## DEVELOPMENT AND VALIDATION OF AN EDUCATIONAL GAME FOR ADOLESCENTS ABOUT BREASTFEEDING

## CONSTRUÇÃO E VALIDAÇÃO DE JOGO EDUCATIVO PARA ADOLESCENTES SOBRE AMAMENTAÇÃO

# DESARROLLO Y VALIDACIÓN DE UN JUEGO EDUCATIVO PARA ADOLESCENTES SOBRE LACTANCIA

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Objective: to develop and validate an educational game for adolescents about breastfeeding. Method: this is a methodological study to develop a game, and then to validate its content and interface based on the evaluation of fifteen judges. We calculated the Content Validity Index regarding the game content and percentile for interface evaluation. Binomial test and Cronbach's Alpha coefficient were used to analyze the consistency of the judges' responses. Results: the game addressed the breastfeeding practice. The general Content Validity Index was 0.98, with an interface agreement reaching a percentage of 98.5%, and the total Cronbach's Alpha coefficient of the game was 0.88, thereby characterizing a validated technology. Some considerations of the experts were accepted with regard to the dimensions evaluated for the ultimate version. Conclusion: the game was validated by experts and is ready to be used with adolescents to promote the breastfeeding practice.

Keywords: Breastfeeding; Adolescent; Educational technology; Maternal and Child Health.

Objetivo: construir e validar jogo educativo para adolescentes sobre amamentação. Método: estudo metodológico com construção do jogo e validação de conteúdo e aparência com base na avaliação de quinze juízes. Calculou-se o Índice de Validade de Conteúdo, no que diz respeito ao conteúdo do jogo, e percentil para avaliação da aparência. O teste binominal e o coeficiente de Alpha de Cronbach foram utilizados para análise da consistência das respostas dos juízes. Resultados: o jogo versou sobre a prática do aleitamento materno. O Índice de Validade de Conteúdo geral foi de 0,98, concordância de aparência com porcentagem de 98,5% e coeficiente de Alpha de Cronbach total do jogo de 0,88, caracterizando tecnologia validada. Algumas considerações dos especialistas foram acatadas em relação às dimensões avaliadas para versão final. Conclusão: o jogo foi validado por especialistas e está apto a ser utilizado junto a adolescentes para promoção da prática do aleitamento materno.

Descritores: Aleitamento Materno; Adolescente; Tecnologia Educacional; Saúde Materno-Infantil.

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Objetivo: desarrollar y validar un juego educativo para adolescentes sobre lactancia materna. Método: estudio metodológico para desarrollar un juego, así como validar su contenido y apariencia basándose en la evaluación de quince jueces. Se calculó el Índice de Validez de Contenido con respecto al contenido del juego y el percentil para evaluación de la apariencia. La prueba binomial y el coeficiente de Alfa de Cronbach fueron utilizados para analizar la consistencia de las respuestas de los jueces. Resultados: el juego abordó la práctica de la lactancia materna. El Índice de Validez de Contenido general fue de 0,98, la concordancia de apariencia tuvo un porcentaje de 98,5% y el coeficiente de Alfa de Cronbach total del juego fue de 0,88, caracterizando una tecnología validada. Algunas consideraciones de los expertos fueron aceptadas con relación a las dimensiones evaluadas para la versión final. Conclusión: el juego fue validado por expertos y está listo para ser utilizado con adolescentes para promover la práctica de la lactancia materna.

Palabras clave: Lactancia Materna; Adolescente; Tecnología Educacional; Salud Materno-Infantil.

#### Introduction

Adolescence is a phase marked by transformations that permeate the most different aspects. During this period, the teenager deals with body image and physiological changes that take time to be understood and assimilated. New experiences and responsibilities may make this phase even more complex, especially when pregnancy happens<sup>(1)</sup>. It is essential that teenage pregnancy be included in the agenda of discussion and production of strategies to address the issue, so that adolescents may experience pregnancy but not for lack of knowledge on the subject or lack of public policies directed to this audience<sup>(2)</sup>.

The experience of teenage pregnancy installs a new reality in the life of a teenager. Breastfeeding is among the various novel experiences that take place after birth. Studies show that teenage mothers breastfeed their babies less than adult women. American study shows that 19.3% of teenage mothers practice exclusive breastfeeding until the third month of the baby's life, while, in Brazil, this rate is  $38.2\%^{(3-4)}$ .

