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Construction and validation of educational technology to promote breastfeeding in the neonatal period[a]

Construção e validação de tecnologia educacional para promoção do aleitamento materno no período neonatal

Construcción y validación de tecnología educativa para promover la lactancia materna en el período neonatal

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Abstract

Objective: to build and validate a text messages and pictures package to promote breastfeeding in the neonatal period. **Methods:** It was a methodological study carried out in four stages: integrative literature review, construction of message and picture package, readability analysis and content and appearance validation. For validation, 11 judges with experience in breastfeeding participated. The criterion for validation was agreement of more than 80%, analysed by means of content and appearance validation indexes. **Results:** the final version of the message and picture package presented a content validity index of 0.86, appearance validity index of 0.85 and a convergent correlation validity of 0.73 between content and appearance (p <0.01). **Conclusions and implications for practice:** the package of text messages and figures was considered valid in content, appearance and convergence for the promotion of breastfeeding in the neonatal period, constituting appropriate educational technology suitable to be shared via phone messages, in order to approach the nursing mothers, helping them to react to common problems in the neonatal period.

Keywords: Information Technology; Breast Feeding; Educational Technology; Validation Study; Health Education.

Resumo

Objetivo: construir e validar um pacote de mensagens de texto e figuras para promoção do aleitamento materno no período neonatal. **Métodos:** tratou-se de um estudo metodológico, realizado em quatro etapas: revisão integrativa da literatura, construção de pacote de mensagens e figuras, análise de legibilidade e validação de conteúdo e aparência. Para validação, participaram 11 juízes com *expertise* em aleitamento materno. O critério para validação foi concordância superior a 80%, analisada por meio dos índices de validação de conteúdo e aparência. **Resultados:** a versão final do pacote de mensagens e figuras apresentou índice de validade de conteúdo de 0,86, índice de validade de aparência de 0,85 e validade convergente com correlação de 0,73 entre o conteúdo e a aparência (p<0,01). **Conclusões e implicações para a prática:** o pacote de mensagens de texto e figuras foi considerado válido em conteúdo, aparência e convergência para promoção do aleitamento materno, no período neonatal, constituindo tecnologia educacional adequada para ser compartilhada via mensagens telefônicas, com intuito de se aproximar das nutrizes, ajudando-as a reagir frente aos problemas comuns no período neonatal.

Palavras-chave: Tecnologia da Informação; Aleitamento Materno; Tecnologia Educacional; Estudo de Validação, Educação em Saúde.

Resumen

Objetivo: construir y validar un paquete de mensajes de texto e imágenes para promover la lactancia materna en el período neonatal. **Métodos:** fue un estudio estudio metodológico, llevado a cabo en cuatro etapas: revisión integradora de la literatura, construcción de un paquete de mensajes e imágenes, análisis de legibilidad y validación de contenido y la apariencia. El criterio de validación fue un acuerdo superior al 80%, analizado por medio de los índices de validación de contenido y apariencia. **Resultados:** la versión final del paquete de mensajes y grabados presentó un índice de validez de contenido de 0,86, un índice de validez de apariencia de 0,85 y una validez de correlación convergente de 0,73 entre contenido y apariencia (p <0,01). **Conclusiones e implicaciones para la práctica:** el paquete de mensajes de texto y imágenes se consideró válido para el contenido, la apariencia y la convergencia para la promoción de la lactancia materna en el período neonatal, constituyendo una tecnología educativa adecuada para ser compartida a través de mensajes telefónicos, con el fin de acercarse a las madres lactantes, ayudándolas a reaccionar ante problemas comunes en el período neonatal.

Palabras clave: Tecnología de la Información; Lactancia Materna; Tecnología Educacional; Estudio de Validación, Educación en Salud.

