

Development of software for health promotion during climacteric: evidences of validity and semantic appropriateness

Desenvolvimento de software para promoção da saúde no climatério: evidências de validade e adequação semântica
Desarrollo de un programa informático para promoción de la salud durante la menopausia: evidencias de validez y adecuación semántica

Geísa Machado Fontenele¹ , Malvina Thaís Pacheco Rodrigues¹ , Thereza Maria Magalhães
Moreira² , Andrea Cronemberger Rufino³ 

Corresponding author:

Geísa Machado

Fontenele

E-mail:

geysaenf@gmail.com

¹Universidade Federal do Piauí. Teresina (PI),

²Universidade Estadual do Ceará. Fortaleza (CE), Brasil.

³Universidade Estadual do Piauí. Teresina (PI), Brasil.

Abstract

Objective: To develop software with evidences of validity and semantic appropriateness regarding health promotion during the climacteric. **Method:** A methodological study conducted in three stages: specification; development; and validity analysis. Validity was assessed by 10 expert judges specializing in gynecology/women's health, and its semantics were analyzed by 11 users of the public health system. The Concordance Index was calculated, and a binomial test was performed. **Results:** The software's content was organized into seven dimensions: 1) Understanding the Climacteric; 2) Healthy Lifestyle; 3) Main Climacteric Complaints; 4) Disease Prevention; 5) Oral Health; 6) Sexuality; 7) Hormone Therapy, Natural Medicine, and Complementary Practices. The software includes a diary feature for recording trigger situations related to the occurrence of hot flashes, which are common during the climacteric. Evidence of validity was found, with an overall agreement rate of 86.4% among the judges. In the binomial test, agreement rates of >85% ($p>0.05$) were evident for each attribute within the dimensions. **Conclusion:** The "Climatério e Saúde®" software provides information with evidence of validity and semantic appropriateness regarding health promotion during the climacteric. It brings to practice a wide range of content on health promotion during the climacteric, grouped within a single validated educational technology.

Descriptors:

Mobile Applications; Climacteric; Validation Study; Menopause; Health Promotion.



How to cite this article:

Fontenele GM, Rodrigues MTP, Moreira TMM, Rufino AC. Development of software for health promotion during climacteric: evidences of validity and semantic appropriateness. Rev. enferm. UFPI. 2026 [Cited: ano mês abreviado dia];15: e6145. DOI: 10.26694/reufpi.v15i1.6145.

Whats is already known on this?

Mobile applications (apps) provide a wide range of possibilities for use and can serve as alternatives for access to disease prevention and health promotion by encouraging healthy practices.

What this study adds?

The availability of free information technology, presented in accessible language and featuring reliable, validated information, is essential for changing habits and symptom control during the climacteric.

Resumo

Objetivo: Desenvolver um software com evidências de validade e adequação semântica sobre promoção da saúde no climatério. **Método:** Estudo metodológico executado em três etapas: especificação; desenvolvimento e; análise da validade. Validade atestada por 10 juízas especialistas em ginecologia/saúde da mulher e sua semântica, analisada por 11 usuárias do sistema público de saúde. Foi calculado Índice de Concordância e realizado teste binomial. **Resultados:** O conteúdo do software foi organizado em sete dimensões: 1) Entendendo o Climatério; 2) Estilo de vida saudável; 3) Principais queixas do climatério; 4) Prevenção de doenças; 5) Saúde Bucal; 6) Sexualidade; 7) Terapia hormonal, medicina natural e práticas complementares. A funcionalidade do software tem um diário para anotar situações-gatilho relacionadas à ocorrência das ondas de calor comuns no climatério. Encontrou-se evidência de validade ao constatar concordância geral de 86,4% entre as juízas. No teste binomial, restaram evidentes proporções >85% ($p>0,05$) de concordância por atributo das dimensões. **Conclusão:** O software “Climatério e Saúde®” disponibiliza informações com evidências de validade e adequação semântica sobre promoção da saúde no climatério. Traz para prática amplo conteúdo sobre promoção da saúde no climatério de forma agrupada em uma mesma tecnologia educativa validada.

Descritores:

Aplicativos móveis; Climatério; Estudo de validação; Menopausa; Promoção da saúde.