Maternal perceptions about the benefits of breastfeeding is essential because this understanding possibly imparts greater security in mothers to breastfeed their children<sup>(5)</sup>. It is considered that a number of difficulties that hinder the practice of breastfeeding (correct grip, feeding time, breast lesions, among others) are consistent with the absence of professional supervision and with the lack of information<sup>(6)</sup>. Thus, the support to overcoming the difficulties becomes an important factor either to the success of breastfeeding or early weaning<sup>(7)</sup>. In this way, it is significant that nurses practice a comprehensive care in all moments of the follow-up of women, as difficulties to breastfeeding may arise<sup>(8)</sup>.

With a view to the good results of the assistance, educational health practices have become a increasingly discussed reality. These are defined as actions directed to the person/ community. They do not work issues involving illness and their harms only, but can stimulate the participation of individuals in health care decisions. They lead people to reflect on and change their way of life, thus fostering autonomy and the principal role of the subjects involved in this practice. Educational activities may happen at individual or collective basis, mediated by a variety of techniques and materials (lectures, games, culture circles, among others)<sup>(9)</sup>.

These practices are based on the need for reorientation of health care paradigms and purpose to promote human health. So, in the case of adolescents, health professionals need to rethink methods to make the educational pratice not only evidence-based but also welcoming and an open space for socialization of doubts, of both mothers and families, respecting limits and beliefs<sup>(10)</sup>.

The use of playful educational technologies treats the learner as part of the process. Such technologies should mediate the reflection of individuals for changes in their behavior, as this directly influences the health-disease process<sup>(11)</sup>. Different educational products have been produced for various audiences and their needs, pointing out the wealth of opportunities for educational care, such as booklets, *blogs* and games<sup>(12-14)</sup>.

When taking into account the importance of breastfeeding, the construction and validation of an educational game problematizing the theme towards teenage mothers was considered a very timely objective. Validation of technologies is essential, given that, through this process, more reliable instruments will be available, consequently providing support to nursing practices and research<sup>(15)</sup>.

Therefore, the present study aimed to build and validate an educative game for teenagers on the promotion of breastfeeding. This can be seen as an educational tool that can be applied by nurses to teenagers in the gravid-puerperal cycle.

## Method

This is a study with emphasis on production, evaluation and improvement of methodological strategies<sup>(16)</sup>. The study was developed in four steps: search for scientific productions addressing breastfeeding; definition of themes and objectives to be covered along with the target audience, preparation of the game and validation of content and appearance.

The production of the game took place from March to September 2014. Initially, a search was held in the Virtual Health Library (BIREME), specifically, in the bibliographic index Latin American Literature in Health Sciences (Lilacs). International Health Sciences Literature (Medline) and in the electronic library Scientific Electronic Library Online (Scielo). Thirtynine articles published in the last five years at national and international level and found with descriptors breastfeeding and adolescent were selected. Handbooks of the Ministry of Health on breastfeeding, infant feeding and child health were also used as theoretical reference to delimit the issues to be addressed in the game, as well as its objectives.

After defining themes and objectives, the prototype was produced. In this step, the production of the dynamics of the game took place. For materialization of the prototype, the services of a graphic *designer* were requested to produce the images to be used.

The validation of the game entitled *Who doesn't Play, doesn't Suck* was held by a committee of 15 experts with evident knowledge and experience on breastfeeding and/or production of educational technologies and ability to evaluate the content and appearance of the game. Appearance validation consists in evaluating the presentation and clarity of the game. Content validation evaluates whether the educational resource is proficient to represent a universe of content<sup>(16)</sup>.

The information on the number of judges needed to validate the instrument is not consistent in the literature. The number varies between 10 and 25 experts<sup>(17-19)</sup>. The first was chosen for convenience and the rest were listed by snowball sampling, with subsequent evaluation of the curriculum of such professionals in the Lattes platform available in the Coordination for the Improvement of Higher Education Personnel (Capes).

After identification of the expert, a face-toface meeting was scheduled (such initial contact was made through electronic mail). At that time, a copy of the game was handed, as well as relevant research instruments.

The adapted Fehring Model assigns scores that vary according to each criterion: being a master in nursing receives 4 points; being a master in nursing with a dissertation on health education and/or adolescence receives 1 point; having published research on health education and/or adolescence receives 2 points; having PhD on health education and/or adolescence receives 2 points; having an article published on health education and/or adolescence receives 2 points; having a recent clinical practice of at least one year on health education and/or adolescence receives 1 point; having training (specialization) in health education and/or adolescence receives 2 points. The maximum total score is 14 points. Expert professionals who obtained scores equal or above five points were considered<sup>(19)</sup>.

