Use of mobile applications as a strategy to support family members in the care of newborns: a scoping review protocol

Utilização de aplicativos móveis como estratégia de apoio a familiares no cuidado a recém-nascidos: protocolo *scoping review*

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ABSTRACT

Objective: To map and describe the studies available in the literature and online stores on mobile applications to support family members of newborns. **Method**: This is a scoping review protocol, prepared following the recommendations of the Joanna Briggs Institute and the items of the PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. The search will be carried out in two stages: 1 - in PubMed, CINAHL, Web of Science, Scopus, LILACS, Embase, Cochrane Library, Google Scholar, and Scielo databases, and in the VHL, the Latin American Theses and Dissertations Portal, and the catalog of theses and dissertations of the Coordination of Improvement of Higher Education Personnel; 2 - in the online stores of Android and iOS operating systems, through the independent use of the term "newborn". The protocol will guide the development of the scoping review for the description and mapping of mobile applications to support family members of newborns.
Descriptors: Newborn Infant; Family; Mobile Applications.

RESUMO

Objetivo: Mapear e descrever os estudos disponíveis na literatura e lojas on-line sobre os aplicativos móveis para apoio a familiares de recém-nascidos. **Método:** Trata-se de protocolo de *scoping review,* elaborado conforme recomendações do Instituto Joanna Briggs, seguindo os itens do PRISMA *Extension for Scoping Reviews* (PRISMA-ScR): *Checklist and Explanation*. A busca será realizada em duas etapas: 1 - nas bases de dados PubMed, CINAHL, *Web of Science*, Scopus, LILACS, Embase, *Cochrane Library*, *Google* Acadêmico, Scielo, como também no Portal BVS e de Teses e Dissertações da América Latina e no Catálogo de Teses e Dissertações da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior; 2 - em lojas on-line para *smartphones* com sistemas operacionais *Android* e *iOS*, por meio da utilização independente do termo "recém-nascido". O protocolo norteará o desenvolvimento da revisão de escopo para descrição e mapeamento de aplicativos móveis para apoio a familiares de recém-nascidos.
Descritores: Recém-Nascido; Família; Aplicativos Móveis.

INTRODUCTION

The birth of a baby significantly marks the life of a family. However, this moment can be followed by intercurrences and, consequently, there is a need for newborn (NB) care[1], whether at home or in hospitals.

Health care for newborns has undergone significant transformations[2] as the technology evolved and characterizes a broader universe in care, also including parents in this context, through "mobile health" (m-health)[3,4]. The term mHealth is used to describe any healthcare practice assisted by mobile devices[5], and it is pointed out as a quick and direct method of distributing information to groups of users[6].

These transformations are in line with the Sustainable Development Goals (SDGs) included in the health agenda through "SDG 3: Good Health and Well-being", which intends that by 2030 there will be no infant and neonatal mortality from preventable causes[7]. The proposal of this protocol is in line

with the SDGs when addressing the support to the family mambers of NBs concerning their care. The growing acceptance and use of computer technology by society and the wide access due to the expansion of mobile technology greatly influence health promotion and prevention. In this sense, through health promotion, based on scientific evidence, family members can be encouraged to adopt good care practices for their NBs[3], including basic care, such as adequate heat, hygiene, and exclusive breastfeeding[8].

Inserted in the context of health promotion, the production of technology that favors the care and prevention of diseases in NBs should be encouraged, as long as the technical and content quality permeates this process. The development of educational technologies aimed at NBs' parents, is necessary to gather knowledge on the social, cultural, and economic context in which these persons are inserted[3,9]. Likewise, it is necessary to understand if access is being guaranteed, through technological devices, if family members feel good when using the applications, and if they can process the information, transforming superficial learning into meaningful ones[3].

In this scenario, mobile technologies (tablets and smartphones, among others) stand out, especially the use of mobile applications (apps) by the world population. These apps aim to contribute to people's access to information and knowledge, via the world wide web (internet), without the restriction of time and space, which also allows new forms of communication[10]. Given the above, different software from all areas of health care are being created or improved.

From this perspective, there is a perception of the popularization of smartphone use and the growing applicability of functions with access to the internet and social networks. A study points out that, in Brazil, the use of smartphones in the year 2019 surpassed the use of computers. There are 410 million internet-connectable devices, 180 million computers, and 230 million smartphones, representing more than one smartphone for each inhabitant[11].