Resumen

Objetivo: Desarrollar un programa informático con evidencia de validez y adecuación semántica sobre promoción de la salud durante la menopausia. **Método:** Estudio metodológico de tres etapas: especificación; desarrollo; y análisis de la validez. La validez fue certificada por 10 juezas expertas en ginecología/salud de la mujer, y su semántica fue analizada por 11 usuarias del sistema público de salud. Se calculó Índice de Concordancia y prueba binomial. **Resultados:** El contenido del software tiene siete dimensiones: 1) Comprender la menopausia; 2) Estilo de vida saludable; 3) Principales molestias de la menopausia; 4) Prevención de enfermedades; 5) Salud bucodental; 6) Sexualidad; 7) Terapia hormonal, medicina natural y prácticas complementarias. El software incluye un diario para anotar situaciones desencadenantes relacionadas con las oleadas de calor habituales en la menopausia. Se encontraron pruebas de validez al constatar una concordancia general del 86,4% entre las evaluadoras. En la prueba binomial, se observaron proporciones evidentes >85% ($p>0,05$) de concordancia por atributo de las dimensiones. **Conclusión:** El software “Climatério e Saúde®” ofrece información con evidencia de validez y adecuación semántica sobre la promoción de la salud durante la menopausia. Aporta a la práctica un amplio contenido sobre el tema, agrupado en una misma tecnología educativa validada.

Descriptores:

Aplicaciones Móviles; Climaterio; Estudio de Validación; Menopausia; Promoción de la Salud.

INTRODUCTION

The climacteric is the period marked by changes in female reproductive function, with psychobiological and social repercussions, which occurs between the ages of 40 and 65, with menopause – or the permanent cessation of menstruation – as its defining milestone. During this stage of the life cycle, women experience biopsychosocial changes with varying frequency, requiring care that considers their physical, psychological, and social characteristics.⁽¹⁾

Although it is a complex phase in women's lives that requires health care to reduce its potential psychological, endocrine, and somatic effects, the climacteric has been the subject of few studies compared

to other phases, such as the pregnancy and postpartum periods. The topic remains marked by taboos, even though there is unmet demand for information on the subject.⁽²⁻³⁾

Furthermore, the climacteric is generally perceived by women in our society as a negative event, with perceptions focused on the body's aging, emotional imbalance, and unpleasant symptoms, which requires strategies that enable women to experience this phase positively and with better quality of life.⁽¹⁻⁴⁾

With the updating of women's health care policies in the country, increased life expectancy, and the constant use of Information and Communication Technology (ICT) tools as allies in care, software offering recommendations on health promotion during the climacteric – provided free of charge and in accessible language, with reliable information and evidences of validity and semantic appropriateness – is essential, since health problems during this phase are potentially modifiable through information, symptom control, and lifestyle changes.⁽⁴⁾ The objective of this study was to develop software with evidences of validity and semantic appropriateness regarding health promotion during the climacteric

METHODS

This is a methodological study conducted in three stages (specification, development, and validity analysis)⁽⁵⁾, carried out in a capital city in northeastern Brazil from 2019 to 2021. Participants were approached individually and, upon agreeing to participate, signed the informed consent form. The sample was selected by convenience in the waiting room for appointments and examinations at a gynecology clinic of the Unified Health System and consisted of 11 women. Next, the researcher read aloud the information contained in each of the seven sections that made up the information guide: 1) Understanding the Climacteric; 2) Healthy Lifestyle; 3) Main Climacteric Complaints; 4) Disease Prevention; 5) Oral Health; 6) Sexuality; 7) Hormone Therapy, Natural Medicine, and Complementary Practices. Then, she asked the women to narrate aloud what they had understood from the reading. Based on the information that raised questions or were not understood by the women, changes were made, resulting in a new version of the content inserted into the software.

Specification Phase

In the initial specification phase, an integrative review⁽⁷⁾ was conducted with the following research question: "Which recommendations for promoting women's health during the climacteric are supported by scientific evidence and should be included in the content of software on this topic?" The search for primary studies was conducted in the Virtual Health Library (BVS) and the Medical Literature Retrieval System Online (MEDLINE/PubMed) via the National Library of Medicine, consulting the Medical Subject Headings (MeSH) and the Web of Science Core Collection. The search period was from May to June 2019. The following descriptors were used to formulate the search strategies: ("climacteric," "menopause," "perimenopause," "postmenopause," "premenopause," "clinical protocols," "guidelines," "primary health care," "health promotion," "health education," "primary care," "disease prevention," "postmenopausal woman"). Studies published in the last five years (May 2014 to May 2019) were included; these were full-text articles addressing the topics of the climacteric and health promotion, published in English, Portuguese, or Spanish. Articles that did not meet the inclusion criteria were excluded, as were technical standards, manuals, laws, resolutions, editorials, letters, commentaries, conference abstracts, and duplicate publications.