Data collection of the validation step was carried out between October and November 2014. One copy of the game and a folder containing an introductory letter with guidance on the validation process, the validation questionnaire and two copies of the Informed Consent (IC) were given to judges. Judges evaluated the game on six dimensions – purpose, content, relevance, organization, and writing style – with the following answers: zero – does not apply; one – totally inappropriate; two – moderately inappropriate; three – moderately appropriate; four – totally appropriate. Data were organized and processed in the Stata 10 program.

In order to determine the correlation between them, the Content Validity Index was calculated for the dimensions concerning the content of the game, and the simple percentile to the dimensions related to the appearance of the game. The Content Validity Index considers the amount of items that scored 3 or 4 according to experts. A Content Validity Index between items of 0.8, presented as an excellent value, was considered<sup>(17)</sup>.

For content evaluation, the Content Validity Index was calculated in three dimensions: objectives of the game, which refer to purpose, goals or purposes to be achieved through the use of educational game; game content related to structure, strategies of presentation and sufficiency; and relevance of the prototype, which evaluates the degree of significance of the items presented in the game.

For appearance evaluation, the simple percentage of the items that received scores 3 and 4 in three dimensions was calculated: organization of the game, which refers to the way of presenting the guidelines, general organization, structure,

and strategy of presentation and formatting; figures, in which the potential of figures to help in the learning of teenage mothers is evaluated; and writing style, which assesses the linguistic features, comprehension and writing style of the game.

The exact binomial distribution test, suitable for small samples, was used to estimate the statistical reliability of the Content Validity Index, considering a significance level of 5% and the proportion of 0.8 of agreement, such as the agreement estimated for the Content Validity Index. The Cronbach's Alpha coefficient was used for analysis of internal consistency of the opinion of judges in each dimension.

The study was approved by the Research Ethics Committee of the Metropolitan College of Grande Fortaleza, under Protocol nº 702,072. The ethical principles of research involving humans in accordance with resolution nº 466/12 of the National Health Council were respected.

#### Results

The initial prototype was built based on the literature on the subject and titled *Who doesn't Play, doesn't Suck,* in allusion to the popular saying, "Who doesn't Cry, doesn't Suck". The game consists of 35 pieces to put on the floor, with 42.5 x 30 cm dimensions, on coated paper, that offer various possibilities of boards. The pieces of the board must be arranged according to the needs and the availability of space in the group, and the sequence of the numbered green cards must be followed.

The game also has a card with instructions and the dice. All items are packed in a  $53 \times 34 \times$ 8.5 cm *Medium Density Fiberboard* (MDF) box painted in yellow and with a game logo sticker on the lid (Figure 1).

Figure 1 – Logo on the lid of the box. Fortaleza, Ceará, 2014



Source: Created by the authors.

The parts correspond to: start, finish, six houses for image-questions (Figure 2), seven yellow and 20 green, all numbered.

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Figure 2 - Pieces of start and finish, image-question. Fortaleza, Ceará, Brazil, 2014

Source: Created by the authors.

In addition to these,  $268.5 \times 6$  cm hand cards are part of the game, produced on *design duo* and containing questions that nurses must do to teenagers, as well as the a guide of answers that will lead nurse/facilitator. Of these, 12 cards/ images (Figure 3) have their images in the pieces of the Board with contents related to the practice of breastfeeding, and 14 yellow cards that address issues related to experiencing breastfeeding.

Figure 3 - Image-card (front and reverse). Fortaleza, Ceará, Brazil, 2014



Source: Created by the authors.

The game can be played by two teams. Each team chooses a integrant to represent it, to go through the Board. Participants must put the pieces that represent them in the starting point, and walk on the board according to the number that is indicated after rolling the dice. During the dynamics of the game, when the piece of the participant groups falls in image-question or yellow houses, the girls should hear the question made by the nurse, and then discuss with their group on the subject contained in the questioncards corresponding to the pieces in the Board.

The discussion should be based on the essence of the proposed response model, and the participant should continue the game by throwing the dice again. When problematization/ discussion consistent with the issue raised does not happen, the participant can lose the turn and pass the opportunity to the rival team to answer. The expected answers are those that contain the essence of the information in the card at hand,

and there is no need to be addressed exactly as described in the cards. The teenager/group that first reach the end of the game is the winner.

