http://www.periodicos.uem.br/ojs/index.php/CiencCuidSaude
ISSN on-line1984-7513
DOI: 10.4025/ciencuidsaude.v24i1.75588

ORIGINAL ARTICLE

AMAMENTACOACH APPLICATION: MATERNAL EXPERIENCES IN BREASTFEEDING PREMATURE INFANTS[1]

Gabriela Ramos Ferreira Curan*
Guilherme Alves da Silva**
Isabella Vicente da Silva***
Luciana Mara Monti Fonseca****
Rosângela Pimenta Ferrari*****
Thaila Correa Castral******
Edilaine Giovanini Rossetto*******

ABSTRACT

Objective: to understand the experience of mothers using the AmamentaCoach app in the breastfeeding process of premature babies. **Method:** a qualitative study with semi-structured interviews conducted with ten mothers. The methodological framework adopted was Thematic Content Analysis. The analysis of participants' statements was guided by the hedonic and pragmatic aspects that make up an explanatory model of User Experience (UX). **Results:** there was an average of six accesses to the app, with a minimum of one and a maximum of 11 login records. Two categories emerged: "Hedonic potentials and challenges" and "Pragmatic potentials and challenges," with four and three subcategories, respectively. The app incited curiosity, fulfilment, and fun, provided emotional and tangible support throughout physical separation, and was perceived as a reliable and targeted care tool for premature dyads. **Final considerations:** To our knowledge, this is the first study worldwide based on a theoretical UX model with mothers of premature babies who used a specific breastfeeding app. In the process toward initiating and establishing breastfeeding, opportunities to spend time on a smartphone may be limited; therefore, the moments a woman devotes to exploring an app should provide a pleasant experience that meets her main needs.

Keywords: Mobile applications; Breastfeeding; Premature newborn; User-centered design; Neonatal nursing; Qualitative research.

INTRODUCTION

The practice of breastfeeding (BF) provides countless benefits for children, mothers, and society, representing a promising way to offset the harm that prematurity imposes on babies born before 37 weeks of gestation[1,2].

However, breastfeeding premature babies is surrounded by challenges that are unusual for mothers of healthy, full-term infants[3]. The baby's anatomical immaturity to establish an effective latch and sucking[4], the physical separation of the dyad through hospitalization[5], maternal stress[6], and low breastfeeding self-efficacy[7] are frequent conditions in this population. Additionally, these mothers need to systematically pump milk to keep milk production, which demands persistence[8] and breastfeeding support strategies consistent with this context.

In the health field, mobile electronic devices (eHealth and mHealth) are internet-based resources increasingly used for maternal and child care and for breastfeeding support[9,10]. However, such resources specifically aimed at mothers of premature infants are scarce[11,12], resulting in a lack of knowledge about these mothers' experiences with their use.

Faced with this gap, we developed the mobile application called AmamentaCoach, to support mothers of premature babies in breastfeeding. The app consists of more than 80 screens and 11

[1]Article from the Doctoral Thesis of Nurse Gabriela Ramos Ferreira Curan, entitled "AmamentaCoach Application: Maternal experiences in breastfeeding premature infants", degree conferred in 2022

*Nurse. Doctor of Nursing. Municipal Health Department of the Londrina Municipal Authority. Londrina, Paraná, Brazil. Email: gabrielafcuran@gmail.com. ORCID: 0000-0002-6447-6484
**Nurse. Specialist in Neonatal Nursing. Evangelical Hospital of Londrina. Londrina, Paraná, Brazil. Email: enfigui@gmail.com. ORCID: 0000-0002-5985-3986.
***Nurse. Master's degree in Nursing. Regional University Hospital of Northern Paraná. Londrina, Paraná, Brazil. Email: isabella.vicente@uel.br. ORCID: 0000-0002-0200-5716. 4
****Nurse. Doctor of Nursing. University of São Paulo. Ribeirão Preto, São Paulo, Brazil. Email: lumonti@eerp.usp.br. ORCID: 0000-0002-5831-8789.
*****Nurse. Doctor of Nursing. State University of Londrina. Londrina, Paraná, Brazil. Email: ropimentaferrari@uel.br. ORCIDO: 0000-0003-0157-7461.
******Nurse. Doctor of Nursing. Federal University of Goiás. Goiânia, Goiás, Brazil. Email: thaccastral@gmail.com. ORCID: 0000-0003-1319-0483
*******Nurse. Doctor of Nursing. State University of Londrina. Londrina, Paraná, Brazil. Email: ediluizrossetto@gmail.com. ORCID: https://orcid.org/0000-0002-0996-5154.

strategies to address prematurity, lactation, breastfeeding, support network, maternal emotions, resilience, and motivation. Details of the app's development and validation will be described in a future paper[13].

Surveying and improving the user experience is crucial for the success and achievement of the desired outcomes of any software[14]. Given the above, this study aimed to understand the experience of mothers who used the AmamentaCoach app in the process of breastfeeding their premature infants.

METHODS

This is a comprehensive qualitative study reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ)[15]. It is part of a research project entitled "Nursing Coaching via App: An Innovative Approach to Breastfeeding Premature Babies", approved by the Research Ethics Committee under opinion No. 3.852.898 and CAAE: 27703419.8.0000.5231, and funded by the CNPq (National Council for Scientific and Technological Development) under call CNPq/MCTI/FNDCT No. 18/2021.

The study took place between October and November 2021, at a tertiary, high-complexity Teaching Hospital (HU) in southern Brazil, which has a regional referral maternity ward for high-risk pregnancies and which has adopted the *Ten Steps to Successful Breastfeeding* in Baby-Friendly Hospitals policy for over 20 years.