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INTRODUCTION

Information and Communication Technologies (ICT) are an economic platform and allow instant access and direct communication for faster information transfer.[1] In the last decade, the number of users of these technologies has increased significantly, which has made it opportune for health professionals and patients to use them in health communication processes.[2]

Among ICT, cell phones stand out, especially *smartphones*, whose spread has contributed to the increase in the number of applications available for *download*[3] which, due to the ease of access to data, practicality, availability and interactivity, have found several functions in the health area.[4] In this context, the *WhatsApp® Messenger* messaging application emerges as a useful health care tool and potential channel for clarifying doubts, transmitting information, guidance and promoting adherence to treatment.[5] It is therefore configured as a fast, reliable technology that can transmit volumes of data, with the potential to revolutionize communication and decision-making in the health sector.[6]

The broad scope and flexibility of *WhatsApp® Messenger*, adjusting to the health needs of each social context, provides innovative healthcare delivery solutions. The use includes providing health information of public interest, clarifying users' questions, and sending educational technologies.[7] Thus, educational technology is considered a facilitating device for health promotion and a caring-educational resource.[8]

Among the possible topics to be addressed in the health care environment, from the use of *WhatsApp® Messenger* and the applicability of educational technologies, is Breastfeeding (BF). Although individual intervention studies that employed this specific technology have not been identified, other researches have indicated benefits of the approach of BF through social media, such as discussions to exchange experiences in *online* groups,[9] Instagram,[10] Facebook4 and other applications.[11]

The development and use of such technologies may imply breastfeeding success. From a care point of view, the use of information technologies in basic care, from prenatal to puerperium, signals significant changes that directly reflect in the rates of breastfeeding. However, although significant initiatives have been developed in recent years, much remains to be done, with a view to raising exclusive and complementary breastfeeding rates in a timely manner and inhibiting early weaning.[12]

Worldwide, the highest prevalence of breastfeeding is in Sub-Saharan Africa, South Asia and parts of Latin America. In high-income countries, the prevalence is less than 20.0%, with significant differences, such as the United Kingdom (<1.0%), Sweden (16.0%), the United States (27.0%) and Norway (35.0%). However, the early initiation of breastfeeding, soon after birth, was low in all countries, as was exclusive breastfeeding (SBA). In recent research, it was identified that among children under six months of age in low- and middle-income countries, 36.3 million (63.0%) did not receive EBF at the time of the research.[13]

Add to this the fact that, currently, due to the pandemic of the new *coronavirus disease* (COVID-19), social distance has become the most effective measure in reducing the spread of the virus. However, this measure may hinder the implementation of the necessary support employed by health teams for the establishment and maintenance of the BF. Faced with this scenario, social media, especially - applications such as *WhatsApp® Messenger* can enable the continuity of health care that transcends physical contact and enable the promotion of BF in the neonatal period.

In this regard, among the recommendations of the health system to respond to the new demands related to COVID-19, it was established the need to consider alternative models of care, such as the provision of services in different environments and/or platforms (by telephone or via the *Web*, for example).[14]

Based on the above and recent studies on the use of applications for health education with patients,[15] it is noted that the use of *smartphones* technology in clinical practice is a growing research topic.[16] Therefore, research is needed to explore how ICT can be used to provide comprehensive support for BF.[17,18] Thus, it was aimed at building and validating Text and Figure Message Pack (TFMP) for the promotion of breastfeeding in the neonatal period.

METHOD

Methodological study, of quantitative approach, developed from August 2018 to November 2019, in four stages: integrative literature review, construction of package of messages and figures, analysis of readability and validation of content and appearance.

Regarding the integrative literature review (RIL), held from January 2001 to July 2019, the *National Library of Medicine* (PUBMED), the *Index to Nursing and Allied Health Literature* (CINAHL), the Virtual Health Library (VHL) - Latin American and Caribbean Health Sciences Literature (LILACS), the *WEB of SCIENCE* and SCOPUS were used. The terms "early weaning", "risk factors" and "neonatal period" were used as research descriptors to select the articles appropriate to the following established inclusion criteria: primary studies that addressed the factors that lead mothers to early weaning in the neonatal period and published in English, Portuguese or Spanish. A total of 1,673 articles were identified as potentially relevant for the review, of which 73 were selected for full reading, remaining 12 articles in the final sample.

