EFFECT OF MOBILE APP-DELIVERED EDUCATION ON QUALITY OF LIFE IN WOMEN WITH BREAST CANCER: PROTOCOL

EFECTO DE LA EDUCACIÓN MEDIANTE APLICACIÓN MÓVIL EN LA CALIDAD DE VIDA DE MUJERES CON CÁNCER DE MAMA: PROTOCOLO

EFEITO DA EDUCAÇÃO POR APLICATIVO MÓVEL NA QUALIDADE DE VIDA DE MULHERES COM CÂNCER DE MAMA: PROTOCOLO

[1]Arlete Maria dos Reis Assis Maurílio
[2]Tiago Ricardo Moreira
[3]Beatriz Santana Caçador
[4]Bruno David Henriques
[5]Laylla Veridiana Castória Silva
[6]João Vitor Andrade

[1]Mestranda em Ciências da Saúde. Universidade Federal de Viçosa, Viçosa- MG, Brazil. ORCID: https://orcid.org/0009-0006-7389-0309
[2]Doutor em Saúde Pública. Universidade Federal de Viçosa, Viçosa- MG, Brazil. ORCID: https://orcid.org/0000-0002-6606-4942
[3]Doutora em Enfermagem. Universidade Federal de Viçosa, Viçosa- MG, Brazil. ORCID: https://orcid.org/0000-0003-4463-3611
[4]Doutor em Ciências da Saúde. Universidade Federal de Viçosa, Viçosa- MG, Brazil. ORCID: https://orcid.org/0000-0002-6844-6661
[5]Mestra em Doenças Infecciosas. Universidade Federal de Viçosa, Viçosa- MG, Brazil. ORCID: https://orcid.org/0000-0002-6488-3485
[6]Doutorando em Enfermagem. Universidade Federal de Alfenas, Alfenas - MG, Brazil. ORCID: https://orcid.org/0000-0003-3729-501X

Corresponding Author
João Vitor Andrade
Rua Gabriel Monteiro da Silva, 700, Centro, Alfenas, MG, Brazil. CEP 37.130-001. contact: +55 (35) 3701-9471, e-mail: jvma100@gmail.com.

Submission: 24-12-2024
Approval: 08-07-2025

ABSTRACT
Objective: To evaluate the effects of education delivered through mobile applications on the support care needs and quality of life of women with breast cancer. **Method**: This is a protocol for a systematic review reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines. The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO). The review will follow nine methodological steps, including the formulation of the research question, definition of inclusion and exclusion criteria, development of the search strategy, study selection and evaluation, data extraction and synthesis, evidence quality assessment, and dissemination of results. The search will be conducted in relevant databases using descriptors such as 'Breast Cancer,' 'Mobile Applications,' 'Education,' and 'Quality of Life,' along with their synonyms. Experimental and quasi-experimental studies will be included, and the selection will be managed using EndNote and Rayyan software. Risk of bias assessment will be performed using the Cochrane Collaboration Risk of Bias 2 tool, and evidence quality will be graded using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) framework. A meta-analysis is intended to determine the effect of the intervention.
Keywords: Breast Neoplasms; Mobile Applications; Education; Quality of Life.

RESUMEN
Objetivo: Evaluar los efectos de la educación realizada a través de aplicaciones móviles en las necesidades de cuidados de apoyo y la calidad de vida de mujeres con cáncer de mama.
Método: Se trata de un protocolo de revisión sistemática reportado de acuerdo con las directrices del Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P). El protocolo fue registrado en el International Prospective Register of Systematic Reviews (PROSPERO). La revisión seguirá nueve etapas metodológicas, incluyendo la formulación de la pregunta de investigación, definición de criterios de inclusión y exclusión, desarrollo de la estrategia de búsqueda, selección y evaluación de estudios, extracción y síntesis de datos, evaluación de la calidad de la evidencia y diseminación de los resultados. La búsqueda se realizará en bases de datos relevantes utilizando descriptores como 'Breast Cancer', 'Mobile Applications', 'Education' y 'Quality of Life', junto con sus sinónimos. Se incluirán estudios experimentales y cuasi-experimentales, y la selección se gestionará con los softwares EndNote y Rayyan. La evaluación del riesgo de sesgo se realizará con la herramienta Cochrane Collaboration Risk of Bias 2, y la calidad de la evidencia se clasificará según el marco de Grading of Recommendations, Assessment, Development and Evaluation (GRADE). Se pretende realizar un metanálisis para determinar el efecto de la intervención.
Palabras clave: Neoplasias de la Mama; Aplicaciones Móviles; Educación; Calidad de Vida.