After produced, the game was presented to 15 nursing judges, of whom 14 (93%) were female. The time elapsed since graduation of professionals ranged from 4 to 21 years ( $\mu =$ 10.47;  $\sigma =$  4.5), and the experience in provision of care, from 1 to 21 years ( $\mu =$  8.27;  $\sigma =$  6.12) and the experience in teaching, from 2 to 8 years ( $\mu =$  4.53;  $\sigma =$  2.8). Among judges, 11 (73.4%) were masters, of which 6 (54.5%) were doctoral candidates and 4 (26.6%) were doctors. Among the participating nurses, 8 (53.3%%) had experience in providing care and teaching, while 2 (13.33%) had experience only with direct nursing care and 5 (33.33%) only with teaching.

The Overall Content Validity Index of items comprising the content assessment dimension and the binomial test and Cronbach's Alpha coefficient are shown in table 1.

**Table 1** – Content Validity Index (CVI), binomial distribution of items and Cronbach's Alpha of theevaluation of the game Who doesn't Play, doesn't Suck according to content evaluation dimensions.Fortaleza, Ceará, Brazil, 2014(to be continued)

Content assessment dimensions	Content Validity Index of the item	Binomial Test*	Cronbach's Alpha
Objectives of the game			0.714
The information/content displayed in the game are consistent with the everyday needs of adolescents.	1.0	0.000	
The game invites and/or instigates changes in behavior and attitude.	1.0	0.000	
The game can circulate in the scientific world.	0.9	0.035	
It meets the goals of professionals and institutions that serve/work with teenage mothers	1.0	0.000	
Content addressed in the game			0.647
The content addresses the theme with accuracy.	0.9	0.035	
The content is complete and comprehensive.	1.0	0.000	
The information presented is correct.	1.0	0.000	
Simulations are compatible with the reality.	1.0	0.000	
The content is suitable to be developed with teenage mothers.	1.0	0.000	

**Table 1 –** Content Validity Index (CVI), binomial distribution of items and Cronbach's Alpha of theevaluation of the game Who doesn't Play, doesn't Suck according to content evaluation dimensions.Fortaleza, Ceará, Brazil, 2014(conclusion)

Content assessment dimensions	Content Validity Index of the item	Binomial Test*	Cronbach's Alpha
Relevance of the game			†
The items illustrate important aspects to the nursing practice along with teenage mothers.	1.0	0.000	
The game features key aspects that should be reinforced with the teenage mothers.	1.0	0.000	
The game proposes the construction of knowledge.	1.0	0.000	
Overall	0.98		0.860

Source: Created by the authors.

\* Statistically significant at p < 0.05.

<sup>†</sup> There was no internal variance between items.

Appearance evaluation through the simple percentage is presented in Table 2.

**Table 2** – Level of agreement, binomial distribution test of the items and Cronbach's alpha of the appearance of the game *Who doesn't Play, doesn't Suck*, according to dimensions of agreement on appearance. Fortaleza, CE, Brazil, 2014

Dimensions of agreement on appearance	Agreement	Binomial	Cronbach's
Dimensions of agreement on appearance	%	Test*	Alpha
Organization of the game			0.778
The cover is attractive and indicates the content of	100	0.000	
the material.			
The font size of the title and of the content in the	100	0.000	
topics is appropriate.			
The material (paper/printing) is appropriate.	86.0	0.167	
Figures of the game			0.754
The figures are able to call the attention of teenage	100	0.000	
mothers.			
The information is well illustrated by the figures.	100	0.000	
The figures are simple – preferably drawings.	100	0.000	
The figures complement the information in the text.	100	0.000	
The figures are clear enough.	93.0	0.035	
Writing style			0.695
The writing has proper style.	100	0.000	
The text is interesting; the tone is friendly.	100	0.000	
The vocabulary is accessible.	100	0.000	
The writing style corresponds to the level of	100	0.000	
knowledge of the target audience.			
Overall	98.5		0.645

Source: Created by the authors.

\* Statistically significant at p < 0.05.

The Cronbach's Alpha coefficient of the game was 0.88.

The evaluation of *experts* revealed that the game is relevant as educational tool. Despite

obtaining a Content Validity Index of 0.98 global, the judges suggested some modifications. These were primarily related to the appearance of the images, which obtained Cronbach's Alpha of 0.695 in dimension of the *figures*, demonstrating the considerable diversity of opinions on the visual aspect of the prototype.

## Discussion

With regard to the appearance of the instrument, a correction in a figure showing a teenager with the baby grabbing a bottle and a pacifier in his mouth was proposed. Thus, the tenth judge proposed to change the bottle and pacifier for a fruit, because, according to this expert, the use of such images reinforces in a negative way the theme in question.