As for the construction of the TFMP, the selection of content was made by identifying the risk factors for early weaning in RIL and had as a base reference for the development of educational messages the manuals of the Ministry of Health[19-21] and the guidelines of the Brazilian Society of Pediatrics.[22,23] After the corpus of the study was constituted, a categorical-thematic analysis was performed.[24]

Then, the TFMP was written in appropriate language and the figures were made by a designer company hired for this purpose, under the supervision of the research team. The choice was to make figures that were attractive, easy to understand, consistent with the socio-cultural context of the mothers and that sought to demonstrate the content of text messages.[25] The figures were prepared in the graphic software Corel Draw X7, Wireframe interface, with dimensions (1080x1080px - 72dpi) and

sizes (54pt- 25pt and 17pt) compatible with the media in which they will be broadcast.

As for the readability analysis, the suitability of the language was evaluated through the Flesch Kincaid test, a measure of complexity of the text associated with ease of reading for different types of readers. The test was performed using the Automatic Grammar Reviewer for Portuguese - ReGra, a Microsoft Word tool, version 2006, which identifies the syntactic structure of the sentence. The calculation was performed using the following formula: FRE = 206.835 - [(1.015 x average length of the sentence) + 84.6 x (average number of syllables)]. The results vary on a scale from zero to 100 points, where the higher the punctuation, the easier the text is. This test was applied, at first, to each message and, subsequently, to the complete package, adopting the following reference: index between 75-100 (very easy texts, suitable for readers with a level of education up to the fourth grade of elementary school).[26] Thus, the sentences that did not reach this index were rewritten to facilitate the understanding of the audience for which it is intended (literate mothers).

As for the validation of content and appearance, this was performed by judges in the areas of nursing and nutrition, with experience in the themes of children's health, BF and health information technology, who decided on the relevance of the dimensions of the BF indexes. The judges necessarily had to be experts in the field of construction, since the task was to decide whether or not the items were referring to the latent trace in question.[27]

For the sample definition, consultations were carried out on articles published in national and international reference journals, in order to locate the expert judges on the subject on screen. In order to be considered a viable judge, it was necessary to reach a minimum score of five points to the pre-selected criteria and adapted from *Fehring's version*.[28] Next, searches were made in the *Lattes* Platform of the National Council for Scientific and Technological Development (CNPq) to verify the adequacy of the possible participants to the inclusion criteria.[29] The establishment of the sample size occurred for convenience. In all, 48 judges were selected, 16 of whom expressed interest in contributing to the validation study. After the process, 11 judges composed the sample.

For the collection of data, contact was made by e-mail and an invitation letter was sent. After consent, the data collection instruments, the instructions, the Term of Free and Informed Consent, in two copies, and a copy of the TFMP were sent via e-mail. Three forms were used: the first one to characterize the specialists, composed of sociodemographic and academic variables; the second one, an instrument for content validation, which evaluates educational technologies in six domains: objectives, organization, writing style, appearance, motivation and cultural adaptation;[30] and the third one, another formatted by 12 items, specific for appearance validation, which evaluates educational materials for people with low literacy.[31] In order for the judges to evaluate the relevance of each item, a Likert-type scale was adopted, with scores from one to five, which was based on the judges' responses regarding the degree of relevance of each item of the instruments.