RESUMO
Objetivo: Avaliar os efeitos da educação realizada por meio de aplicativos móveis nas necessidades de cuidados de suporte e na qualidade de vida de mulheres com câncer de mama. Método: Trata-se de um protocolo de revisão sistemática reportado conforme as diretrizes do Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P). O protocolo foi registrado na International Prospective Register of Systematic Reviews (PROSPERO). A revisão seguirá nove etapas metodológicas, contemplando a formulação da questão de pesquisa, definição de critérios de inclusão e exclusão, desenvolvimento da estratégia de busca, seleção e avaliação dos estudos, extração e síntese dos dados, avaliação da qualidade da evidência e disseminação dos resultados. A busca será realizada em bases de dados relevantes, utilizando descritores como 'Breast Cancer', 'Mobile Applications', 'Education' e 'Quality of Life', e seus respectivos sinônimos. Estudos experimentais e quase-experimentais serão incluídos, e a seleção será gerenciada com os softwares EndNote e Rayyan. A avaliação do risco de viés será realizada com a ferramenta Cochrane Collaboration Risk of Bias 2, e a qualidade da evidência será classificada pelo Grading of Recommendations, Assessment, Development and Evaluation (GRADE). Pretende-se realizar uma metanálise para determinar o efeito da intervenção.
Palavras-chave: Neoplasias da Mama; Aplicativos Móveis; Educação; Qualidade de Vida.

INTRODUCTION

O Breast cancer is the most common type of cancer among women worldwide. In 2022, approximately 2.3 million new cases were diagnosed, accounting for 11.6% of all new cancer cases globally[1]. It is estimated that one in every twelve women will be diagnosed with breast cancer during their lifetime, and one in every seventy-one women will die from the disease[2].

The quality of life of women diagnosed with breast cancer is often compromised by physical symptoms such as pain and fatigue, as well as emotional challenges, including low self-esteem, anxiety, and depression[3]. Supportive care needs range from information about the disease and its treatment to psychosocial and emotional support. Addressing these needs effectively is essential for promoting patient well-being and recovery, making it a priority in the comprehensive management of breast cancer[4].

In recent years, mobile technologies have emerged as promising tools in the field of healthcare. Mobile applications offer accessible platforms to provide information, monitor symptoms, and implement educational interventions[5]. In the context of breast cancer, these apps allow patients to access personalized content related to disease management and self-care strategies, potentially improving their quality of life and empowering them to take an active role in their health[6].

Recent studies indicate that digital interventions, such as mobile apps, can reduce treatment-related symptoms and improve adherence to long-term care. Moreover, these tools have been associated with improvements in supportive care needs by offering interactive educational content that enhances patients' knowledge and provides emotional support. As such, the economic feasibility of these interventions and their high acceptance rates among users underscore their potential to integrate care across various settings[5-6].

Despite the growing number of studies examining the impact of mobile apps on quality of life and supportive care needs in women with breast cancer, there remains a significant gap in consolidating these findings. The evidence remains fragmented, hindering a comprehensive understanding of the impact of these interventions. In this context, conducting a systematic review and meta-analysis to synthesize this information is essential to guide future clinical practice and research[7-8].

Therefore, this study presents the protocol for a systematic review aimed at evaluating the effect of education delivered through mobile apps on the supportive care needs and quality of life of women with breast cancer. The synthesis of evidence will contribute to the advancement of knowledge in this field, providing a basis for the development of more effective, accessible, and patient-centered interventions.

METHOD

Study Design

This is a systematic literature review protocol developed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) checklist[7], following the nine methodological steps proposed by Donato and Donato[8], which include: formulation of the research question, protocol registration, definition of inclusion and exclusion criteria, development of the search strategy, study selection and evaluation, data extraction, information synthesis, assessment of the quality of evidence, and finally, dissemination of the results through scientific publication.

Formulation of the Research Question

This study will be conducted using the PICOS strategy (an acronym for Patient, Intervention, Comparison, Outcomes, and Study design), summarized in Table 1, to guide the formulation of the research question and the eligibility criteria. Accordingly, the study is guided by the following research question: Is education provided through mobile applications, aimed at supportive care and quality of life, effective in improving supportive care needs and the quality of life of women with breast cancer compared to conventional interventions or the absence of educational interventions?

Table 1 - Research question according to the PICOS strategy, Viçosa-MG, 2024.