Participants were recruited through convenience sampling, facilitated by the fact that one of the authors is a nurse in the Neonatal Unit of the aforementioned hospital. The inclusion criteria were: being the mother of an infant born at the study hospital between June and September 2021 with a gestational age (GA) of less than 37 weeks; being literate; expressing the intention to breastfeed; having access to an Android smartphone; and agreeing to download the app. Participants were free to use the app as frequently and for as long as they wished. Exclusion criteria included any clinical conditions that contraindicated or prevented BF.

Content analysis was considered “a set of techniques through which a group of data can be analyzed”[16]. Two authors conducted the interviews, previously trained by an experienced researcher, with whom they developed a semi-structured interview script, composed of three main questions.

The introductory phase asked about their experiences with baby feeding and reminded the interviewees of the occasion when they were invited to try the app. Their questions were: "First, I would like you to tell how is the baby's feeding going so far?"; "Now, I'd like us to go back to the day your baby was born, there in the Maternity Ward at the HU... Tell me how you end up participating in this study using a mobile app? What did you understand about the research when you were invited? What was the guidance you had when you were invited to participate in this study?"

The second set of questions, presented in Figure 1, was structured as an algorithm that adapted the prompts according to each participant’s reported use of the app. In other words, the interviewer tailored the questions to reflect the participant’s intensity of app engagement.

The third set of questions consisted of three closing items intended to capture the mothers’ final reflections: “Is there anything else you would like to share that I have not asked about?”; “Do you have any suggestions for improving the app?”; and “If it were necessary to schedule another session to complete the study, would you be willing to participate again?”

The interviews were conducted in October and November of 2021 via Google Meet and were recorded for subsequent transcription. During transcription, orthographic corrections were made to protect participants from the exposure of language errors or speech disfluencies, without altering the content of their statements. Participants and their infants were characterized according to sociodemographic and clinical variables, based on information collected from the app's database, including: maternal age, parity, educational level, gestational age at birth, length of hospital stay, employment and income status, marital status, infant feeding method at hospital discharge, and number of times the app was accessed.

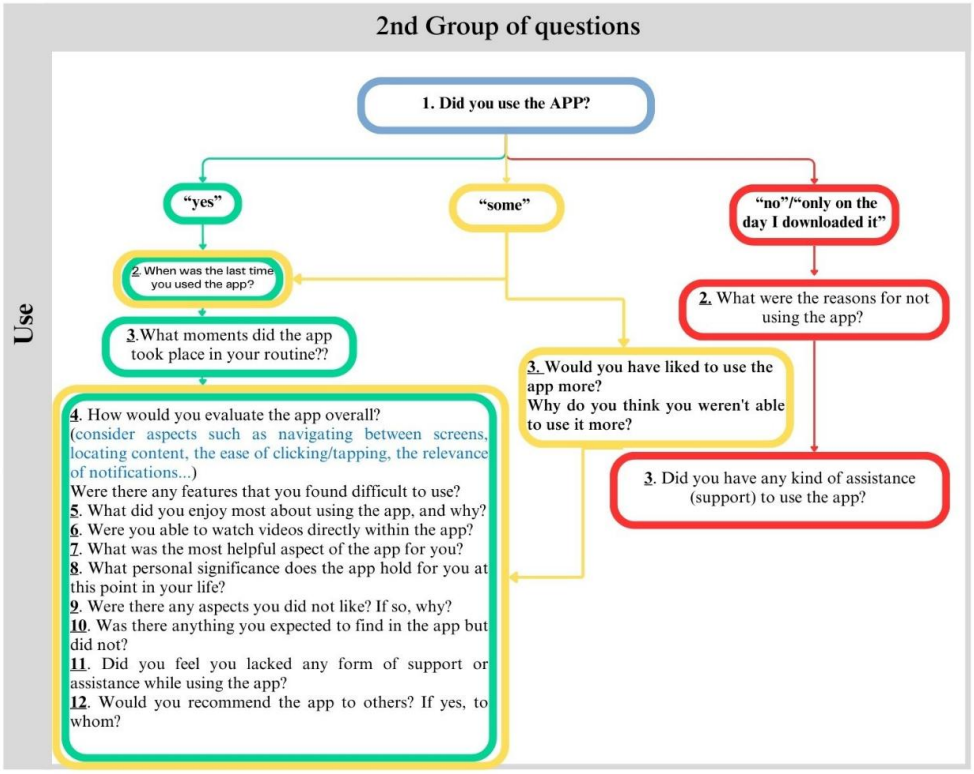

Figure 1. Semi-structured script prepared to guide the interviews.
Source: the authors

The interviews were conducted in October and November of 2021 via Google Meet and were recorded for subsequent transcription. During transcription, orthographic corrections were made to protect participants from the exposure of language errors or speech disfluencies, without altering the content of their statements. Participants and their infants were characterized according to sociodemographic and clinical variables, based on information collected from the app's database, including: maternal age, parity, educational level, gestational age at birth, length of hospital stay, employment and income status, marital status, infant feeding method at hospital discharge, and number of times the app was accessed.

Pre-analysis of the Data

The composition of the *corpus* adhered to the principles of representativeness, homogeneity, relevance, and exhaustiveness. It is important to note that a recording failure in one of the interviews led to the re-recording of a new interview with the same participant.

The explanatory model of User Experience (UX)[14] was adopted as the theoretical framework, based on the assumption that women's experiences as users (UX) of an app designed to support premature breastfeeding were influenced not only by the app's utility, functionality, and usability but also by contextual conditions, both internal and external to the user.

An initial floating reading of the transcriptions was conducted, followed by content exploration through a coding process that involved identifying keywords and related themes, and subsequently organizing the data into thematic categories. To identify quotations and ensure anonymity, codes were created using the letter "I" for "Interviewee," sequential Arabic numerals according to the order of the interviews, and an acronym indicating the type of infant feeding reported at the time of the interview: artificial feeding (AF), mixed breastfeeding (MB), exclusive breastfeeding (EB), and semi-demand breastfeeding (SDB).