The selected articles were classified according to their level of evidence, based on the classification by Melnyk and Fineout-Overholt,⁽⁸⁾ into seven levels, with Level 1 representing the highest level of evidence. To analyze the selected articles, tables were used to organize them by title, journal, year of publication, level of evidence, and recommendations. The information from the software was supplemented by gray literature, including references from official national and international agencies that focus on the climacteric.

In this article, the main reporting guideline used was the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which provides guidance for reporting different types or aspects of systematic reviews and other types of evidence synthesis (e.g., review studies).⁽⁶⁾

After classifying the scientific evidence, a spreadsheet was created, divided into guidance areas that make up the software's data system. Based on the results of the literature review, an information guide was developed, and plans were then made to incorporate this information into the software. During this phase of the study, the textual and illustrative content was defined, as well as the interactive functions that would be part of the software.

Development Phase

In the second stage, content validation and semantic analysis were performed. Content validation consists of an analysis of the recommendations contained in the software by expert judges in the field, who evaluate the content and determine whether the items correspond to what was proposed in the study.⁽⁹⁾

To select the judges, parameters were developed based on Fehring's selection criteria.⁽¹⁰⁾ The category of judges included gynecologists and nurses working in the field of gynecology/women's health, as they are professionals with expertise in the topic of the climacteric and are directly involved in the process of caring for this population.

The instrument containing guidelines for health promotion during the climacteric was evaluated for its level of relevance and verbal comprehensibility. For each item or area, four response categories were defined, scored from 1 to 4 on a Likert scale. The evaluation was conducted using the following adjectives: Regarding the level of relevance: (1) not at all relevant, (2) somewhat irrelevant, (3) very relevant, and (4) highly relevant; regarding verbal comprehensibility: (1) not understandable, (2) somewhat understandable, (3) very understandable, and (4) highly understandable. A space was provided for justifications and suggestions.

The judges who agreed to participate in the study (11 female judges) received an invitation letter via email. Upon acceptance, a link to Google Forms, an Informed Consent Form (ICF), a questionnaire for socioprofessional assessment, an instruction guide, the software content, and a questionnaire for content evaluation were sent. A 15-day deadline was set for the expert judges to return the instrument, which could be extended for an additional 15 days. Judges who, after this deadline, did not return the instrument fully evaluated and analyzed were excluded from the sample.

In the semantic analysis, women whose profiles matched those of the technology's users evaluated each section of the software, indicating their level of comprehension and understanding of the information. This stage was conducted by women aged 40 to 65 who were waiting for an outpatient gynecological appointment and reported climacteric symptoms. A diverse sample was recruited in terms of socioeducational and cultural background, given that this clinic serves patients from across the state on a daily basis, as the institution is a referral center for medium and high-complexity care in Piauí. Inclusion criteria for the study were women aged 40 to 65 who reported climacteric symptoms, had an educational level sufficient for reading, and owned smartphones. Women who could not read or did not own smartphones were excluded.

Data were collected via a questionnaire, an assessment instrument for the guidelines administered to the women and judges.

Validation Phase

For content validation, the concordance index (CI) was calculated, a quantitative procedure that indicates the extent to which experts' opinions agree. The CI is calculated using a 4-point ordinal Likert scale. The following formula was used to calculate the CI: [% Concordance = (number of "3" and "4" responses) / (total number of participating judges)]. A binomial test was also applied to verify agreement among the judges, with a p-value > 0.85 (≥85%) considered appropriate. A significance level (α) of 5% was adopted.¹⁰