Population	Women with breast cancer
Intervention	Education through mobile applications
Comparison	Conventional educational interventions or no intervention
Outcomes	Improvement in supportive care needs and quality of life
Study design	Interventional studies (clinical trials or quasi-experiments)

Source: Developed by the authors, 2024; based on Araújo[9].

Protocol Development and Registration

The items described in Step 1 and in Steps 3 through 8 comprised the protocol, which was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number CRD42024620896[10].

Inclusion and Exclusion Criteria

The review will include randomized clinical trials that evaluated the effectiveness of mobile applications in delivering educational interventions aimed at meeting supportive care needs and improving the quality of life of women with breast cancer. Studies involving adult women (over 18 years old) with breast cancer at any stage of treatment will be considered, provided they were published from 2008 onward, with no restrictions on location or language.

The time restriction is justified by the fact that 2008 marked the launch of the App Store

(July 10, 2008), which initiated the mass distribution of mobile applications and made this technology widely accessible to the public. Subsequently, Google Play was launched on March 6, 2012, further expanding the reach and popularization of mobile applications across different operating systems[11].

To be eligible for full-text screening, studies must meet the following criteria: (1) the population must consist of adult or elderly women with breast cancer; (2) the intervention must involve educational programs focused on supportive care and quality of life delivered through mobile applications; (3) the intervention must aim to assess effectiveness; (4) the comparison group must involve conventional educational interventions or the absence of an intervention; and (5) the study design must be a clinical trial or quasi-experimental study. Exclusion criteria include gray literature, such as theses and monographs.

Development of the Search Strategy

The systematic review will include searches in the following sources of information:

(1) Web of Science, (2) Scopus, and (3) MEDLINE/PubMed. The search strategy was developed by a pair of researchers, supervised by a second pair, and reviewed by a fifth researcher with expertise in health thesauri and academic terminology. The literature search was repeated immediately after finalizing the search strategy and was conducted on December 22, 2024, to identify eligible studies.

The search strategy was based on keywords from the relevant literature and previous reviews. To ensure breadth and accuracy of the terms, descriptors from the Medical Subject Headings (MeSH) and their respective synonyms were used, combined in the information sources using the boolean operators AND and OR. Table 2 presents the terms used to construct the search strategies in the information sources based on MeSH.

Table 2 - MeSH terms and keywords used for search strategy development, Viçosa-MG, 2024.

PICOS Element	Terms	Block
Women with breast cancer	Breast Neoplasms* Breast Cancer, Breast Carcinoma, Breast Carcinomas, Breast Malignant Neoplasm, Breast Malignant Neoplasms, Breast Malignant Tumor, Breast Malignant Tumors, Breast Neoplasm, Breast Tumor, Breast Tumors, Cancer of Breast, Cancer of the Breast, Cancer, Breast, Cancer, Mammary, Cancers, Mammary, Carcinoma, Breast, Carcinoma, Human Mammary, Carcinomas, Breast, Carcinomas, Human Mammary, Human Mammary Carcinoma, Human Mammary Carcinomas, Human Mammary Neoplasm, Human Mammary Neoplasms, Malignant Neoplasm of Breast, Malignant Tumor of Breast, Mammary Cancer, Mammary Cancers, Mammary Carcinoma, Human, Mammary Carcinomas, Human,	A

	Mammary Neoplasm, Human, Mammary Neoplasms, Human, Neoplasm, Breast, Neoplasm, Human Mammary, Neoplasms, Breast, Neoplasms, Human Mammary, Tumor, Breast, Tumors, Breast	
Education through mobile applications	Mobile Applications* Application, Mobile, Applications, Mobile, Mobile Application, Mobile Apps, App, Mobile, Apps, Mobile, Mobile App, Portable Electronic Apps, App, Portable Electronic, Electronic App, Portable, Portable Electronic App, Portable Electronic Applications, Application, Portable Electronic, Electronic Application, Portable, Portable Electronic Application, Portable Software Apps, App, Portable Software, Portable Software App, Software App, Portable, Portable Software Applications, Application, Portable Software, Portable Software Application, Software Application, Portable, Smartphone Apps, App, Smartphone, Apps, Smartphone, Smartphone App	B
	Education* Educational Activities, Activities, Educational, Activity, Educational, Educational Activity, Literacy Programs, Literacy Program, Program, Literacy, Programs, Literacy, Training Programs, Programs, Training, Program, Training, Training Program, Workshops, Workshop	C
Improvement in supportive care needs and quality of life	Quality of Life* Life Quality, Health-Related Quality of Life, Health Related Quality of Life, HRQOL	D
Search strategy format:	Controlled terms (*) and uncontrolled terms were combined using OR within each block, followed by the combination of blocks using (A) AND (B) AND (C).	