Material Analysis and Data Processing

The systematization of elements identified in the participants' narratives was guided by the hedonic and pragmatic aspects constituting the User Needs Experience (NX) axis of the UX explanatory model[14]. A semantic criterion was used for categorization.

RESULTS AND DISCUSSION

The interviews lasted an average of 15 minutes; most mothers were at home with their children; one mother was in the hospital, where her child was hospitalized. Ten mothers participated in the study, with an average age of 28 years, and the average Gestational Age (GA) of their babies at birth was 34 weeks. Most of the women were primiparous (n=7), had completed high school (n=5), were formally employed (n=7), and had a family income between 2 and 3 minimum wages (n=7). Most lived with a partner or spouse (n=9).

Table 1. Profile of AmamentaCoach app users. Londrina, PR, Brazil, 2022

Participant	I1-AA	I2-MB	I3-MB	I4-EB	I5-EB	I6-EB	I7-SDB	I8-MB	I9-AF	I10-MB
Age	24	17	26	29	30	40	20	35	29	28
GA*	32	36	28	33	34	34	36	36	36	36
Pregnancy	1	1	1	2	3	2	1	1	1	1
Days Hospitalized**	24	2	41	11	7	7	6	16	9	4
Education	4	6	9	7	7	9	7	7	7	4
Have a job	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Income (number of salaries)	1	2 - 3	2 - 3	1	1	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3
Partner	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BF at discharge	AF	MB	MB	EF	EF	EF	n/a***	EF	EF	EF
Accesses (number of)	4	10	7	1	11	2	4	6	4	10

*Gestational age; **Total number of days the baby was hospitalized; ***Not applicable (Interview conducted before the newborn was discharged)

Education level defined according to the Brazilian public schools classification available at https://www.ipea.gov.br/atlasestado/arquivos/rmd/4874-conjunto4v10.html, where 4=6th to 9th grade of elementary school; 6 = Incomplete high school; 7 = Complete high school; 9 = Complete higher education.

Source: Own elaboration.

The app's database records showed an average of six accesses per participant, with a minimum of one and a maximum of 11 logins. In the interviews, in response to the question "Did you use the app?", four mothers responded yes (I1-AF, I2-MB, I5-EB, I10-MB), three considered they used it little (I3-MB, I7-SDB, I9-AF), and three reported using the app only on the day of download. It is important to note that of these three, two (I4-EB and I6-EB) reported technical problems with both the hospital's and home's wireless internet signal, which hindered access and use of the app. The third (I8-MB) reported that her smartphone broke, while another highlighted the difficulty of using it in daily life:

> "[...] But once I got home, I ended up forgetting — things were just so hectic! (laughs)". (I6-EB)

Adherence and engagement in a digital health intervention are complex and multifaceted phenomena[17]. When designing features targeted at mothers of premature infants, it is essential to consider key contextual factors, such as the ongoing postpartum phase and its biopsychosocial impact on women, as well as the arrival of a preterm baby, often accompanied by significant distress and concern. Mothers who already had one or more children needed to balance their time, energy, and emotional resources, which highlights the importance of investigating the role that mobile apps may play in the daily lives of these women, and the level of engagement required to generate meaningful benefits. Given that opportunities to spend time on a smartphone are often limited in this life context, the moments a woman dedicates to exploring an app must be effective in meeting her core needs, thereby delivering a satisfying user experience.

The concept of User Experience (UX) encompasses all aspects of the interaction between an individual and a technology. It

involves interpreting the user's needs, intentions, and perspectives, as well as evaluating emotional responses, impressions, and perceptions related to a given product[14]. User needs when interacting with a technology can be divided into two categories: *hedonic aspects,* which include all non-objective components of UX and are related to stimulation and goals oriented toward "being"; and *pragmatic aspects,* which comprise the objective components of UX and are associated with goals related to "doing" and "task" performance[14].

The two thematic categories that emerged in this study were aligned with these assumptions, encompassing mothers' experiences with the app within the context of premature motherhood and the journey toward establishing BF. The first category was titled *"Hedonic potentials and challenges in the user experience with the app"*, comprising four subcategories. The second was *"Potentialities and pragmatic challenges in the app experience"*, comprising three subcategories, as shown in Figure 2.

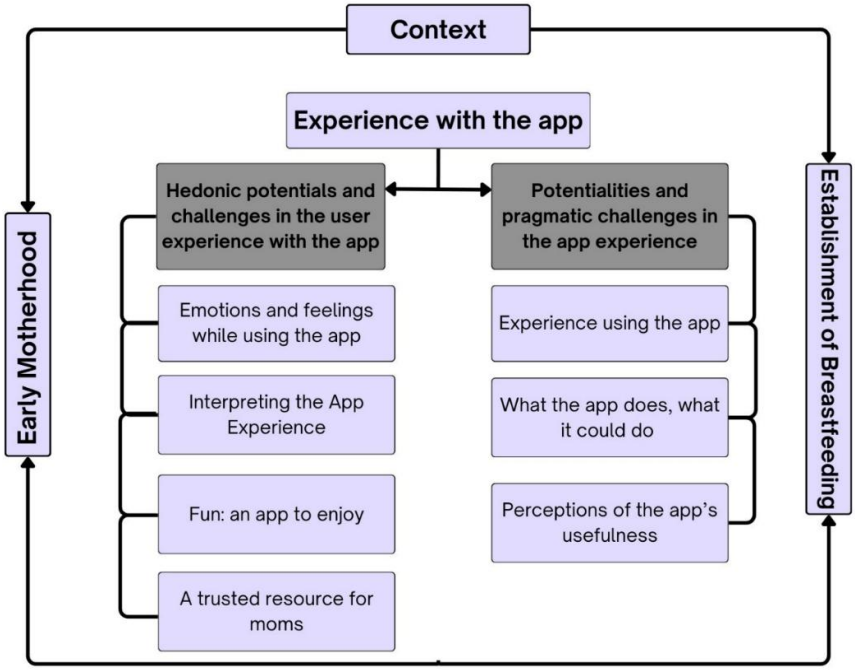

Figure 2. Comprehensive and analytical diagram of reported maternal experiences.
Source: The authors.