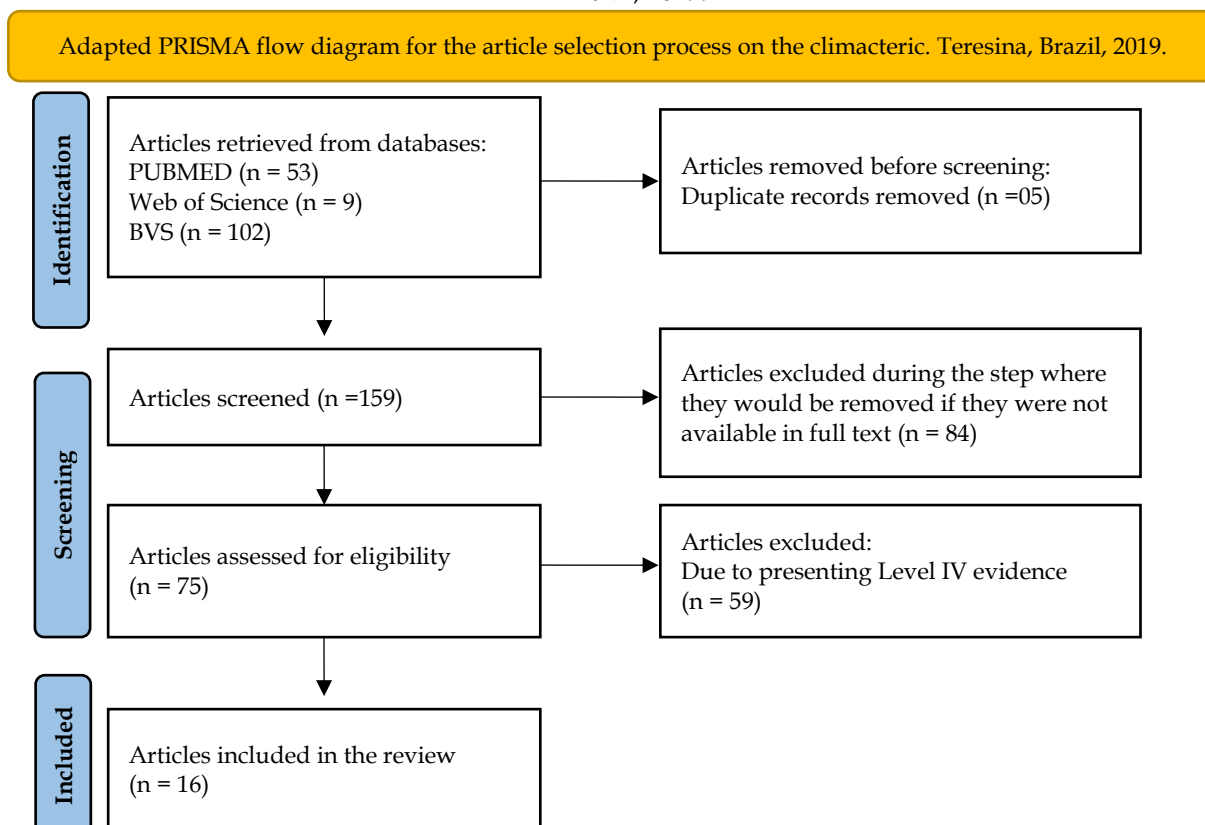
To develop the technology, support was provided by an undergraduate student in the Computer Science program at the Federal University of Piauí, who was a scholarship recipient of the Program for Initiation in Technological Development and Innovation (PIBIT). The software development process followed Somerville's⁽¹²⁾ recommendations, which comprise a set of systematic stages: 1) software specification; 2) software implementation; 3) software validation; 4) system evolution. This research addressed the first three stages mentioned.

This research was submitted for review by a research ethics committee and was conducted in accordance with ethical principles in all its phases, being approved under Opinion No. 3.191.129.

RESULTS

The search and selection of scientific evidence on health promotion during the climacteric in online databases initially yielded 164 articles. Of these, five were excluded because they were duplicates, and 84 were excluded because full-text versions were not available. After stratification by level of scientific evidence, 59 were removed because they were classified as Level IV, leaving 16 studies for evaluation, which were analyzed in full and classified by level of evidence.

Figure 1. PRISMA flow diagram illustrating the selection of articles on the climacteric. Teresina (PI), Brazil, 2019.



Source: Adapted from PRISMA, 2020.

After analyzing indexed literature and gray literature, the content of the software titled “Climacteric and Health” was presented in seven areas:

Area 1, “Understanding the Climacteric”: aims to clarify the definition of age groups, milestones, and situations that characterize the climacteric and menopause. The goal was to highlight the importance of the psychosocial aspects experienced during this phase. This area comprised the following topics: What is the climacteric?; What is menopause?; Physical, psychological, and social changes during the climacteric.