Source: Developed by the authors, 2024.
Legend: *Controlled term (MeSH).

Study Selection and Quality Assessment

The search strategy was applied to the selected information sources, yielding a total of 113 studies, as shown in Table 3.

Table 3 - Search strategy based on MeSH and keywords, Viçosa-MG, 2024.

MEDLINE/PubMed = 38
(((("Breast Neoplasms"[Title/Abstract] OR "Breast Cancer"[Title/Abstract] OR "Breast Carcinoma"[Title/Abstract] OR "Breast Carcinomas"[Title/Abstract] OR "Breast Malignant Neoplasm"[Title/Abstract] OR "Breast Malignant Neoplasms"[Title/Abstract] OR "Breast Malignant Tumor"[Title/Abstract] OR "Breast Malignant Tumors"[Title/Abstract] OR "Breast Neoplasm"[Title/Abstract] OR "Breast Tumor"[Title/Abstract] OR "Breast Tumors"[Title/Abstract] OR "Cancer of Breast"[Title/Abstract] OR "Cancer of the Breast"[Title/Abstract] OR "Cancer, Breast"[Title/Abstract] OR "Cancer, Mammary"[Title/Abstract] OR "Cancers, Mammary"[Title/Abstract] OR "Carcinoma, Breast"[Title/Abstract] OR "Carcinoma, Human Mammary"[Title/Abstract] OR "Carcinomas, Breast"[Title/Abstract] OR "Carcinomas, Human Mammary"[Title/Abstract] OR "Human Mammary Carcinoma"[Title/Abstract] OR "Human Mammary Carcinomas"[Title/Abstract] OR "Human Mammary Neoplasm"[Title/Abstract] OR "Human Mammary Neoplasms"[Title/Abstract] OR "Malignant Neoplasm of Breast"[Title/Abstract] OR "Malignant Tumor of Breast"[Title/Abstract] OR "Mammary Cancer"[Title/Abstract] OR "Mammary Cancers"[Title/Abstract] OR "Mammary Carcinoma, Human"[Title/Abstract] OR "Mammary Carcinomas, Human"[Title/Abstract] OR "Mammary Neoplasm, Human"[Title/Abstract] OR "Mammary Neoplasms, Human"[Title/Abstract] OR "Neoplasm, Breast"[Title/Abstract] OR "Neoplasm, Human Mammary"[Title/Abstract] OR "Neoplasms, Breast"[Title/Abstract] OR "Neoplasms, Human Mammary"[Title/Abstract] OR "Tumor, Breast"[Title/Abstract] OR "Tumors, Breast"[Title/Abstract]) AND ("Mobile Applications"[Title/Abstract] OR "Application, Mobile"[Title/Abstract] OR "Applications, Mobile"[Title/Abstract] OR "Mobile Application"[Title/Abstract] OR "Mobile Apps"[Title/Abstract] OR "App, Mobile"[Title/Abstract] OR "Apps, Mobile"[Title/Abstract] OR "Mobile App"[Title/Abstract] OR "Portable Electronic Apps"[Title/Abstract] OR "App, Portable Electronic"[Title/Abstract] OR "Electronic App, Portable"[Title/Abstract] OR "Portable Electronic App"[Title/Abstract] OR "Portable Electronic Applications"[Title/Abstract] OR "Application, Portable Electronic"[Title/Abstract] OR "Electronic

Application, Portable"[Title/Abstract] OR "Portable Electronic Application"[Title/Abstract] OR "Portable Software Apps"[Title/Abstract] OR "App, Portable Software"[Title/Abstract] OR "Portable Software App"[Title/Abstract] OR "Software App, Portable"[Title/Abstract] OR "Portable Software Applications"[Title/Abstract] OR "Application, Portable Software"[Title/Abstract] OR "Portable Software Application"[Title/Abstract] OR "Software Application, Portable"[Title/Abstract] OR "Smartphone Apps"[Title/Abstract] OR "App, Smartphone"[Title/Abstract] OR "Apps, Smartphone"[Title/Abstract] OR "Smartphone App"[Title/Abstract])) AND ("Education"[Title/Abstract] OR "Educational Activities"[Title/Abstract] OR "Activities, Educational"[Title/Abstract] OR "Activity, Educational"[Title/Abstract] OR "Educational Activity"[Title/Abstract] OR "Literacy Programs"[Title/Abstract] OR "Literacy Program"[Title/Abstract] OR "Program, Literacy"[Title/Abstract] OR "Programs, Literacy"[Title/Abstract] OR "Training Programs"[Title/Abstract] OR "Programs, Training"[Title/Abstract] OR "Program, Training"[Title/Abstract] OR "Training Program"[Title/Abstract] OR "Workshops"[Title/Abstract] OR "Workshop"[Title/Abstract])) AND ("Quality of Life"[Title/Abstract] OR "Life Quality"[Title/Abstract] OR "Health-Related Quality of Life"[Title/Abstract] OR "Health Related Quality of Life"[Title/Abstract] OR "HRQOL"[Title/Abstract])