The literature points out that the main risk factor for the termination of exclusive breastfeeding is the use of the pacifier, reducing the prevalence in 41%<sup>(16)</sup>. Despite this, the practice of using pacifiers is deep-rooted in the Brazilian culture, affecting even people who have knowledge about its negative effects<sup>(18)</sup>.

The insertion of supplementary feeding, in the case of exclusive breastfeeding, should happen from the six month of life onwards, when the child needs nutritional support from vitamins, proteins and minerals contained in fruits and vegetables. These are indispensable for the growth and development of the child, as well as for the process of adoption of future healthy eating habits. These foods should be gradually offered, starting with pasty fruit and savory porridge<sup>(19)</sup>.

Still on appearance, it was proposed to change one further image were the baby was on the breast of the mother, as that picture did not show the correct grip. The suggestion of two judges of showing to the superior side of the areola of the mother and correcting the baby's lips was accepted. The correct grip is essential for successful breastfeeding. This can be characterized by the infant's mouth wide open, the baby's chin must be touching the breast, and the lower lip must be turned out, in the form of "fish mouth", sealing the mouth and breast. The areola must be more visible at the top of the mouth than at the low side, there must be audible noise, swallowing, evident movements of the jaws and the mother should not experience pain in the nipple while breastfeeding<sup>(19)</sup>.

Lactation management with proper positioning of the baby and grip of the nipple-areolar region generates effective feeding and can prevent the onset of complications in breastfeeding<sup>(18)</sup>.

As regards content, some considerations were also made, in view of the emergence of some differences between the notes of judges (Cronbach's Alpha of 0.647 regarding the Content dimension addressed in the game). It was suggested that the yellow card that had the question "is there weak milk?" contained more information about phases of milk. According to the third judge, the card had more information about colostrum.

The first milk, in the beginning of the feeding, is thinner because of the presence of large amounts of water and rich in antibodies and quenches thirst of the infant; the later milk, in the end of the feeding, is composed of lipids responsible for infant weight gain<sup>(19)</sup>.

Another recommendation was made on the image-card with the question "Can the mother's food intake negatively affect breastfeeding?". The insertion of information with regard to the need to increase water intake by the mother and also to make it clear that the consumption of chocolate can cause colic in baby was recommended. The breastfeeding woman must intake at least one liter of water beyond the normal daily intake, paying attention to the fact that milk production takes approximately 900 ml of this liquid<sup>(19)</sup>.

On the yellow card with the question "Can a woman who gets pregnant again continue breastfeeding?", there was disagreement of opinions among the judges 1, 3 and 15. In case of a new pregnancy, the woman can continue breastfeeding, if that is her desire, and if she has no predisposition to preterm birth, since this complication contraindicates breastfeeding. A number of factors contribute to early weaning among these nursing mothers. They include decreased milk production, change in the taste and breast sensibility<sup>(20)</sup>.

Some difficulties, such as identifying nurses who met the criterion for expertise proposed by Fehring, combined with the uniqueness of the copy produced of the game, contributed to the delay in collecting data. This represents one of the limitations of this study. After the process and validation with experts, later validation along with target audiences is deemed relevant, as well as a study on clinical applicability of this educational technology.

## Conclusion

The construction and validation of the game *Who doesn't Play, doesn't Suck* passed through a process of evaluation by expert judges with results pointing to content and appearance validation of the prototype.

Although the Content Validity Index of 0.98 gave evidenced that the game was suitable to be applied to adolescents, the contributions of *experts* in the validation process led to change some images and texts in order to make them more effective. Furthermore, the use of this technology during the gravid-puerperal cycle will facilitate the nursing practice, considering that the game is a tool capable of covering the major doubts that pervade the daily lives of teenage mothers, encouraging breastfeeding.

Thus, the game validated by experts is proper to be used along with teenagers to promote the practice of breastfeeding.

### **Collaborations:**

1. conception, design, analysis and interpretation of the data: Ana Karoline Chaves da Silva, Karla Maryane de Menezes Oliveira, Manuela de Mendonça Figueirêdo Coelho, Denizielle de Jesus Moreira Moura and Karla Correia Lima Miranda;

2. article writting and relevant review of the intellectual content: Manuela de Mendonça Figueirêdo Coelho, Denizielle de Jesus Moreira Moura and Karla Correia Lima Miranda;

3. final approval of the version to be published: Manuela de Mendonça Figueirêdo Coelho.

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