Hedonic potentials and challenges in the user experience with the app

Hedonic attributes relate to an individual's emotional experiences, psychological well-being, and enjoyment of technology. Furthermore, in line with the current shift in UX toward valuing well-being and meaning, it is now supported to incorporate into its investigations not only hedonic aspects (the pursuit of pleasure, contentment, and fun) but also eudaimonic aspects (the pursuit of meaning, authenticity, excellence, and growth)[18].

"Emotions and feelings while using the app"

In this subcategory, some mothers reported that it was enjoyable to use, as well as a pleasant way to review their own experiences of premature motherhood:

> "When I did things, I recorded them, and then I got home and enjoyed looking back" (I3-EB).

Adding well-being to users during their experience with a product is promising and is part of a series of progressive approaches to technology design, such as Positive Design or Positive Computing[19].

One participant reported that the app met her personal interest in reading, and that using the app awakened her empathy for the experiences of other mothers.

> "[…] I was curious […] I was really into it because I enjoy reading, and it was nice to hear other moms' thoughts on breastfeeding" (I2-MB).

Curiosity and the perception of a product as novel are concepts rooted in consumer psychology and were among the first hedonic elements to be incorporated into designers' requirements as components of UX[19]. In addition, the sense of pleasantness associated with following posts made by other mothers within the app contributes to strengthening maternal self-confidence in breastfeeding through the mechanism of *vicarious experience* - a mental process in which individuals "simulate" another person's experience by observing their example(s) in performing specific tasks or behaviors[20].

This is different from the emotions that arise during the actual interaction with the app. This was confirmed in the interviews, as when asked specifically about the meaning they attributed to the experience of using the app, some mothers struggled to verbalize a response.

The meaning most strongly attributed to the app was that it served as a source of assistance and support for breastfeeding, as expressed by seven mothers, reinforcing the motivations that guided the development of this resource. Worth noting, even mothers who did not fully engage with the app also assigned this meaning to it, as illustrated by I8-MB:

> "I knew there was so much value in there, really, right?! In the content, the questions themselves…"

One of the most widely accepted definitions of UX conceptualizes it as *"*a person's perceptions and responses resulting from the use or anticipated use of a product, system, or service"[14,21]. In this sense, the user experience begins as soon as the individual comes into contact with the resource and forms their initial impressions of it. Users anticipate and perceive its effectiveness and efficiency, which, in turn, generate feelings of satisfaction, shaping their expectations for future use[19].

Other meanings were also ascribed to the experience with the app. Some participants described it as fostering a sense of being a learning mother and of feeling specially cared for or being the focus of someone's concern. Others spoke about a strengthened sense of connection with their baby. Several mothers described the app as offering access to specialized support tailored specifically to their premature infants, which was perceived as a privilege. One participant expressed a sense of gratitude for the support received:

> "It's a God-blessed app because it really helped me, helped me a lot." (I9-AF).

She also saw the experience as an opportunity for mutual support.

On the other hand, use of the app also triggered a sense of "non-belonging" in one mother, as expressed in the following statement:

> "[…] one difficulty was that I wasn't really fitting in anymore toward the end […] he (the baby) was already on artificial milk, so I felt like the black sheep, different from that group. Because my baby was no longer exclusively breastfed […]" (I8-MB)

This statement, unique within the *corpus* of the present study, invites reflection on the mother's life context and some of the emotions expressed during the interview. The explanation of introducing formula at one month of age was marked by the mother's emotional distress, as she described non-exclusive breastfeeding as a source of pain.

> "It's an honor for a mother, isn't it…? To truly be able to breastfeed… it hurts not being able to… not the way I wish I could" (I8-MB)

Cultural contextual factors compose the foundation upon which all aspects of user needs experience (NX) are built[14]. Although the most recent national survey estimated that only 37% of children under six months are exclusively breastfed[22], Brazil is recognized for its strong public policies promoting and protecting breastfeeding. The importance of this practice is a recurring theme in interactions with mothers. It can be inferred that this mother's experience with the app was significantly shaped by the cultural emphasis on exclusive breastfeeding during the first six months of life. Her emotional response to the introduction of formula feeding, perceived as a deviation from this ideal, undermined her sense of dignity and maternal fulfillment.

It is also important to recognize the influence of users' intrinsic factors on the UX, which can affect how they interact with the app[23], such as attitudes and expectations toward the system,

personality traits, and mood states, among others. Both the meaning attributed to the app experience and the (dis)satisfaction with one's own breastfeeding journey reflect each woman's inner world, including her personal experiences, expectations, and values. This becomes evident in the contrasting examples of two participants. The first, I8-MB, who practiced mixed feeding, felt frustrated and had a negative experience with the app, while the second, I9-AF, who experienced complete weaning shortly after discharge, attributed broadly positive meanings to the app experience, extending beyond the realm of BF.

Still, in an effort to reduce potential discomfort among app users, scheduled notifications with questions about the establishment and maintenance of EBF were suspended for those who indicated that they had discontinued EBF. In mobile applications, push notifications are messages displayed outside the app, on the smartphone's home screen, and are used to convey information, provide reminders, or prompt the user to take specific actions[9].