Area 2, “Healthy Lifestyle”: focused on the importance of a healthy lifestyle for promoting health and disease prevention. Recommendations were provided to encourage physical activity and a healthy diet.

Area 3, “Main Climacteric Complaints: What to Do?”: highlights care guidelines and recommendations related to the main complaints reported by women during the climacteric, whether transient or long-lasting. It addresses the symptoms that most significantly impact a woman’s quality of life during this period, including: 1) insomnia; 2) symptoms related to the urinary and genital organs; 3) hot flashes and night sweats; and 4) psychological disorders.

Area 4, “Disease Prevention”: provides guidance focused on the prevention of chronic and metabolic diseases, to which women become more prone after ovarian failure; information on the prevention of osteoporosis and falls; prevention and screening for cervical and breast cancers; and prevention of sexually transmitted infections (STIs).

Area 5, “Oral Health”: aims to promote the understanding that oral and dental care are also important for overall health during the climacteric and aging.

Area 6, “Sexuality”: This area provided information on the experience of female sexuality during the climacteric and aging. The topic was addressed as a natural aspect of life, and any difficulties that may arise during this phase should be treated using available therapies.

Area 7, “Hormone Therapy (HT), Natural Medicine, and Complementary Practices”: This section addressed the available therapeutic options and those most frequently used to relieve climacteric symptoms: hormone therapy (HT) and treatments based on natural medicine and complementary

practices, such as acupuncture, homeopathy, meditation, yoga and stretching, flower remedies, and herbal medicine.

Content validation was performed by ten judges. The group that participated in the validation consisted entirely of women. Most were nurses (60%), had graduated more than ten years prior (90%), held a doctorate in gynecology/women's health (80%), had written a thesis and/or dissertation on the subject (50%), and were between the ages of 50 and 60 (80%).

The software's CI exceeded the minimum agreement threshold of 0.80 stipulated in the literature for verifying the validity of an instrument.^(5,13-14) To further validate the software, the binomial test was also applied, based on the assumption that the proportion of agreement (p) is >85% (one-sided), with a significance level (α) of 5%. The binomial test demonstrated that all proportions of concordance for each attribute across the areas were >85% ($p>0.05$).

Table 1. Average Concordance Index (CI) scores among female judges by the attributes of Relevance (R) and Verbal Comprehension (VC) by area. Teresina (PI), Brazil, 2020.

Areas R/VC	1		2		3		4		5		6		7		Total
	R*	VC†	R	VC	R	VC	R	VC	R	VC	R	VC	R	VC	
Average	3.5	3.6	3.6	3.5	3.6	3.5	3.4	3.3	3.3	3.4	3.4	3.5	3.2	3.4	3.4
CI(%)	90%	90%	90%	80%	90%	80%	80%	80%	90%	90%	90%	90%	80%	90%	86.4

R*- Relevance by área; VC†- Verbal comprehension by area.

Source: authors (2020).

Some areas showed a borderline CI (80%) in the items "Relevance" (R) and "Verbal Comprehension" (VC), notably Area 4, "Disease Prevention." An CI of 80% does not invalidate the test; it should be interpreted in light of the scores achieved in the other areas. In this study, the scores achieved in most areas are above 85%, which confirms the test's validity.

Table 2 presents the percentage of agreement ($\geq 85\%$) from the binomial test for the attributes by area.

Table 2. Percentage of agreement ($\geq 85\%$) from the binomial test for the attributes by area. Teresina (PI), Brazil, 2020.

Software Dimension	Attributes					
	Relevance			Verbal Comprehension		
	n	%	p-value ¹	n	%	p-value ¹
Understanding the Climacteric	9	90.0	0.803	9	90.0	0.803
Healthy Lifestyle	9	90.0	0.803	8	80.0	0.456
Common Climacteric Complaints	9	90.0	0.803	8	80.0	0.456
Disease Prevention	8	80.0	0.456	8	80.0	0.456
Oral Health	9	90.0	0.803	9	90.0	0.803
Sexuality	9	90.0	0.803	9	90.0	0.803
Hormone Therapy, Natural Medicine, and Complementary Practices	8	80.0	0.456	9	90.0	0.803
Overall (n = 140)	n=121; 86.4%; p-value 0.639 ²					

¹Binomial Test; ²Test for Proportions.