The construction of this protocol took place in the face of the presented scenario and it is justified by the need for an in-depth approach to mobile applications to support family members in the care of NBs. To meet the above demand, it is necessary to map the available evidence on this topic, as there is a lack of knowledge regarding research that evaluates the development and

availability of mobile applications as a support strategy for family members in the care of newborns. Therefore, the objective of this study was to map and describe the studies available in the literature and online stores on mobile applications to support family members of newborns.

METHOD

This is a protocol for a scoping review study that can be used to map studies, clarify work definitions or study concepts, summarize the evidence and inform future research[12,13]. The study proposed will be conducted according to the Joanna Briggs Institute (JBI) methodology for scoping reviews[11-14]. The protocol was registered in the Open Science Framework (OSF), available at https://osf.io/vtyce/DOI 10.17605/OSF.IO/VTYCE.

To define the research question and the study's objective, the mnemonic PCC (Population, Concept, and Context), proposed by the JBI, will be used, as it is better suited to the review's objectives. Thus, the following categorical structures of interest to the study were defined: Population (P): parents and relatives of newborns; Concept (C): studies that address mobile applications in the field of neonatology; and Context (C): newborn care. From this structure, the review question was elaborated.

Review question

Which mobile applications developed to support family members in the care of newborns exist in the literature or are available in online stores of Android and iOS operating systems?

First step

Search in the databases and portals of the Virtual Health Library, the Latin American Theses and Dissertations Portal, and the catalog of theses and dissertations of the Coordination of Improvement of Higher Education Personnel (Capes).

Eligibility criteria

Inclusion criteria

Publications that respond to the study's objective, original scientific articles, with a descriptive, analytical, quantitative, or qualitative approach, theses, dissertations, with no time restriction, with no language restriction, available in full format and free of charge, electronically. Studies in editorial format, letters to the editor, opinion articles, advertisements, and gamified applica-

tions will not be included in the study. Duplicate documents will be counted only once.

Search strategy

Initial search strategies will be carried out for each of the bases: PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, Scopus, Latin American and Caribbean Health Sciences Literature (LILACS), Excerpta Medica Database (Embase), Cochrane Library, Google Scholar, Scielo, and Virtual Health Library (VHL), as well as gray literature (dissertations and theses), through the Latin American Theses and Dissertations Portal and the catalog of theses and dissertations of the Coordination of Improvement of Higher Education Personnel (CAPES).

For the initial search, the "advanced search" feature will be used, using the MeSH (Medical Subject Headings) and DeCS (Health Sciences Descriptors) descriptors and the Boolean operators AND and OR. The strategy used for the search in the Latin American Theses and Dissertations Portal and the Dissertations Portal and the catalog of theses and dissertations of CAPES will be the use of a solitary term as well as a the use of crossed terms without the Boolean operators. The strategy will integrate the following cross-referenced terms in Portuguese: recém-nascido OR recém-nascido prematuro AND família OR pais AND aplicativos móveis OR dispositivos móveis OR intervenção baseada na internet OR app móveis OR acesso à internet OR acesso à informação online. In English, the following terms will be used and crossed: *newborn* OR *infant* AND *parents* OR *family* AND *mobile applications* OR *educational technology* OR *technology* OR *app mobile* AND *neonatology*. The followin uncontrolled descriptors will be used: *app* móveis, *app mobile*, aplicativos para dispositivos móveis, aplicativo móvel. The description of the crossings is presented in Figure 1.

A tertiary search will be carried out in the reference lists of all the literature that meets the inclusion criteria of this study to identify additional studies. The studies selected in this search will be evaluated similarly to the other studies. In case of the addition of documents, these will be released separately and duly identified in the presentation of results.

Selection of studies

Once the articles are searched in the databases/portals, they will be exported to a spreadsheet for later grouping and removal of duplicates.

The organization of the full text of the studies will occur by using folders created for this purpose that will be evaluated by two independent reviewers who will analyze the inclusion and exclusion criteria in depth. A third reviewer will be consulted in case of disagreements between the two reviewers at each stage of the process to systematize the scoping review and reduce research bias during the selection of studies. Full-text studies that are excluded will have the reasons for not meeting the inclusion criteria recorded and will subsequently be reported in the review. The study selection procedure is shown in Figure 2. This review decision process will be presented in a flow diagram format.