After evaluation by the judges, the data were doubly inserted into *Microsoft Excel software* spreadsheet, version 2013, then processed and analyzed by *Statistical Package for Social Sciences for Windows (SPSS) software (2009),* version 18.0. Sociodemographic and academic information were tabulated and presented by means of descriptive statistics, thus calculating average, relative and absolute frequencies. To determine the level of agreement among the judges regarding the content, the Content Validity Index (CVI) was calculated, verified from the sum of the consent of the judges who marked items 4 and 5, divided by the total number of responses. Therefore, it was considered an acceptable index equal to or higher than 78.0% (CVI ≥ 0.78), for individual evaluation of each item and general evaluation of the TFMP.[32]

To determine the level of agreement among the judges regarding appearance, the Appearance Validity Index was calculated for each item (AVI-I) computed by the number of specialists who answered 4 or 5 divided by the total of specialists who evaluated the item. For the total AVI (AVI-T), the sum of the AVI-I was calculated and divided by the total of items.[31] Those with AVI<0.78 and the need to adapt the appearance of educational technology in health were considered excellent.[31]

To show the convergent validity of the TFMP, the results of the content evaluation instrument and the appearance evaluation instrument were summarized by score, by summing the answers of the scales. The convergence technique used was conducted based on the correlation between the scores of two scales, whose contents are directed to the same theoretical direction.[33] Pearson's correlation was calculated from the total scores and the domains of the content validation instrument, as well as the appearance validation instrument score. The results of correlations above $r>0.3$ and $p<0.05$ were considered to be plausible convergence validation. The significance level adopted was $p \leq 0.05$, with Confidence Interval (CI) of 95.0% for the statistical tests performed.

Study approved by the Research Ethics Committee of the Amílcar Ferreira Sobral Campus, of the Federal University of Piauí, according to the Certificate of Presentation for Ethical Appreciation No. 03637218.7.0000.5660 and opinion No. 3.055.341.

RESULTS

The final version of the educational technology developed had a quantitative of 28 text messages and respective figures, organized in blocks, following a logical sequence of grouping by common themes: Block 1 - Presentation and completion of monitoring; Block 2 - Introduction on the BF; Block 3 - Advantages of BF; Block 4 - Position and handle; Block 5 - Evolution and production of breast milk; Block 6 - Breast care; Block 7 - Milking milk; Block 8 - Possible complications in the breast; Block 9 - Professional support; Block 10 - Legal instruments to protect the BF; and Block 11 - Liquid supply.

Once the TFMP was built, the Flesch Kincaid readability test was performed on each of the 28 text messages, obtaining an index variation between 75 and 99 and on the complete package with an average of 87 points. Thus, it was found that the language used in educational technology was suitable for individuals with low levels of education and/or who were not in the habit of reading. An example of the messages developed, and their image is shown in Figure 1.

The sample was composed of 11 judges, ten nurses and a nutritionist. The ages of the judges ranged from 30 to 50 years. Of the 11 judges selected, two (18.2%) concluded post-doctoral studies in Obstetrics Nursing, eight (72.7%) had PhDs in Nursing, Child and Adolescent Health Nursing and Pediatrics. The judges were professors and published works in the study area on screen (100.0%). The average length of training was 33.36 years, with the majority (eight - 72.7%) between one and 20 years. About the regions of Brazil in which the judges worked, it was found that judges from four Brazilian regions (North, Northeast, South and Southeast) and six states (Piauí, Ceará, São Paulo, Pará, Paraná, Rio Grande do Sul) participated in the research.

Regarding the validation of the TFMP, an CVI average of more than 0.86 was observed in the five dimensions of the instrument evaluated. The global CVI of the developed technology was 0.86, being therefore satisfactory and allowing to consider the TFMP validated in terms of content (Table 1). Likewise, the AVI of 0.85 allows considering the package valid in terms of appearance.

Initially, the judges evaluated the TFMP as to the objectives to be achieved with the use. In this domain, the items were considered valid, since there was a minimum agreement of 82.0% (CVI 0.82). Among the items alluding to the organizational dimension, the lowest agreement was 73.0% (CVI 0.73) in that related to the ordering of messages. Two judges disagreed with this item and one did not agree nor disagree. The discordant judges suggested changes in the sequence of presentation of the messages, so that aspects related to milk descent and breast fissures were oriented in the first messages. The choice was made to follow the suggestions of the experts and thus the sequence of the messages /figures was modified.