Source: authors (2020).

The semantic analysis was conducted with 11 women selected by convenience from the waiting room of a reference public gynecology outpatient clinic in the state, while they were waiting for a medical or nursing consultation or gynecological exams.

Figure 2 illustrates the home screen of the *Climatério e Saúde®* app, with navigation options organized into seven areas, in addition to the "Diary" feature for recording information about situations that trigger hot flashes, "Reminders," and "Contact Us." It is also possible to navigate through the sections and their subcategories containing information relevant to health promotion during the climacteric. For example, the "Healthy Lifestyle" area also includes information on physical activity, healthy eating, and sleep hygiene, among other topics.

Figure 2. Main menu of the *Climatério e Saúde*® app, Teresina (PI), Brazil, 2019.

Source: authors (2020).

DISCUSSION

Limited understanding of menopause and its implications can lead to misinformation, fear, and stigmatization of this natural stage of life.⁽¹⁴⁾ For some women, the menopausal transition may go unnoticed, while for others it triggers various changes in physical and mental health that can potentially impact their quality of life. Therefore, there is a need to provide more information, resources, and support for women going through menopause.⁽¹⁵⁾

Over the past few decades, the landscape of women's healthcare has undergone transformations, and health technologies – especially Information and Communication Technology (ICT) tools – have been integrated into this field, becoming allies in the care process, with an unprecedented increase in the scale and diversity of their use. Tools for telehealth, telemonitoring, telecare, and the use of mobile apps are substantially affecting health care delivery and production.⁽¹⁶⁾

In the field of women's health, the majority of existing apps address aspects of the menstrual cycle, fertility, physical activity, and gynecological conditions. In addition, many of them are available in English and may also involve a cost to purchase. A small but growing number of mobile health (mHealth) apps focus specifically on menopause, generally addressing patient education, symptom monitoring, and therapeutic guidance. A longitudinal study that followed 1,900 women who used the "Health & Her" app found that those who interacted more frequently with the app's features – such as symptom tracking, menstrual cycle tracking, and in-app activities – experienced significantly greater reductions in menopausal symptoms over a two-month period.⁽¹⁷⁾

Thus, mobile health apps designed to meet the needs of women during menopause and supervised by specialists can increase their awareness and knowledge and, consequently, have the potential to prevent menopausal complications.⁽¹⁸⁾ However, a systematic review of 22 mHealth apps for menopause revealed that only 27.3% of the apps involved healthcare professionals in their development, and only 22.7% used evidence-based information. Regarding links to additional information, only 44% of the apps provided sources for their information (academic papers, reports, or links), which raises concerns about the quality

and reliability of these tools.⁽¹⁷⁾ Therefore, the process of developing and validating apps based on the scientific method is essential.

In the validation process conducted with experts – which included nurses and physicians with experience in women's health and gynecology, whether in clinical practice, teaching, or research – the results demonstrate that the content of the *Climatório e Saúde*® software is valid, as the statistical tests employed provided evidence of the validity of the information incorporated into the technology. The software's CI was higher than the minimum agreement threshold of 0.80 stipulated in the literature for verifying the validity of an instrument.^(5,13) This confirms that the technology is reliable and contains robust information, making its use appropriate for promoting women's health during the climacteric.

The application of the binomial test yielded p-values greater than 0.05, indicating an adequate proportion of judges in agreement regarding the appropriateness and relevance of the information.⁽¹⁰⁾ The contribution of professionals from different fields is important in the development and validation of educational technologies. A multiprofessional perspective incorporates distinctive features of different practices, broadens the relevant knowledge base, enhances the quality of the product, and facilitates its practical use.⁽¹⁹⁾

Semantic analysis is another very important step in this process. An Australian randomized controlled trial on the use of apps by pregnant women found that, although apps are easy to download and require no training or computer skills, their acceptance among low-income women may be lower depending on ethnicity. These findings suggest that the available apps may not be meeting the needs of the population groups studied, highlighting the need for cultural adaptation of such tools during their development.⁽²⁰⁾

A study that analyzed users' perceptions and experiences with the apps and whether they contributed to improving their experience with menopause found that of the 551 reviews analyzed, 397 (72%) were positive, 112 (20%) were negative, and 42 (8%) were neutral. Overall, app features such as the diary and data reports enhanced users' knowledge and understanding of their condition.⁽¹⁵⁾

Thus, it is clear how important it is to validate the educational technology with its target audience, given that this step ensures a greater likelihood of acceptance and understanding of the information it contains. Textual changes were made to the *Climatório e Saúde*® software after identifying words or expressions that were not understood by the study participants and that required modifications to make the information clearer.