SCOPUS = 46

(TITLE-ABS-KEY ("Breast Neoplasms" OR "Breast Cancer" OR "Breast Carcinoma" OR "Breast Carcinomas" OR "Breast Malignant Neoplasm" OR "Breast Malignant Neoplasms" OR "Breast Malignant Tumor" OR "Breast Malignant Tumors" OR "Breast Neoplasm" OR "Breast Tumor" OR "Breast Tumors" OR "cancer off breast" OR "cancer off the breast" OR "Cancer, Breast" OR "Cancer, Mammary" OR "Cancers, Mammary" OR "Carcinoma, Breast" OR "Carcinoma, Human Mammary" OR "Carcinomas, Breast" OR "Carcinomas, Human Mammary" OR "Human Mammary Carcinoma" OR "Human Mammary Carcinomas" OR "Human Mammary Neoplasm" OR "Human Mammary Neoplasms" OR "malignant neoplasm off breast" OR "malignant tumor off breast" OR "Mammary Cancer" OR "Mammary Cancers" OR "Mammary Carcinoma, Human" OR "Mammary Carcinomas, Human" OR "Mammary Neoplasm, Human" OR "Mammary Neoplasms, Human" OR "Neoplasm, Breast" OR "Neoplasm, Human Mammary" OR "Neoplasms, Breast" OR "Neoplasms, Human Mammary" OR "Tumor, Breast" OR "Tumors, Breast") AND TITLE-ABS-KEY ("Mobile Applications" OR "Application, Mobile" OR "Applications, Mobile" OR "Mobile Application" OR "Mobile Apps" OR "App, Mobile" OR "Apps, Mobile" OR "Mobile App" OR "Portable Electronic Apps" OR "App, Portable Electronic" OR "Electronic App, Portable" OR "Portable Electronic App" OR "Portable Electronic Applications" OR "Application, Portable Electronic" OR "Electronic Application, Portable" OR "Portable Electronic Application" OR "portable sofftware apps" OR "app, portable sofftware" OR "portable sofftware app" OR "sofftware app, portable" OR "portable sofftware applications" OR "application, portable sofftware" OR "portable sofftware application" OR "sofftware application, portable" OR "earphone apps" OR "app, earphone" OR "apps, earphone" OR "earphone app") AND TITLE-ABS-KEY ("Education" OR "Educational Activities" OR "Activities, Educational" OR "Activity, Educational" OR "Educational Activity" OR "Literacy Programs" OR "Literacy Program" OR "Program, Literacy" OR "Programs, Literacy" OR "Training Programs" OR "Programs, Training" OR "Program, Training" OR "Training Program" OR "Workshops" OR "Workshop") AND TITLE-ABS-KEY ("quality off life" OR "Life Quality" OR "health-related quality off life" OR "health related quality off life" OR "triol"))