Also, regarding the organization dimension, the items "the material via virtual platform is adequate" and "the number of messages is adequate" presented an agreement between the judges of 91.0%, indicating that the experts agreed that the TFMP is valid as an educational technology to be presented via social media (*WhatsApp® Messenger*) and that the option to send messages daily, during the neonatal period (28 days), is enough to meet the proposal to collaborate in the implementation and maintenance of the BF in this phase.

As for the writing style dimension, there was 91.0% agreement of the judges on the items "the text is vivid and interesting/the tone is friendly" and "the vocabulary is accessible". One judge disagreed and another did not agree nor disagree. The one who disagreed presented as justification the need to change some terms, such as replacing the expression cracks in the nipples with more popular phrase: *nipple sores*. This and other suggestions that followed the same guideline were accepted. However, according to the possibilities and in order to reach the highest indexes related to the readability test, it was sought to maintain the two expressions, popular and technical, explaining each other, in order to reach the complete objective of the educational technology, which also includes raising the literacy of the mothers.

Still in this dimension, the item "the style of writing corresponding to the level of knowledge of the target audience" reached an agreement of less than 80.0%. However, it is emphasized that one judge partially disagreed with this statement (two other participants neither agreed nor disagreed) and that, prior to the TFMP 's referral to judges, the material was submitted *to Flesch Kincaid's* readability test, reaching indexes above 75, which classify the messages produced as "Very Easy". However, as mentioned,

Picture	Message	Flesch Kincaid readability test
	As soon as the baby is born, the mother's milk is **usually little**. This milk is called **colostrum**, has a yellow color and works as the first vaccine for the baby, because it protects it against various diseases. This is the ideal milk to feed the baby in the first days of life. After about 3 to 5 days, the milk production will increase.	90.0 - Very easy

Figure 1: Example of a message and its respective figure to be sent to breastfeeding mothers to promote breastfeeding in the neonatal period. Floriano, PI, Brazil, 2020

some suggestions were accepted to facilitate the understanding of the content of the messages by the target audience.

On the appearance dimension, of the 11 judges, nine (82.0%) agreed that the messages seemed organized, that the figures served to complement the texts and that they were expressive and enough. Thus, some judges suggested reorganization of the writing of passages evaluated as not very informative. Soon, the phrase "Then talk to your family" was changed to "Then talk to your family, friends and close people if you feel lonely. Regarding the motivation dimension, there was a minimum agreement of 73.0% about the interaction invited by the text, suggestion of actions and promotion of behavior and attitude change. For 91.0% and 82.0% of the judges, the TFMP, respectively, was appropriate for age, gender and culture, as well as presenting logic.

In addition, there was unanimous agreement of the judges on the items of the TFMP, referring to the presentation of themes that portray important key aspects (organizational dimension); association of the theme of each session with the corresponding text (writing style dimension); exhibition of simple figures (appearance dimension); approaching issues necessary for the nutrition in BF; proposal to the nursing mothers in BF to achieve self-care, both of the motivation dimension.

Therefore, when considering the CVI values of the answers to the items of the content validation questionnaire from the participating judges, it was realized that out of the 25 items evaluated, 24 were considered valid. However, item 5.5 (Promotes behavior and attitude change) did not obtain a satisfactory CVI. About the figures, some modifications were also requested and complied with by the team of researchers, such as changing the color of the letter used, removal of topics present in the body of the figure to decrease the excess of information in the images, among others.

In Table 1, it observes the AVI of TFMP, classified as excellent (0.85), showing that the material produced includes illustrations and texts arranged visually in a layout that favors communication and health education. The judges presented comments on the technology produced, the proposal of the TFMP to help women and families to succeed in the process of BF.

In order to ensure other validity elements for the TFMP, Table 2 shows the convergent validity results.