Data extraction strategy

Two independent reviewers will also extract data from the studies included in the scoping review, using a data extraction tool developed for this review (Figure 3). Before starting the extraction, the authors will conduct a pilot test with a random sample of five articles to test the form. If modifications are required, these will be detailed in the full scoping review.

Data presentation

The data will be summarized and the panorama of the information recovered will be presented, as well as the extension and the literary nature of the applications created to support family members in the care of NBs. Tables, charts, or diagrams of the extracted data will be presented, as shown in Table 3. The descriptive and narrative analysis will accompany the identified and mapped results, describing how these results relate to the scoping review's objective and question.

Second stage

Search in online stores of Android and iOS operating systems.

In each online store, searches will be performed using the term "newborn". The data collection will be performed by two independent and previously trained researchers. This collection is not related to the collection that will be conducted at the first stage of the review.

Application of eligibility criteria

Inclusion criteria
The applications must address contents on newborn care for family members.

Databases/ queries	Search Strategies
LILACS	#1 recém-nascido AND "aplicativos móveis"; #2 recém-nascido OR família AND "aplicativos móveis"; #3 recém-nascido AND família AND "aplicativos móveis"; #4 recém-nascido AND "aplicativos para dispositivos móveis"; #5 recém-nascido AND "intervenção baseada na internet"; #6 recém-nascido AND "app móveis"; #7 recém-nascido AND pais AND "aplicativos móveis"; #8 recém-nascido AND pais AND "acesso à internet"; #9 recém-nascido AND pais AND "acesso à informação online"; #10 "recém-nascido prematuro" AND família AND "aplicativos móveis"
VHL	#1 recém-nascido AND "aplicativo móvel"; #2 recém-nascido AND "aplicativo móvel" AND família; #3 recém-nascido AND pais AND "aplicativos móveis"; #4 recém-nascido AND pais AND "mobile health"; #5 "recém-nascido prematuro" AND família AND "aplicativos móveis"
PubMed	#1 newborn AND parents AND "mobile applications"; #2 newborn AND family AND "mobile applications"; #3 infant AND parents AND (mobile applications OR educational Technology OR mobile applications OR educational technology OR technology) AND neonatology
Scielo	#1 newborn AND parents AND "mobile applications"; #2 infant AND parents AND (mobile applications OR educational technology OR mobile applications OR educational technology OR technology) AND neonatology; #3newborn AND family AND "mobile applications"; newborn AND "mobile applications"
Web of Science	#1 infant AND parents AND (mobile applications OR educational technology OR technology) AND neonatology; #2 newborn AND parents AND "mobile applications"; newborn AND family AND "mobile applications"
Scopus	#1 newborn AND parents AND "mobile applications"; newborn AND family AND "mobile applications"; #2 infant AND parents AND ("mobile applications"OR"educational technology") AND neonatology
Cochrane	#1 newborn AND family AND "mobile applications"; #2 newborn AND parents AND "mobile applications"; #3 newborn AND parents AND "mobile applications" OR "mobile app"
CINAHL	#1 newborn OR neonate OR infant OR baby AND parent OR family AND "mobile applications" OR apps OR "mobile apps"
Embase	#1 newborn AND Family AND "mobile applications"; #2 newborn AND family AND "mobile app"; #3 newborn AND parent AND "mobile app"
Google Scholar	#1 "recém-nascido" AND pais AND "aplicativos móveis"; #2 newborn AND "mobile applications" OR "app mobile" AND parente
CAPES	#1 "aplicativo móvel"; #2"recém-nascido"
Latin America	#1 "aplicativo móvel" #2 "recém-nascido"

Figure 1 - Development of search strategies in the various databases/Portals. Londrina, PR, Brazil, 2022
Source: Prepared by the authors, 2022.

Exclusion criteria
Applications not available for download, in free or paid forms (closed or internal tests), gamified applications, or applications from products will be excluded. Duplicate applications will be counted only once.

Data extraction strategy
An instrument will be developed for this study, consisting of 12 variables about the applications (Figure 4) that will be pilot tested through a random extraction of data from five applications. If necessary, specific adjustments will be made to the instrument or as they arise during the process. The modified version will be detailed in the full scoping review.

Two independent reviewers will perform the data extraction, and, if necessary, a third reviewer will be consulted in case of doubts.