As a limitation of the study, we note the need for usability testing with the women who make up the study's target audience, in order to assess the need to include other hypermedia tools that would make the technology more interactive. These tests may also identify other gaps, enabling further refinement, which will ensure greater efficiency of *Climatório e Saúde*®. In addition, the app is currently available only for the Android operating system. This limitation restricts access for a large portion of the population, impacting the use of the technology. However, a request has already been made to make it available for iOS.

The *Climatório e Saúde*® software offers users validated information on health promotion during the climacteric, free of charge and in accessible language. The tool provides reliable information based on current scientific evidence and helps fill the existing gap in the field of specific interventions targeting the health of women in the climacteric.

Furthermore, the fact that it provides extensive content on health promotion during the climacteric, all consolidated within a single tool, is a key distinguishing feature of the educational technology developed and validated in this study. The information is presented through text and images, aiming to facilitate its understanding and retention

CONCLUSION

The *Climatório e Saúde*® software provides evidence-based information that is semantically appropriate regarding health promotion during the climacteric. The tool presents validated information on health promotion during the climacteric organized into seven dimensions: 1) Understanding the Climacteric; 2) Healthy Lifestyle; 3) Common Climacteric Complaints; 4) Disease Prevention; 5) Oral Health; 6) Sexuality; 7) Hormone Therapy, Natural Medicine, and Complementary Practices. It is registered with the National Institute of Industrial Property (INPI) under Case No. BR512021001457-0 and is available free of charge at:

<https://play.google.com/store/apps/details?id=com.devUFPI.projectClimaterioESaude>

CONTRIBUTIONS

Contributed to the conception or design of the study/research: Machado GF, Pacheco MTP, Moreira TMM, Rufino AC. Contributed to data collection: Machado GF, Pacheco MTP, Moreira TMM, Rufino AC. Contributed to the analysis and/or interpretation of data: Machado GF, Pacheco MTP. Contributed to article writing or critical review: Moreira TMM, Rufino AC. Final approval of the version to be published: Moreira TMM, Rufino AC.

REFERENCES

1. Ministério da Saúde (BR). Instituto Sírio Libanês de ensino e pesquisa. Protocolos de Atenção Básica: saúde das Mulheres. Brasília (DF): Ministério da Saúde; 2016. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/protocolos_atencao_basica_saude_mulheres.pdf
2. Amaral ICGA. Conhecimento sobre menopausa de acordo com mulheres brasileiras de meia idade: um estudo de base populacional [dissertação]. Faculdade de Ciências Médicas, Universidade Estadual de Campinas. São Paulo, 2018. Disponível: http://bdtd.ibict.br/vufind/Record/CAMP_c153b1a63a67fef663d4b5d0a84af7b8
3. Mazzetto FMC, Marin MJS, Ferreira MLSM, Orso LF. The experience of the climacteric period for women without children. *Millenium*. 2019;2(10):21-30. DOI: <https://doi.org/10.29352/mill0210.02.00238>
4. Assunção DFS, Pires DHK, Barreto EL, Gonçalves FA, Dias RS. Quality of life of climateric stage women. *Rev. Soc. Bras. Clín. Méd.* 2017;15(2):80-3. Disponível: https://docs.bvsalud.org/biblioref/2017/11/875548/152_80-83.pdf
5. Polit DF, Beck CT. Fundamentos da pesquisa em enfermagem: avaliação de evidências na prática de enfermagem. 7. ed. Porto Alegre: Artmed; 2019.
6. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2009;372:71. DOI: <https://doi.org/10.1136/bmj.n71>
7. Botelho LLR, Cunha CCA, Macedo M. The integrative review method in organizational studies. *Gestão e Sociedade*. 2011;5(11):121-36. DOI: <https://doi.org/10.21171/ges.v5i11.1220>
8. Melnyk BM, Fineout-Overholt E. Making the case for evidence-based practice. In: Melnyk BM, Fineout-Overholt E. *Evidence-Based Practice in Neursing& Healthcare: a guide to best practice*. Phifadelphia: Lippincot Williams; 2005. Available from: <https://www.scirp.org/%28S%28vtj3fa45qm1ean45vvffcz55%29%29/reference/referencespapers.aspx?referenceid=938118>
9. Oliveira MS. Self care of the woman in the whitewashing of the mastectomy: study of appearance validation and content of the educative technology [dissertação]. Programa de Pós-Graduação em Enfermagem, Universidade Estadual do Ceará, Fortaleza, 2006. Available from: <https://repositorio.ufc.br/handle/riufc/1972>
10. Fehring RJ. Methods to validate nursing diagnoses. *Heart & Lung: The Journal of Critical Care*. 1987;16(6):625-29. Disponível em: https://epublications.marquette.edu/cgi/viewcontent.cgi?article=1026&context=nursing_fac
11. Oliveira SC, Lopes MVO, Fernandes AFC. Development and validation of an educational booklet for healthy eating during pregnancy. *Rev. Latino-Am. Enfermagem*. 2014;22(4):611-20. DOI: <https://doi.org/10.1590/0104-1169.3313.2459>
12. Sommerville I. *Engenharia de Software*. 9. ed. São Paulo: Pearson Prentice Hall; 2011.