Table 2 shows that the TFMP showed convergence between the total scores and the domains of the content validity instrument with the appearance scores, revealing the convergent validity of the material. The appearance validity instrument's correlation scores were strong with the domains, organization, writing style and motivation, moderate correlation with appearance and weak with the objective domain. However, the latter did not meet the adopted criterion of correlation above 0.3 for convergent validity.

Table 1. Index of validity of content and appearance of the package of text messages and figures, according to the analysis of the judges. Floriano, PI, Brazil, 2020

Dimensions of the content validation tool	Judges' agreement	
	n (%)	CVI
1. Objective Dimension	**29 (88)**	**0.88**
1.1Adheres to the general objective of the research.	9 (82)	0.82
1.2 It helps in the acquisition and exchange of knowledge between the health professional and breastfeeding mothers.	10 (91)	0.91
1.3 It is suitable for use by any professional working in the Family Health Strategy.	10 (91)	0.91
2. Organization Dimension	57 (86)	0.86
2.1 The initial message is attractive, indicating the purpose of the contact.	9 (82)	0.82
2.2 The size of the message title within the material is adequate.	9 (82)	0.82
2.3 The messages follow an order.	8 (73)	0.73
2.4 The material via virtual platform is suitable.	10 (91)	0.91
2.5 The number of messages is adequate.	10 (91)	0.91
2.6 The themes portray important key aspects.	11 (100)	1.00
3. Writing style dimension	57 (86)	0.86
3.1 Writing is in a style suitable for breast-feeding.	9 (82)	0.82
3.2 The text is vivid and interesting. The tone is friendly.	10 (91)	0.91
3.3 Vocabulary is accessible.	10 (91)	0.91
3.4 The theme of each session is associated with the corresponding text.	11 (100)	1.00
3.5 The text is clear.	9 (82)	0.82
3.6 The style of writing corresponding to the level of knowledge of the target audience.	8 (73)	0.73

Table 1. Continued...

Dimensions of the content validation tool	Judges' agreement	
	n (%)	CVI
4. Dimension appearance	38 (86)	0.86
4.1 The messages seem organized.	9 (82)	0.82
4.2 The pictures are simple.	11 (100)	1.00
4.3 The pictures serve to complement the texts.	9 (82)	0.82
4.4 4.4 The pictures are expressive and enough.	9 (82)	0.82
5. Motivational dimension	57 (86)	0.86
5.1 The material is appropriate for age, gender and culture.	10 (91)	0.91
5.2 The material is logical.	9 (82)	0.82
5.3 Interaction is invited by the text and suggests actions.	8 (73)	0.73
5.4 It addresses issues necessary for breastfeeding nutrition.	11 (100)	1.00
5.5 Promotes behavior and attitude change.	8 (73)	0.73
5.6 The material proposes to the breastfeeding nurturer the realization of self-care.	11 (100)	1.00
Content Validity Index		**0.86**
Total Appearance Expiration Rate*		**0.85**

Table 2. Convergent validity of the package of text messages and pictures for the promotion of breastfeeding in the neonatal period. Floriano, PI, Brazil, 2020

Domains Content Validation Tool	Educational Technology Appearance Validation Instrument	p-value *
Objectives	0.281*	0.402
Organization	0.713*	0.014
Writing Style	0.697*	0.017
Appearance	0.392*	0.233
Motivation	0.588*	0.057
Total SAM	0.735*	0.010

*Pearson Correlation Coefficient

These results show that the content and appearance of the TFMP were in the same direction of quality and were consistent with the literature on the subject.

DISCUSSION

The content that underpinned the construction of the TFMP to promote breastfeeding in the neonatal period contemplated aspects related to: Breast milk decrease; types of nipples; breast milk production; breastfeeding technique (position and handle); definition, prevention and management of breast fissures; definition, prevention and management of breast ingurgitation and mastitis; perceptions about weak/low milk; pain when breastfeeding; professional knowledge and influences of the social and family context in the maintenance of; legal instruments to protect breast milk in Brazil; supply of infantile formulas / artificial milk and influence on the production of breast milk; supply of other liquids and influence on the production of breast milk; use of bottle and pacifier, among others.