Synthesis and presentation of data
The final data will be presented descriptively and through tables, graphs, or diagrams that facilitate the visualization of the results. Descriptive statistics will be used for data analysis, expressed by absolute and relative frequencies.
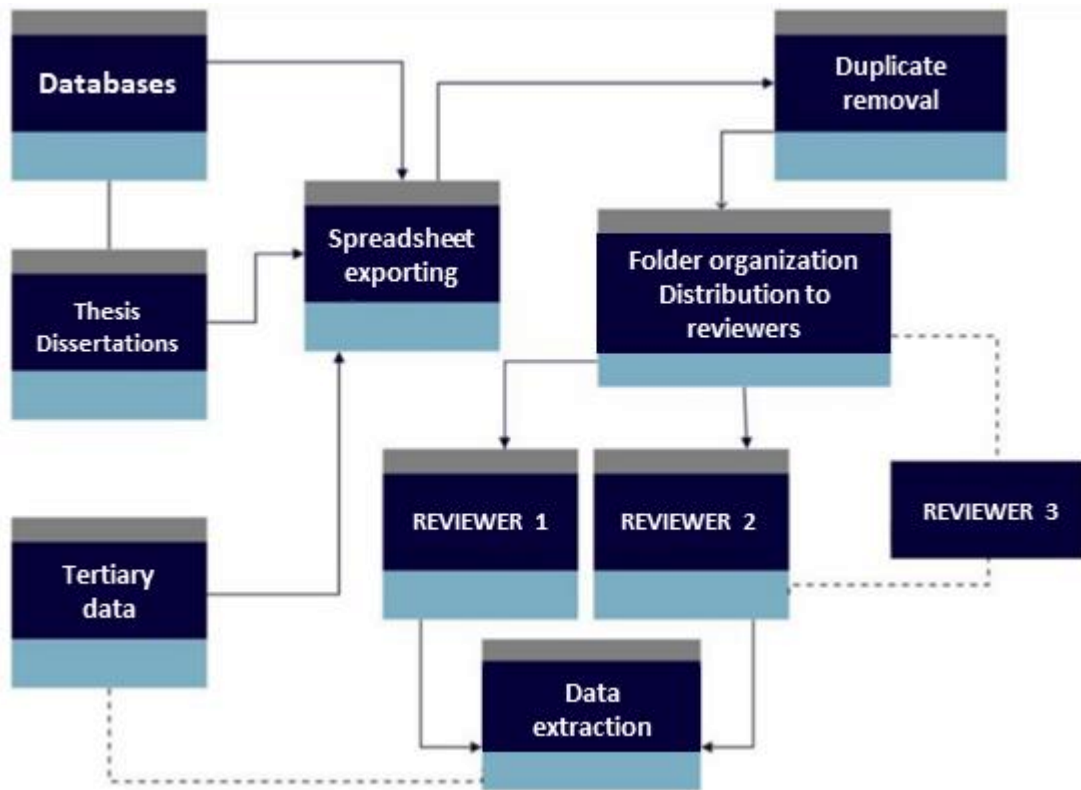
Figure 2 - Study selection procedure. Londrina, PR, Brazil, 2022
Source: Prepared by the authors, 2022.

Selected study data	Details
Bibliographic information	
Authors	Last name/First name (Vancouver style)
Year	Year of publication
Title	Original title
Publication type	Article, thesis, dissertation
Study location	City/country where the study was carried out
Journal	Journal title
Study characteristics	
Study design	Methodological design
Study objective	Main objective
Level of evidence	I, II, III, IV, V, VI, VII or VIII
Application name	Describe the name of the application or what it is called in the study
Application purpose	Describe the theme/main purpose of the application/ theme of support for family members
Area of applicability of support to family members	E.g.: Hospital, primary care, mental health (etc.)

Figure 3 - Instrument for data extraction. Londrina, PR, Brazil, 2022
Source: Prepared by the authors, 2022.

Data extraction	Details
Operational system	Android and iOS
Application name	Quote the application name
Country/state in which the app was produced	Location where the app was produced
Language	Source language
Year of creation	Year of creation
Year of update in the online store	Last update on the online store
Sub-topic addressed	E.g.: Breastfeeding, child development, etc.
Institutional or private use license	License type
Type of access (open or paid)	Whether the app is free
Number of downloads	Number of downloads
Accessibility for people with disabilities	Yes or No. Which one?
Content classification	Classification age

Figure 4 - Instrument for extracting data from the online stores. Londrina, PR, Brazil, 2022
Source: Prepared by the authors, 2022.