Another hedonic aspect that emerged from the mothers' accounts was enjoyment, which composed the subcategory "*Fun: an app to enjoy*," as illustrated by I3-MB and I9-AF in statements such as "*It was really nice to use*". Even the anticipation of using the app generated the expectation that it would be pleasant and sparked interest in participating in the study.

One participant suggested a new feature that could enhance the fun aspect of the app experience:

> "There could be a little space for us to add the baby's name, weight, height... [...] So I could see the other moms' info and they could see mine. Like a way for us to exchange information". (I9-AF)

Earlier concepts of UX regarded pleasure and enjoyment as secondary attributes, considered less relevant than pragmatic needs such as error reduction and goal achievement. However, this hierarchy has increasingly been recognized as misguided[18], as "there is at least an intensity difference between enjoying something and merely being satisfied with it"[19]. Experiencing well-being and joy is undoubtedly a fundamental human desire, and thus, it makes little sense to disregard this premise in the design of digital health promotion strategies.

The final hedonic attribute revealed in the mothers' experience with the app was Trustworthiness, which formed the subcategory "*A trusted resource for moms*". It was found that the app's development by healthcare professionals, as well as its connection to a research project, provided a sense of scientific credibility. The app was understood as trustworthy due to its comprehensiveness, to the extent that it was considered recommendable to other mothers as a valuable source of support:

> "If I were to talk to another mom today about this app, because it's still in testing, right? From what I understand. Before it becomes available to everyone… It really helped me. I would tell her it helped me a lot". (I9-AF)

Another key point of reliability was the perception that the app reinforces guidance that mothers receive from health professionals and helps to consolidate knowledge, expressed by interviewee I10-MB:

> "I didn't know that, it was actually you (the researcher) […] who told me. I also saw it on the app that when the baby makes noise, they're actually not sucking properly […] you have to get the latch just right".

Reliability refers to the trust between the user and the organization, and has an impact on different aspects, such as emotions[14]. In the context of supporting breastfeeding for premature babies, this trust in the resource is a fundamental factor and is filtered by each woman's personal beliefs and values.

Potentialities and pragmatic challenges in the app experience

Pragmatic aspects are qualities of the user experience that reflect the instrumentality of a system, that is, its perceived ability to support task execution or action-taking[14,19]. In the explanatory UX model adopted in this study[14], the pragmatic aspects are usability, functionality, and usefulness.

The subcategory *"Experiences using the app"* includes statements related to usability, understood as a characteristic of the interaction between user and product, defined by ease of use and ease of learning to use it[14]. Four mothers described the app as easy to use. The account of participant I2-MB explains that the researchers

facilitated mothers' learning during the app's initial presentation. It is well known that app acceptability is strongly linked to the perception of simplicity and ease of use, which makes these qualities highly desirable and broadly applicable to most app designs[24]. As a potential usability enhancement, participant I2-MB suggested that the app include a feature to support mothers who are not literate, an important consideration for future versions.

Literacy did not appear to influence perceptions of the app's intuitiveness, as participant I10-MB had an incomplete primary education, while I4-EB had completed high school.

The participants tested the app during its development phase, during which updates and revisions were actively being implemented by the information technology (IT) team, a process that typically continues in Agile Development frameworks[25]. However, this may have led to technical issues for some users, potentially explaining the difficulties reported by I4-EB. To achieve intuitive design, developers must understand their users, identify and reduce both physical and cognitive friction points, and bridge knowledge gaps with user interfaces that promote discoverability and learning capacity[26].

Functionality is considered a technical matter and refers to the extent to which a system operates effectively and fulfills the product's intended purposes. Evaluating this attribute seeks to answer the question: "What is the product capable of doing?" and from there, determine which features must be present in the device or technology[27]. Based on this premise, the AmamentaCoach app was designed to: (1) serve as a reliable source of information and support for breastfeeding among mothers of preterm infants, (2) act as a tool for motivation and engagement, (3) function as a platform for recording information, setting goals, and tracking breastfeeding performance, and (4) be a resource worthy of recommendation to other mothers. In this regard, seven mothers reported that they would recommend the app to other mothers. Several mentioned specific women, and some even stated they would recommend it to pregnant women and mothers of full-term infants. The following subcategories highlight the users' perceptions of the app's functionalities.

According to five mothers, using the app supported technical learning about breastfeeding:

> "It helped me position myself to breastfeed her, it taught me how to help her latch correctly […] When the milk hardens, you have to massage it" (I2-MB).

The app served as a source of motivation for mothers navigating the challenges of breastfeeding in the context of prematurity. It also encouraged them to document their actions and promoted greater awareness of their breastfeeding journey and progress:

> "Oh, it really motivated me, I won't lie... Like, when it was time to pump, I'd think, 'Yesterday I pumped this much, today I'm going to pump more.' I kind of wanted to beat my own record, you know?" (I3-MB)

Other perceptions of the app's functionality went beyond the primary premises that guided its development. It was seen as a resource that encouraged meaningful reflection, a means of finding answers even in the absence of direct support, and a tool sought out during moments of anxiety.

> "So, the questions were really cool because I was asking things and getting the answers at the same time, even without someone actually telling me" (I9-AF). "[...] Because it taught me things I didn't know, and there was no one at home who could help me" (I2-MB).

> "[…] I would get anxious, and then I'd read through the content…" (I1-AF)

Users often seek out optimized apps with multiple functions, as these increase convenience and reduce the need to rely on multiple single-purpose applications[24]. Participants also came across weaknesses and functional challenges within the app. Technical issues were reported, which compromised its functionality for some users,

> "I wasn't able to upload a photo, you know, the one that talks about the motivation to breastfeed." (I7-SDB)

The participants tested the app during its ongoing revisions and updates by the IT team, a process that typically continues uninterrupted throughout the mobile technology development cycle. This may have led to technical issues, as some features were undergoing adjustments at the

time. As participants reported weaknesses in their user experience, the development team received this feedback and worked on correcting the identified bugs. Insufficient resolution of reported malfunctions to app failures can result in deteriorating quality; however, the collaborative efforts of researchers, developers, and users are instrumental in resolving technical issues, ensuring ongoing integrity, and continuously enhancing the app's functionality[28].