These contents were relevant to the educational material because, as identified in the integrative review carried out, they can constitute factors of protection to the environment or risk for early weaning. Thus, it was evidenced that the perception of nipples, often mistaken, of delay in the descent of milk,[34] besides the presence of flat or inverted nipples,[35] as well as the presence of breast lesions[36] and pain associated with breastfeeding[37] can trigger early weaning. In addition, the ineffective breastfeeding technique, which makes sucking and emptying of the breast difficult, may generate losses in the dynamics of milk production and breast problems such as cracks, breast ingurgitation and mastitis (more common in the neonatal period), may also be associated with interruption of EBF.[38]

The content used in the construction of the educational material also included the use of artificial nozzles (bottle and pacifier), considered to be players that can increase the risk of early weaning,[39] in addition to infant formula and artificial milk, both considered to be predictors of shorter BF times.[40] On the other hand, the support and promotion of family and health professionals are configured as protective factors to BF, showing that the practice of BF is influenced by the environment in which the child is nourished and by the attitudes of the signifiers, such as husbands/companions and grandparents of the child, which are added to those of the mother, in view of the availability for lactation.[41]

Even with evidence-based construction, the validation of the content and appearance of TFMP was important for scientific anchorage and credibility of educational technology.[42] The judges who validated the content were mostly nurses, whose data corroborates other validation studies of educational materials involving the promotion of BF, justified by the fact that, in general, the nurse is the professional with a relevant role in the application of technologies and educational interventions to achieve better rates of BF,[18,43] in addition to being a professional able to identify and diagnose situations unfavorable to BF.[18]

Another significant fact about the profile of the participating judges concerns their provenance. This aspect demonstrated that the TFMP was validated by professionals from different Brazilian regions and states. This characteristic represents a favorable aspect, since it was possible to gather several specialized knowledges on the subject addressed by the material, especially the Brazilian context that presents continental dimensions and, consequently, different experiences, practices and perspectives about BF.[44]

According to the evaluations made by the judges, the TFMP was validated in 24 of the 25 items of the questionnaire. Therefore, some modifications were requested in order to include relevant issues that, from the judges' perspective, could contribute to the implementation and maintenance of the BF in the neonatal period, especially with regard to addressing the main factors that contribute to early weaning in this phase. It is emphasized that the removal of messages or figures presented in the package was not suggested by the judges.[45]

With the validation of the material, the judges showed that the content of the messages presents clarity for the achievement of the proposed goal that involves improving the performance of nursing mothers in the BF process. For the judges, the technology produced collaborates in the acquisition and exchange of knowledge between health professionals and nursing mothers. In this regard, systematic review research, aimed at providing a comprehensive understanding of existing digital interventions that support BF, has shown that the effectiveness of information and communication systems to address barriers to BF has been demonstrated predominantly in terms of improved knowledge on the topic. It was also clarified that the level of knowledge of mothers can help them in several ways, such as avoiding physical discomfort and perceiving milk supply.[17]

The judges also agreed that the messages were well organized, and the figures completed the meaning of the texts, besides being simple and expressive. Appropriate use of illustrations was sought in order to allow readability and understanding of the messages presented, which were proposed as a way to attract readers, awaken and maintain interest in reading, complement and reinforce the information provided by the health professional in relation to the BF process. Thus, it is emphasized that the figures should be part of the educational material to facilitate the reader's understanding and, for this, they need to contemplate characters, scenarios and experiences closer to the target audience, allowing the opportunity to build new meanings and allowing the understanding of daily life.[46] The use of figures associated with text makes the educational material of adequate understanding during reading.[47]

Regarding the motivation dimension, one of the items did not reach validation, concerning the possibility of the technology produced to promote behavior and attitude change among the nursing mothers during the breastfeeding process. In fact, this limitation had been pointed out by some participating judges and also finds support in other studies of educational material validation, which in turn found similar results.[31,48,49] This suggests that this dimension of the instrument needs to be re-evaluated as to its relevance for content validation.