User involvement and ethical aspects
The users and developers of the apps were not involved in the development of this protocol, nor will they be involved in later stages. The authors of this review protocol do not have conflicts of interest and emphasize that the results will be published preferably in open access journals or presented at relevant scientific events.

The proposed protocol will guide the development of a scoping review that will describe and map mobile applications to support families of newborns.

CONFLICT OF INTEREST
The authors have declared that there is no conflict of interest.

REFERENCES

1. Naidon ÂM, Neves ET, Silveira A, Ribeiro CF. Gestation, delivery, birth and hospitalization of newborns in neonatal intensive therapy: mother's report. Texto Contexto Enferm. 2018;27(2). https://doi.org/10.1590/0104-070720180005750016

2. Marinho CSR, Flor TBM, Pinheiro JMF, Ferreira MAF. Millennium Development Goals: the impact of healthcare interventions and changes in socioeconomic factors and sanitation on under-five mortality in Brazil. Cad Saúde Pública. 2020;36(10). https://doi.org/10.1590/0102-311X00191219

3. D'Agostini MM, Aredes NDA, Campbell SH, Fonseca LMM. Serious Game e-Baby Família: an educational technology for premature infant care. Rev Bras Enferm. 2020 [cited 2021 out 14];73(4). https://doi.org/10.1590/0034-7167-2019-0116

4. Rau NM, Hasan K, Ahamed SI, Asan O, Flynn KE, Basir MA. Designing a tablet-based prematurity education app for parents hospitalized for preterm birth. Int J Med Inform. 2020;141:104200. https://doi.org/10.1016/j.ijmedinf.2020.104200

5. Sadeghi M, Kahouei M, Pahlevanynejad S, Valinejadi A, Momeni M, Kermani F, et al. Mobile applications for prematurity: a systematic review protocol. BMJ Paediatrics Open. 2021;5(e001183). http://dx.doi.org/10.1136/bmjpo-2021-001183

6. Pizur-Barnekow K, Kim UO, Ahamed SI, Hasan M k, Dreier S, Leuthner SR, et al. Giving voice to parents in the development of the Preemie PrEP for parents (P3) mobile APP. Adv Neonatal Care. 2020;20(1). https://doi.org/10.1097/ANC.0000000000000669

7. Nações Unidas (US). About the Sustainable Development Goals [Internet]. Nova York:

UN; 2015 [cited 2021 Oct 10]. Available from: http://abm.org.br/ods/wp-content/uploads/2017/10/Relatorio-sobre-os-Objetivos-do-Milenio-2015.pdf

8. Santos A, Góes F, Ledo B, Silva L, Bastos M, Silva M. Educational technology on home care for low-risk newborns. Rev Enferm UERJ. 2020;28:e44488. https://doi.org/10.12957/reuerj.2020.44488

9. Silva IOAM, Aredes ADA, Bicalho MB, Delácio NCB, Mazzo LDL, Fonseca LMM. Booklet on premature infants as educational technology for the family: quasi-experimental study. Acta Paul Enferm. 2018;31(4). https://doi.org/10.1590/1982-0194201800048

10. Barra DCC, Paim SMS, Sasso GTMD, Colla GW. Methods for developing mobile apps in health: an integrative review of the literature. Texto Contexto Enferm. 2017;26(4). https://doi.org/10.1590/0104-07072017002260017

11. Velasco NS, Figueiredo LS, Cavalcanti ACD, Flores PVP. Systematic review on mobile applications in adherence to the treatment of patients with heart failure. Research, Society and Development. 2020;9(7). http://dx.doi.org/10.33448/rsd-v9i7.4306

12. Aromataris E, Munn Z, editors. JBI Manual for Evidence Synthesis. Adelaide: JBI; 2020 [cited 2021 Oct 25]. Available from: https://synthesismanual.jbi.global/. https://jbi-global-wiki.refined.site/space/MANUAL

13. Peters MDJ, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. JBI Evidence Synthesis. 2020;18(10). https://doi.org/10.11124/JBIES-20-00167

14. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. https://doi.org/10.7326/M18-0850

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