WEB OF SCIENCE = 29

((TI=("Breast Neoplasms" OR "Breast Cancer" OR "Breast Carcinoma" OR "Breast Carcinomas" OR "Breast Malignant Neoplasm" OR "Breast Malignant Neoplasms" OR "Breast Malignant Tumor" OR "Breast Malignant Tumors" OR "Breast Neoplasm" OR "Breast Tumor" OR "Breast Tumors" OR "Cancer of Breast" OR "Cancer of the Breast" OR "Cancer, Breast" OR "Cancer, Mammary" OR "Cancers, Mammary" OR "Carcinoma, Breast" OR "Carcinoma, Human Mammary" OR "Carcinomas, Breast" OR "Carcinomas, Human Mammary" OR "Human Mammary Carcinoma" OR "Human Mammary Carcinomas" OR "Human Mammary Neoplasm" OR "Human Mammary Neoplasms" OR "Malignant Neoplasm of Breast" OR "Malignant Tumor of Breast" OR "Mammary Cancer" OR "Mammary Cancers" OR "Mammary Carcinoma, Human" OR "Mammary Carcinomas, Human" OR "Mammary Neoplasm, Human" OR "Mammary Neoplasms, Human" OR "Neoplasm, Breast" OR "Neoplasm, Human Mammary" OR "Neoplasms, Breast" OR "Neoplasms, Human Mammary" OR "Tumor, Breast" OR "Tumors, Breast") OR AB=("Breast Neoplasms" OR "Breast Cancer" OR "Breast Carcinoma" OR "Breast Carcinomas" OR "Breast Malignant Neoplasm" OR "Breast Malignant Neoplasms" OR "Breast Malignant Tumor" OR "Breast Malignant Tumors" OR "Breast Neoplasm" OR "Breast Tumor" OR "Breast Tumors" OR "Cancer of Breast" OR "Cancer of the Breast" OR "Cancer, Breast" OR "Cancer, Mammary" OR "Cancers, Mammary" OR "Carcinoma, Breast" OR "Carcinoma, Human Mammary" OR "Carcinomas, Breast" OR "Carcinomas, Human Mammary" OR "Human Mammary Carcinoma" OR "Human Mammary Carcinomas" OR "Human Mammary Neoplasm" OR "Human Mammary Neoplasms" OR "Malignant Neoplasm of Breast" OR "Malignant Tumor of Breast" OR "Mammary Cancer" OR "Mammary Cancers" OR "Mammary Carcinoma, Human" OR "Mammary Carcinomas, Human" OR "Mammary Neoplasm, Human" OR "Mammary Neoplasms, Human" OR "Neoplasm, Breast" OR "Neoplasm, Human Mammary" OR "Neoplasms, Breast" OR "Neoplasms, Human Mammary" OR "Tumor, Breast" OR "Tumors, Breast")) AND (TI=("Mobile Applications" OR "Application, Mobile" OR "Applications, Mobile" OR "Mobile Application" OR "Mobile Apps" OR "App, Mobile" OR "Apps, Mobile" OR "Mobile App" OR "Portable Electronic Apps" OR "App, Portable Electronic" OR "Electronic App, Portable" OR "Portable Electronic App" OR "Portable Electronic Applications" OR "Application, Portable Electronic" OR "Electronic Application, Portable" OR "Portable Electronic Application" OR "Portable Software Apps" OR "App, Portable Software" OR "Portable Software App" OR "Software App, Portable" OR "Portable Software Applications" OR "Application, Portable Software" OR "Portable Software Application" OR "Software Application, Portable" OR "Smartphone Apps" OR "App, Smartphone" OR "Apps, Smartphone" OR "Smartphone App") OR AB=("Mobile

Applications" OR "Application, Mobile" OR "Applications, Mobile" OR "Mobile Application" OR "Mobile Apps" OR "App, Mobile" OR "Apps, Mobile" OR "Mobile App" OR "Portable Electronic Apps" OR "App, Portable Electronic" OR "Electronic App, Portable" OR "Portable Electronic App" OR "Portable Electronic Applications" OR "Application, Portable Electronic" OR "Electronic Application, Portable" OR "Portable Electronic Application" OR "Portable Software Apps" OR "App, Portable Software" OR "Portable Software App" OR "Software App, Portable" OR "Portable Software Applications" OR "Application, Portable Software" OR "Portable Software Application" OR "Software Application, Portable" OR "Smartphone Apps" OR "App, Smartphone" OR "Apps, Smartphone" OR "Smartphone App")) AND (TI=("Education" OR "Educational Activities" OR "Activities, Educational" OR "Activity, Educational" OR "Educational Activity" OR "Literacy Programs" OR "Literacy Program" OR "Program, Literacy" OR "Programs, Literacy" OR "Training Programs" OR "Programs, Training" OR "Program, Training" OR "Training Program" OR "Workshops" OR "Workshop") OR AB=("Education" OR "Educational Activities" OR "Activities, Educational" OR "Activity, Educational" OR "Educational Activity" OR "Literacy Programs" OR "Literacy Program" OR "Program, Literacy" OR "Programs, Literacy" OR "Training Programs" OR "Programs, Training" OR "Program, Training" OR "Training Program" OR "Workshops" OR "Workshop") AND (TI=("Quality of Life" OR "Life Quality" OR "Health-Related Quality of Life" OR "Health Related Quality of Life" OR "HRQOL") OR AB=("Quality of Life" OR "Life Quality" OR "Health-Related Quality of Life" OR "Health Related Quality of Life" OR "HRQOL")))))

Source: Developed by the authors, 2024.

The search was conducted in the previously mentioned databases, and the results will be imported into the EndNote reference management software[12]. All records will be consolidated into a single folder within the software, where duplicate studies will be identified and removed. After the removal of duplicates, the search results will be imported into the Rayyan web application, which facilitates the article selection process based on titles and abstracts, allowing for blinded collaboration between reviewers[13].