It is necessary to reflect and recognize that, as far as aspects related to health and living habits are concerned, change does not occur suddenly, but requires that the subject is willing to change.[49] Similarly, judges have reflected on the complexity involving behavioral changes and the possible limitations of the TFMP which, in isolation, would not be able to promote change without proper individual accompaniment.[48] However, it should be noted that the protocol of this research foresees a quasi-experimental study that will have as its target public nutritionists in the process of BF in the neonatal period, corresponding to the second stage of this work, in which the effectiveness of the educational technology evaluated in this study will be investigated.

It is agreed that the information provided through *WhatsApp*® *Messenger* may not be enough to modify the behaviors of the nurturers. However, it contributes to the construction of knowledge, a necessary factor for the adherence to BF or any other health habit.[50] It is also important to highlight that the evaluation of the judges took place before the pandemic period of the new coronavirus, so that one can consider the importance of the TFMP as a work tool that, besides enabling health education, maintains preventive measures of social distancing.

That said, and from the understanding that items such as: "help in the acquisition and exchange of knowledge between the health professional and breastfeeding mothers" (CVI 0.91) and "the material proposes to the breastfeeding nurturer to perform self-care" (CVI 1.00) have reached excellent rates of validity of content, it can be inferred that the TFMP may positively impact the promotion of BF.

Besides, it is important to consider that the proposal of application of the educative intervention is precocious, starting, still, in the Joint Lodging of the maternity. In view of this, a recent meta-analysis, aimed at describing the published evidence of interventions to promote BF exclusively among postpartum women in terms of their characteristics, indicated that interventions to promote BF, from the perspective of behavioral changes, should be initiated during the first week postpartum, or earlier. This tends to be a period of adaptation and a time when most women are able to focus on BF. It is also important to consider the fact that women may be less likely to breastfeed if they miss an opportunity soon after the birth.[51]

Regarding the convergent validity, the results found were promising and show a package of text messages and figures with theoretical-conceptual coherence, arranged in a layout

structure favorable to the activities for which they are intended. The scores of the appearance validation instrument showed moderate total correlation index with the content validation instrument, demarcating the convergent validity of the TFMP. Despite being a challenge for the validation studies due to the difficulty in choosing the instruments for comparison, in order to demonstrate coherence and convergence within the material being evaluated, the results found signaled differential in the evidence of validity of the material developed in this study

The choice of content and appearance validation scores to perform the convergence validation study is one of the strong points of the study, since no construction research and internal validation of educational materials bringing such analysis were found. This choice occurred because of the link between the concepts of content, appearance and the representation of both in the development of educational technologies demonstrated in other studies.[31,44]

CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

The Text and Figure Messages Package was built with consistent scientific basis, from the choice of the moment of application (neonatal period) to the aspects addressed in the messages. The readability test proved satisfactory to prevent learning barriers due to low schooling. The educational technology showed signs of content validity, appearance and convergence, showing quality and potential to be effective in promoting breastfeeding in the neonatal period.

It is a low-cost educational technology that can be used through WhatsApp® Messenger to get closer to the nurturers, supporting them to react to common problems in this period, and which, statistically, are associated with early weaning rates. It is conjectured that its use can be carried out within the Family Health Strategy by nurses and community health agents who maintain in their areas assigned the use of message applications to bring the community closer to the health service.

As limitations, they include the small number of judges and the lack of a pilot for semantic validation. However, as for the restriction concerning judges, it is emphasized that the constitution of a high-level body of judges from different regions of the country has managed to equalize the restricted quantity and, in this way, raise the quality of the analysis of the Text and Figure Messages Package.

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