Scientific literature reports that, in general, users tend to be intolerant of unnecessary features and are quick to notice when a device lacks functions they would consider useful[28]. In this regard, the access to games enabled by the app was deemed an unviable feature for mothers, as expressed by I10-MB. For I9-AF, the app could allow for sequential entries of the baby's anthropometric data, such as weight and height, in addition to photo uploads. On this topic, another qualitative study on user experience emphasizes that apps can go beyond superficial functionalities like simply providing reminders or assistance with daily tasks; they can also support identity and inclusion by promoting personalization[24]. Adding information about the babies, for instance, could in the future become a more meaningful and engaging feature for mothers, more so than access to games unrelated to motherhood.

Still regarding functionality, the app's notification inquiring about the baby's hospital discharge was perceived as inopportune,

> "[...] it would always ask: 'has your baby been discharged yet?' And I'd always answer: no... no... no..." (I3-MB)

Balancing the need for ongoing monitoring with a satisfying user experience poses a significant challenge in planning and development. During the creation of the AmamentaCoach app, the development team engaged in extensive discussions regarding how frequently the app should prompt users with certain questions. It is also worth noting that user feedback played a crucial role in guiding decisions about both the frequency and format of these prompts.

The final subcategory within *"Potentialities and pragmatic challenges in the app experience"* was titled *"Perspectives on the app's usefulness"*. Usefulness refers to the extent to which a technology is able to meet a need identified by the user[14]. The mothers recognized several features of the app as useful, addressing a range of needs such as receiving support, interacting with others, sharing experiences, documenting their journey, resolving doubts, and being encouraged to reflect throughout the process.

Some positive aspects related to the app's usefulness were reported by the mothers, with particular emphasis on the exchange of experiences:

> "It helped me with so much […] You could talk to other moms who had questions, it is a good thing because everyone knows how hard this is. (…) I would go on the app to see what other moms thought." (I2-MB)

> "EI10, for example, everything she posted there, I'd try to take in as much as I could, because she was a second-time mom, so she had more experience." (I9-AF)

The experience with the technology fostered connection among the parties involved in the journey of premature breastfeeding, namely relationships with other mothers and healthcare professionals. In a study exploring the experience of physicians and nurses as users of healthcare technologies, relationships were described as "creating a sense of contact with the people who care for me and those I care for" and "feeling close and connected to other people who are important to me," and were classified as the least salient among psychological needs in UX[18]. The findings of the present study can be grounded, among other factors, in the nature of the phenomenon that constitutes the context of app use, namely: the establishment of BF, a process strongly influenced by social factors. Results from another qualitative study on UX in healthcare highlighted that the value of apps goes beyond mere functionality and their ability to assist in care delivery; they are also capable of fostering richer interpersonal connections, enhancing personality, and supporting family routines[24], as reflected in the mothers' accounts in the present study.

The timing of the interviews was not uniform with respect to the mothers' app usage periods, with some still actively using it at the time of the interview, while others had not accessed it for over a month. This represents a study limitation,

as it may have introduced memory gaps regarding the investigated experience. Additionally, online data collection may pose another limitation, since the lack of a physical meeting place could have compromised privacy during the interviews. To mitigate this, researchers assured participants they could choose the most convenient date and time for the interview and were free to pause or stop the conversation at any moment if they wished.

The adoption of a qualitative approach is common in studies investigating the experience of users of mHealth applications[29,30]. However, by recognizing UX as a complex phenomenon, and in this case, influenced by many variables related to the context of BF in prematurity, a mixed-methods approach that includes an assessment of quantitative aspects can deepen the understanding of the user experience with this app.

Longitudinal studies can also enable the analysis of the app's usage, challenges, and potential over time, and the findings can provide information on the ideal time to introduce it.

FINAL CONSIDERATIONS

Reinforcing the theoretical framework adopted, the mothers' experience was shaped not only by the app's usefulness, functionality, and usability, but also by contextual factors, lived experiences, and emotional states before, during, and after its use. From the users' perspective, valuable insights emerged that deepen the understanding of how various elements interact to shape the experience of using a breastfeeding support app within the context of prematurity. Notably, the richness of responses regarding the meaning attributed to the app was striking. The most strongly conveyed interpretation was that the app served as a source of support and guidance throughout the breastfeeding process. In addition, some of the app's limitations, particularly those related to functionality and usability, provided important input for future improvements to the intervention.

According to current knowledge, this is the first study to analyze the experience of mothers of premature babies supported by an app on their breastfeeding journey, based on a theoretical UX model. A comprehensive analysis of the mothers' statements as users of the AmamentaCoach app provided an overview of the app, which proved to be enjoyable to use, capable of arousing curiosity and attention, useful in meeting diverse needs, easy to use, intuitive, and suitable for recommending to other mothers.