In Rayyan, the study selection process will occur in two stages. In the first stage, two independent reviewers (AMRAM, JVA) will screen titles and abstracts based on the predefined eligibility criteria. This initial analysis will identify the most promising articles, which will then undergo a full-text review in the next phase.

Studies that meet the inclusion criteria will be assessed in full. This careful reading aims to confirm whether the articles truly meet the eligibility requirements and contribute significantly to the research topic. In both stages, each article will be evaluated independently by two reviewers. In case of disagreement between them, a third reviewer (BSC) will be invited to reanalyze the article. Subsequently, all researchers will meet to discuss differing opinions and reach a consensus regarding the inclusion or exclusion of the article.

The primary outcome of this review is the improvement in the quality of life of women with breast cancer, assessed using validated instruments such as the World Health Organization Quality of Life - Bref, among others. Quality of life will be measured based on the results presented in the studies at pre- and post-intervention time points.

The Cochrane Risk of Bias tools ROB 2.0 and ROBINS-I will be used in this study to assess risk of bias, with the former applied to randomized clinical trials (parallel-group, cluster-randomized, and crossover designs)[14], and the latter to quasi-experimental or non-randomized studies[15].

To ensure impartiality and methodological rigor, two researchers will independently assess the risk of bias. In case of discrepancies between their assessments, a third researcher will be invited to mediate a discussion and reach a final consensus.

Data Extraction

Two researchers will independently extract data from the included studies using a data extraction form adapted from a previous study[16]. The components of this form are presented in Table 4.

Table 4 - Information to be extracted from the selected articles.

Study Identification		Author(s) Year of publication Country where the study was conducted Language
Method	*Participants*	Eligibility criteria Sociodemographic and clinical characteristics Clinical stage of breast cancer
	Setting	Level of care Context and details
	Design and Group Allocation	Study design Duration of the study Follow-up groups (experimental group × control/placebo group) Randomization Allocation concealment
	Intervention (Education via mobile app)	Type of app Frequency of interactions Duration of the intervention
	Control Group	Type of control (no treatment, standard treatment, placebo) Description of the intervention
	Primary Outcome (Quality of life)	Instrument used for assessment Time points of measurement
	Other Outcomes	Name and definition Instrument used for assessment Time points of measurement
Results		Number of participants randomized or allocated per analyzed group(s) Description of dropout participants Demographic data for each group Summary group data at different time points Adverse events Effect of the intervention
Discussion		Interpretation of the results Extent of generalizability Suggestions for future studies Study limitations
Conclusion		Main conclusions

Source: Developed by the authors, 2024.

The researchers involved in this review may contact the authors of the included studies by email to obtain additional information, if necessary.

Data Synthesis

Depending on the results obtained in the present review, the data may be analyzed quantitatively, through meta-analysis, and/or qualitatively, through narrative synthesis. If a meta-analysis is feasible, data will be

processed using the Stata statistical software. Risk ratios will be used for dichotomous variables, and mean differences for continuous variables, both with a 95% confidence interval and a 5% level of significance.

Heterogeneity across studies will be assessed using Cochran's Q statistic[17] and Higgins' I² statistic[18], where I² values of 25%, 50%, and 75% will indicate low, moderate, and high heterogeneity, respectively. The results will be presented in a forest plot.

If necessary, a subgroup analysis may be conducted to explore potential sources of heterogeneity, such as type of intervention, control group, age groups, duration of treatment, and study quality.

Assessment of Evidence Quality

The quality of the evidence will be assessed using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system[19]. This evaluation will be performed independently by two researchers to ensure impartiality and methodological rigor. In the event of discrepancies, a third researcher will be invited to participate in a joint meeting to reach a consensus.

Dissemination of Results

Once all steps are completed, the systematic review article will be written. It will be clear and precise, thoroughly detailing each process performed, from title definition to the final conclusion.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1.   Arnold M, Morgan E, Rumgay H, Mafra A, Singh D, Laversanne M, et al. Current and future burden of breast cancer: Global statistics for 2020 and 2040. The Breast. 2022 Dec 1;66:15-23. https://doi.org/10.1016/j.breast.2022.08.010

2.   Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, Jemal A. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2024 May;74(3):229-63. https://doi.org/10.3322/caac.21834

