meta-analysis*. Psycho-oncol. [Internet]. 2008 nov [acesso em 2019 jan 21]; 18(6): 571-9. Disponível em: [https://www.researchgate.net/publication/23487852\\_Mindfulness-based\\_stress\\_reduction\\_and\\_cancer\\_A\\_meta-analysis](https://www.researchgate.net/publication/23487852_Mindfulness-based_stress_reduction_and_cancer_A_meta-analysis)
9. Williams M, Penman D. *Atenção Plena - A Felicidade Aguarda*. Rio de Janeiro-RJ: GMT Editores Ltda; 2015.
10. Demarzo M, Garcia-Campayo J. *Mindfulness Aplicado à Saúde*. In: Augusto DK, Umpierre RN. *PROMEF - Programa de Atualização em Medicina de Família e Comunidade*. Porto Alegre-RS: Artmed Panamericana; [Internet]. 2017 mai [acesso em 2019 abr 13]. pp.125-64. Disponível em: [https://www.researchgate.net/publication/317225586\\_Mindfulness\\_Aplicado\\_a\\_Saude\\_Mindfulness\\_for\\_Health](https://www.researchgate.net/publication/317225586_Mindfulness_Aplicado_a_Saude_Mindfulness_for_Health)
11. Keng SL, Smoski MJ, Robins CJ. *Effects of Mindfulness on Psychological Health: A Review of Empirical Studies*. Clin. psychol. rev. [Internet]. 2011 abr [acesso em 2019 jan 27]; 31(6): 1041-1056. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3679190/>
12. Castanhel FD, Liberali R. *Redução de Estresse Baseada em Mindfulness nos sintomas do câncer de mama: revisão sistemática e metanálise*. Einstein (São Paulo) [Internet]. 2018 dez [acesso em 2019 mar 5]; 16(4): eRW4383. Disponível em: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1679-45082018000400400](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1679-45082018000400400)
13. Cramer H, Lauche R, Paul A, Dobos G. *Mindfulness-based stress reduction for breast cancer - a systematic review and meta-analysis*. Curr. oncol. rep. [Internet]. 2012 out [acesso em 2019 abr 11]; 19(5): e343-e352. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3457885/>
14. Astin JA. *Mind-body therapies for the management of pain*. Clin. j. pain. [Internet]. 2004 jan/fev [acesso em 2019 abr 20]; 20(1):27-32. Disponível em: <https://static1.squarespace.com/static/5c084f7931d4dfcab1b2c53c/t/5c61ca1e24a694f373ca4ef4/1549912607562/astincjp.pdf>
15. Fundação Getúlio Vargas de São Paulo (FGV-SP). *O Estado de S. Paulo. Brasil já tem mais de um smartphone ativo por habitante, diz estudo da FGV*. [Internet]. 2018 mai [acesso em 2018 set 10]. Disponível em: <https://link.estadao.com.br/noticias/geral,brasil-ja-tem-mais-de-um-smartphone-ativo-por-habitante-diz-estudo-da-fgv,70002275238>
16. Associação Brasileira de Startups (ABStartups). *IT Fórum 365. 2019: ano promissor para as startups no Brasil*. [Internet] 2019 jan [acesso em 2018 set 17]. Disponível em: <https://itforum365.com.br/2019-ano-promissor-para-as-startups-no-brasil/>
17. Mani M, Kavanagh DJ, Hides L, Stoyanov SR. *Review and Evaluation of Mindfulness-Based iPhone Apps*. J. med. internet res. [Internet]. 2015 jul/set [acesso em 2019 mar 18]; 3(3): e82. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4705029/>
18. Pressman RS. *Engenharia de software*. São Paulo: Makron Books,1995.
19. Fox RS, Lillis TA, Gerhart J, Hoerger M, Duberstein P. *Multiple Group Confirmatory Factor Analysis of the DASS-21 Depression and Anxiety Scales: How Do They Perform in a Cancer Sample?*. Psychol. rep. [Internet]. 2017 ago [acesso em 2019 abr 28]; 121(3): 548-565. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6053047/>

Received in: 04/08/2019  
Required revisions: 16/10/2019  
Approved in: 19/10/2019  
Published in: 01/06/2020

**Corresponding author**

Leandro Santiago da Silva  
**Address:** Rua Ariúis, 139, Catolé  
Campina Grande/PB, Brazil  
**Zip code:** 58410-284

**E-mail address:** leandrosantiago@hotmail.com.

**Telephone number:** +55 (83) 98847-8078

**Disclosure:** The authors claim  
to have no conflict of interest.