USO DO APLICATIVO MÓVEL AMAMENTACOACH: EXPERIÊNCIA DE MÃES DE BEBÊS PREMATUROS

RESUMO

Objetivo: compreender a experiência de mães com o uso do *app* AmamentaCoach no processo de amamentação de bebês prematuros. **Método:** estudo qualitativo com entrevistas semiestruturadas realizadas com dez mães. Utilizou-se como referencial metodológico a Análise de Conteúdo Temática. A análise das falas das participantes foi norteada pelos aspectos hedônicos e pragmáticos constituintes de um modelo explicativo de *User Experience* (*UX*). **Resultados:** houve em média seis acessos no *app*, com mínimo de um e máximo de 11 registros de *login*. Emergiram duas categorias: "Potencialidades e desafios hedônicos" e "Potencialidades e desafios pragmáticos", com quatro e três subcategorias, respectivamente. O *app* despertou curiosidade, agradabilidade e diversão, ofereceu apoio emocional e prático durante a separação física e percebido como uma ferramenta de cuidado confiável e direcionado para binômios prematuros. **Considerações finais:** Ao que temos conhecimento, este é o primeiro estudo no mundo baseado em um modelo teórico de *UX* com mães de bebês prematuros que utilizaram um *app* específico para amamentação. Na jornada pela iniciação e estabelecimento da amamentação, as oportunidades de dispender tempo com o smartphone podem ser restritas; portanto, os períodos que a mulher dedica a explorar um *app* devem prover uma experiência satisfatória e que atenda suas principais necessidades.

Palavras-chave: Aplicativos móveis; Aleitamento materno; Recém-nascido prematuro; Design centrado no usuário; Enfermagem neonatal; Pesquisa qualitativa.

USO DE LA APLICACIÓN MÓVIL AMAMENTACOACH: EXPERIENCIA DE MADRES DE BEBÉS PREMATUROS

RESUMEN

Objetivo: comprender la experiencia de madres con el uso de la aplicación *AmamentaCoach* en el proceso de lactancia de bebés prematuros. **Método**: estudio cualitativo con entrevistas semiestructuradas realizadas con 10 madres. Se utilizó como referencial metodológico el Análisis de Contenido Temático. El análisis de los discursos de las participantes fue guiado por los aspectos hedónicos y pragmáticos constituyentes de un modelo explicativo de *User Experience* (*UX*). **Resultados**: hubo un promedio de 6 accesos a la aplicación, con un mínimo de 1 y máximo de once registros de inicio de sesión. Surgieron dos categorías: "Potencialidades y desafíos hedonistas" y "Potencialidades y retos pragmáticos", con cuatro y tres subcategorías, respectivamente. La aplicación despertó curiosidad, afabilidad y diversión, ofreció apoyo emocional y práctico durante la separación física y fue percibida como una herramienta de cuidado confiable y dirigida a los binomios prematuros. **Consideraciones finales**: por lo que sabemos, este es el primer estudio en el mundo basado en un modelo teórico de *UX* con madres de bebés prematuros que utilizaron una aplicación específica para amamantar. En el camino hacia la iniciación y el establecimiento de la lactancia, las oportunidades para pasar tiempo con el *smartphone* pueden ser limitadas; por lo tanto, los períodos que una mujer dedica a explorar una aplicación deben proporcionar una experiencia satisfactoria que atienda sus principales necesidades.

Palabras clave: Aplicaciones móviles; Lactancia materna; Recién nacido prematuro; Diseño centrado en el usuario; Enfermería neonatal; Investigación cualitativa.

REFERENCESS

1. Tronco CS, Bonilha ALL, Teles JM. Support network for breastfeeding in late prematurity. Ciênc Cuid Saúde. 2020; 19:e46479. DOI: https://doi.org/10.4025/ciencuidsaude.v19i0.46479

2. Kinoshita M, White MJ, Doolan A. Clinical assessment of breastfeeding in preterm infants. Eur J Clin Nutr. 2024; 78:825–29. DOI: https://doi.org/10.1038/s41430-024-01471-3

3. Curan GRF. App AmamentaCoach: desenvolvimento, validação e experiência de uso por mães de filhos prematuros. 2022. [tese]. Londrina (PR): Universidade Estadual de Londrina; 2022.

4. Shlomai NO, Mordechai C, Morag I, Abram TB, Eventov Friedman SE. Cue-based feeding in the NICU—a pathway to earlier oral feeding of preterm infants. Front Pediatr. 2024;12:1417628. DOI: 10.3389/fped.2024.1417628

5. Haiek LN, LeDrew M, Charette C, Bartick M. Shared decision-making for infant feeding and care during the coronavirus disease 2019 pandemic. Matern Child Nutr. 2021;17(2):e13129. DOI: 10.1111/mcn.13129.

6. Nandula PS, Hudak ML. Remote Lactation Support in the COVID-19 Era. NeoReviews. 2021;(6):e392–7. DOI: 10.1542/neo.22-6-e392

7. Arshadi Bostanabad M, Hosseinzadeh M, Molazemi Z, Namdar Areshtanab H. Emotional intelligence and stress and their relationship with breastfeeding self-efficacy in mothers of premature infants. BMC Womens Health. 2024;24(1):15. DOI: 10.1186/s12905-023-02849-4

8. Hoban R, Medina-Poeliniz C, Signorile M, Janes J, Fan CS, Meier PP. Early postpartum pumping behaviors, pumped milk volume, and achievement of secretory activation in breast pump-dependent mothers of preterm infants. J Perinatol. 2024;44:1597-1606. DOI: 10.1038/s41372-024-02021-2

9. Humphrey G, Dobson R, Parag V, Hiemstra M, Howie S, Marsh S, et al. See How They Grow: Testing the feasibility of a mobile app to support parents' understanding of child growth charts. Gopichandran V, editor. PLOS ONE. 2021;16(2):e0246045. DOI: 1371/journal.pone.0246045

10. Silva MM, Penha JC, Barbosa ICFJ, Carneiro CT, Borges JWP, Bezerra MAR. Construção e validação de tecnologia educacional para promoção do aleitamento materno no período neonatal. Esc Anna Nery. 2021;25(2). DOI: https://doi.org/10.1590/2177-9465-EAN-2020-0235

11. Campana KSS, Curan GRF, Rossetto EG, Costa LLC, Silva LMF da. Uso de aplicativos para smartphones visando a promoção da amamentação de prematuros: revisão de escopo. Adv Nurs Health. 2022. DOI: 10.5433/anh.2022v4.id43664