3.   Andrade JV, Souza JC, Bonifácio RG, Bressan VR, Resck ZM, Nogueira DA, et al. Características sociodemográficas, hábitos de vida, doenças crônicas e aspectos do tratamento do Câncer de Mama em mulheres: estudo transversal. CLCS. 2023 Nov 10;16(11):25688-711. https://doi.org/10.55905/revconv.16n.11-055

4.   Webb ME, Murray E, Younger ZW, Goodfellow H, Ross J. The supportive care needs of cancer patients: a systematic review. J Cancer Educ. 2021 Oct 1:1-0. https://doi.org/10.1007/s13187-020-01941-9

5.   Samadbeik M, Garavand A, Aslani N, Sajedimehr N, Fatehi F. Mobile health interventions for cancer patient education: a scoping review. Int J Med Inform. 2023 Sep 9:105214. https://doi.org/10.1016/j.ijmedinf.2023.105214

6.   Çınar D, Karadakovan A, Erdoğan AP. Effect of mobile phone app-based training on the quality of life for women with breast cancer. Eur J Oncol Nurs. 2021 Jun 1;52:101960. https://doi.org/10.1016/j.ejon.2021.101960

7. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic reviews. 2015 Dec;4:1-9. https://doi.org/10.1186/2046-4053-4-1

8. Donato H, Donato M. Stages for undertaking a systematic review. Acta Med Port. 2019 Mar 29;32(3):227-35. https://doi.org/10.20344/amp.11923

9. Araújo WC. Recuperação da informação em saúde: construção, modelos e estratégias. ConCI. 2020 Jul 10;3(2):100-34. https://doi.org/10.33467/conci.v3i2.13447

10. Prospero (International Prospective Register of Systematic Review). Maurílio AMR, Andrade JV, Caçador BS. Effect of mobile app-delivered education on supportive care needs and quality of life in women with breast cancer: systematic review and meta-analysis [Internet], 2024: CRD42024620896. Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42024620896

11. Kenton W. Apple App Store: Meaning, History, Google Play [Internet]. Investopedia; 2023 Jan 26 [cited 2024 Dec 23]. Available from: https://www-investopedia-com.translate.goog/terms/a/apple-app-store.asp?_x_tr_sl=en&_x_tr_tl=pt&_x_tr_hl=pt&_x_tr_pto=tc

12. Bramer W, Bain P. Updating search strategies for systematic reviews using EndNote. JMLA. 2017 Jul;105(3):285. https://doi.org/10.5195/jmla.2017.183

13. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. Systematic reviews. 2016 Dec;5:1-0. https://doi.org/10.1186/s13643-016-0384-4

14. Sterne JA, Hernán MA, McAleenan A, Reeves BC, Higgins JP. Assessing risk of bias in a non-randomized study. Cochrane Handbook. 2019 Sep 23:621-41. https://doi.org/10.1002/9781119536604.ch25

15. Sterne JA, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. Bmj. 2019 Aug 28;366. https://doi.org/10.1136/bmj.l4898

16. Sant'Anna AV, Toledo LV, Salgado PO, Azevedo C, Nogueira DA, Moura CC. Efeitos da terapia assistida com animais no manejo da dor: protocolo de revisão sistemática. Online braz. j. nurs.(Online). 2023 Aug 17:e20236653-. https://doi.org/10.17665/1676-4285.20236653

17. Lau J, Ioannidis JP, Schmid CH. Quantitative synthesis in systematic reviews. Annals of inter med. 1997 Nov 1;127(9):820-6. https://doi.org/10.7326/0003-4819-127-9-199711010-00008

18. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. Statistics in medicine. 2002 Jun 15;21(11):1539-58. https://doi.org/10.1002/sim.11867

19. Bezerra CT, Grande AJ, Galvão VK, Santos DH, Atallah ÁN, Silva V. Assessment of the strength of recommendation and quality of evidence: GRADE checklist. A descriptive study Sao Paulo Med J. 2022 Sep 12;140(6):829-36. https://doi.org/10.1590/1516-3180.2022.0043.R1.07042022

Declaration of Conflict of Interest:

Nothing to Declare

Author Contributions

Arlete Maria dos Reis Assis Maurílio. Creator, executor, developer, responsible for the initial drafting of the protocol and approval of the final version. Tiago Ricardo Moreira. Responsible for monitoring, as well as reading and approving the final version. Beatriz Santana Caçador. Contributed to the initial drafting and approved the final version. Bruno David Henriques. Responsible for approving the final version.

Laylla Veridiana Castória Silva. Contributed to the initial drafting and approved the final version. João Vitor Andrade. Executor, developer, responsible for project supervision, initial drafting of the protocol, and approval of the final version.