13. Rocha TAH, Fachini LA, Thumé E, Silva NC, Barbosa ACQ, Carmo M, et al. Mobile health: new perspectives for healthcare provision. *Epidemiol. Serv. Saúde*. 2016;25(1):159-70. DOI: <https://doi.org/10.5123/S1679-49742016000100016>
14. Coronado, PJ. et al. Quality of life at peri- and postmenopause: analysis of the results from app “Mi Menopausia”. *Maturitas*. 2025;197(108267): DOI: <https://doi.org/10.1016/j.maturitas.2025.108267>
15. Sillence E, Hardy C, Kemp E. “This App Just Gets Me”: Assessing the Quality, Features and User Reviews of Menopause Smartphone Apps. *Journal of Consumer Health on the Internet*. 2023;27(2):156-172. DOI: <https://doi.org/10.1080/15398285.2023.2204287>
16. Coluci MZO, Alexandre NMC, Milani D. Construction of measurement instruments in the area of health. *Ciênc. Saúde Coletiva*. 2015;20(3):925-36. DOI: <https://doi.org/10.1590/1413-81232015203.04332013>
17. Karam J, Paul MM, Shufelt C, Ravikumar P, Fratianni AM, Oloyede S, et al. Evaluating the Efficacy of a Mobile Phone App in Enhancing Menopause Knowledge and Shared Decision-Making: Protocol for a Randomized Controlled Trial. *JMIR Res Protoc*. 2025;14:e76536. DOI: <https://doi.org/10.2196/76536>
18. Pourshahrokhi N, Hunter M, Farokhzadian J, Ahmadian L. Identifying the content, capabilities, and design features of a mobile-based cognitive behavioral therapy intervention for managing menopausal symptoms. *International Journal of Medical Informatics*. 2026;206. DOI: <https://doi.org/10.1016/j.ijmedinf.2025.106163>
19. Ribeiro PL, Cherubim DO, Padoin SMM, Paula CC. Creation and validation of a visual educational technology contente for lactation physiology learning. *Rev Bras Enferm*. 2020;73(6):e20190564. DOI: <http://dx.doi.org/110.1590/0034-7167-2019-0564>
20. Buchanan L, Anderson E, MBIostat HX, Phongsavan P, Rissel C, Wen LM et al. Sources of information and the use of mobile applications for health and parenting information during pregnancy: Implications for health promotion. *Health Informatics Journal*. 2021;27(3):1–10. Available from: <https://journals.sagepub.com/doi/pdf/10.1177/14604582211043146>

Conflicts of interest: No
Submission: 2024/19/09
Revised: 2025/07/07
Accepted: 2026/21/01
Publication: 2026/19/08

Editor in Chief or Scientific: José Wicto Pereira Borges
Associate Editor: Dayze Djanira Furtado de Galiza

Authors retain copyright and grant the Revista de Enfermagem da UFPI the right of first publication, with the work simultaneously licensed under the Creative Commons Attribution BY 4.0 License, which allows sharing the work with acknowledgment of authorship and initial publication in this journal.