12. Richardson B, Dol J, Rutledge K, Monaghan J, Orovec A, Howie K, et al. Evaluation of Mobile Apps Targeted to Parents of Infants in the Neonatal Intensive Care Unit: Systematic App Review. JMIR mHealth and uHealth. 2019;7(4). DOI: 10.2196/11620

13. Curan GRF, Nascimento OP, Bergamo JAO, Koga CAL, Silva RIA, Ferreira DR, et al. A Mobile App to Promote Breastfeeding Self-Efficacy in Preterm Infants' Mothers: Development and Validation. Clin Nurs Res. 2023;33(1):95-103. DOI:10.1177/10547738231214582

14. Zarour M, Alharbi M. User experience framework that combines aspects, dimensions, and measurement methods. Park E, editor. Cogent Eng. 2017;4(1). DOI: 10.1080/23311916.2017.1421006

15. Souza VR dos S, Marziale MHP, Silva GTR, Nascimento PL. Tradução e validação para a língua portuguesa e avaliação do guia COREQ. Acta Paul Enferm. 2021; 34. DOI: https://doi.org/10.37689/acta-ape/2021AO02631

16. Dalla Valle PR, Ferreira JL. Análise de Conteúdo na perspectiva de Bardin: contribuições e limitações para a pesquisa qualitativa em educação. Educ Rev. 2025;41:e49377. DOI: https://doi.org/10.1590/0102-469849377

17. Santos SLV. Engajamento de usuários com tecnologias emergentes e imersivas [Internet]. Goiânia: Cegraf UFG; 2024 [citado 2025 maio 24]. E-book. Disponível em: https://portaldelivros.ufg.br/index.php/cegrafufg/catalog/book/679.

18. Hohm A, Happel O, Hurtienne J, Grundgeiger T. User experience in safety–critical domains: a survey on motivational orientations and psychological need satisfaction in acute care. Cogn, Technol Work. 2022;24(2):247-60. DOI: 10.1007/s10111-022-00697-0

19. Hassenzahl M, Burmester M, Koller F. User Experience Is All There Is: Twenty Years of Designing Positive Experiences and Meaningful Technology. i-com. 2021;20(3):197–213. DOI: 10.1515/icom-2021-0034

20. Dennis CL. Theoretical underpinnings of breastfeeding confidence: a self-efficacy framework. J Hum Lact. 1999;15(3):195-201. DOI: 10.1177/089033449901500303

21. Ding X, Soikun TM. Definition, Dimensions, and Research Methods of User Experience. IJARBSS. 2023;13(8):2222-6990. DOI: 10.6007/IJARBSS/v13-i8/18256

22. Universidade Federal do Rio de Janeiro. Aleitamento materno: Prevalência e práticas de aleitamento materno em crianças brasileiras menores de 2 anos - ENANI 2019 [Internet]. Rio de Janeiro: UFRJ; 2021 [citado 2025 maio 12]. Disponível em: https://enani.nutricao.ufrj.br/wp-content/uploads/2023/10/Relatorio-4-ENANI-2019-Aleitamento-Materno.pdf

23. Porsani RN, Raposo F, Demaison AL, Paschoarelli LC. Design + Realidade Virtual: Revisão Teórica de Conceitos, Reflexões e Práticas de UX. Cuaderno [Internet]. 27 mayo 2024 [citado 2025 maio 4];(225). Disponible en:

https://dspace.palermo.edu/ojs/index.php/cdc/article/view/11249

24. Wang AH, Newman K, Martin LS, Lapum J. Beyond instrumental support: Mobile application use by family caregivers of persons living with dementia. Dementia (London). 2022;21(5):1488-1510. DOI: 10.1177/14713012211073440

25. Alyahya S, Ivins WK, Gray WA. Raising the Awareness of Development Progress in Distributed Agile Projects. J Software. 2013;8(12). DOI: 10.4304/jsw.8.12.3066-3081

26. Kuoch S, Nowakowski C, Hottelart K, Reilhac P, Escrieut P. Designing an intuitive driving experience in a digital world. Preprints. 2018;2018070629. DOI: 10.20944/preprints201807.0629.v1

27. McNamara N, Kirakowski J. Functionality, usability, and user experience. Interactions. 2006;13(6):26. DOI: 10.1145/1167948.1167972

28. Hilbolling S, Berends H, Deken F, Tuertscher P. Sustaining Complement Quality for Digital Product Platforms: A Case Study of the Philips Hue Ecosystem. J Prod Innov Manage. 2020. DOI: 10.1111/jpim.12555

29. Demirci J, Caplan E, Murray N, Cohen S. "I Just Want to Do Everything Right:" Primiparous Women's Accounts of Early Breastfeeding via an App-Based Diary. J Pediatr Health Care. 2018;32(2):163-72. DOI: 10.1016/j.pedhc.2017.09.010

30. Szinay D, Perski O, Jones A, Chadborn T, Brown J, Naughton F. Perceptions of factors influencing engagement with health and well-being apps in the United Kingdom: qualitative interview study. JMIR Mhealth Uhealth 2021;9(12):e29098. DOI: 10.2196/29098

Corresponding author: Guilherme Alves da Silva. Rua China, nº 285, Bloco 1 Apt 134.CEP: 86046-460, Londrina – PR. Telefone: (44) 99714-4331. Email: enfigui@gmail.com

Submitted: 15/02/2025
Accepted: 13/07/2025

Financial support:

This work was funded by CNPq, based on the original research entitled *'Nursing coaching via app: an innovative approach to breastfeeding premature babies'*, registered under CAAE number 27703419.8.0000.5231, and developed in a multicenter format across the states of Paraná and Goiás.