RESEARCH | PESQUISA

Effectiveness of an educational game for pregnant women: aggregated knowledge and the women's experience[a]

Efetividade de jogo educativo para gestantes: conhecimento agregado e vivência das mulheres

Eficacia del juego educativo para las mujeres embarazadas: conocimiento agregado y experiencia de las mujeres

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ABSTRACT

Objectives: to verify the effectiveness of an educational game for pregnant women about their rights during labor and delivery; to compare the knowledge of pregnant women about their rights before and after applying the game and to investigate how good this experience was for them. **Method:** quantitative study with secondary qualitative analysis. Data collection took place between July and September 2019. Participants were 51 pregnant women attended at two Primary Health Units of the city of Guarulhos. The Kolmogorov-Smirnov and the non-parametric Wilcoxon tests were used. The level of significance adopted was .05. Lexical content analysis was performed with the use of the *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* software. **Results:** the mean knowledge of the pregnant women after the educational activity was higher than the mean knowledge before the activity ($Z = -5.924$; $p = .000$). There was a significant difference when comparing the assessment of the pregnant women's knowledge before and after the game ($p = .000$). The responses of the pregnant women emphasized the positivity of the educational action and valued the images of the game as an innovative educational resource. **Conclusion and Implications for practice:** The study demonstrated that the game was effective for use in guiding pregnant women playfully and that knowledge was gained in an imagetic and participatory way.

Keywords: Health Education; Nursing; Games and Toys; Childbirth; Women's Health.

RESUMO

Objetivos: verificar a efetividade do jogo educativo para gestantes sobre seus direitos durante o trabalho de parto e parto; comparar o conhecimento das gestantes sobre seus direitos antes e após a aplicação do jogo e conhecer como foi para elas essa experiência. **Método:** estudo quantitativo com análise qualitativa secundária. A coleta de dados ocorreu entre julho e setembro de 2019. Participaram 51 gestantes atendidas em duas Unidades Básicas de Saúde do município de Guarulhos. Utilizaram-se os testes Kolmogorov-Smirnov e o não-paramétrico Wilcoxon e nível de significância de 0,05. Adotou-se a análise lexical de conteúdo com apoio do *software Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*. **Resultados:** a efetividade do jogo foi comprovada pela comparação da média do conhecimento das gestantes antes e após a atividade educativa ($Z = -5,924$; $p = 0,000$). Houve diferença significativa na comparação da avaliação do conhecimento das gestantes antes e após o jogo ($p=0,000$). As respostas das gestantes enfatizaram a positividade da ação educativa e valorizaram as imagens do jogo como recurso educacional inovador. **Conclusão e Implicações para a prática:** O jogo mostrou-se efetivo para ser utilizado na orientação de gestantes de forma lúdica e demonstrou agregar conhecimento de modo imagético e participativo.

Palavras-chave: Educação em Saúde; Enfermagem; Jogos e Brinquedos; Parto; Saúde da Mulher.

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RESUMEN

Objetivos: verificar la eficacia del juego educativo para mujeres embarazadas sobre sus derechos durante el trabajo de parto y el parto; comparar el conocimiento de las mujeres embarazadas sobre sus derechos antes y después de aplicar el juego y saber cómo fue para ellas esta experiencia. **Método**: estudio cuantitativo con análisis cualitativo secundario. La recolección de datos se realizó entre julio y septiembre de 2019. Participaron 51 gestantes atendidas en dos Unidades de Atención Básicas de Salud de la ciudad de Guarulhos. Se utilizaron las pruebas de Kolmogorov-Smirnov y las pruebas no paramétricas de Wilcoxon. El nivel de significancia adoptado fue de 0,05. Se adoptó por el análisis de contenido léxico con el apoyo del *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires.* **Resultados**: el conocimiento medio de las embarazadas después de la actividad educativa fue mayor que el conocimiento medio antes de la actividad ($Z = -5,924$; $p = 0,000$). Hubo una diferencia significativa en la comparación de los conocimientos de las mujeres embarazadas antes y después del juego ($p=0,000$). Las respuestas de las embarazadas destacaron la positividad de la acción educativa y valoraron las imágenes del juego como un recurso educativo innovador. **Conclusión e implicaciones para la práctica**: el juego demostró ser eficaz para ser utilizado en la orientación de las mujeres embarazadas de una manera lúdica y demostró añadir conocimiento de una manera imagética y participativa.

Palabras clave: Educación para la Salud; Enfermería; Juegos y Juguetes; Parto; Salud de la Mujer.

INTRODUCTION

In recent decades, obstetric care has undergone major changes and new practices have been incorporated based on scientific evidence, known as Good Practices, recommended by the World Health Organization (WHO). Accordingly, some previously performed procedures have lost strength or it has been recommended that they are abandoned, since scientific evidence has shown their ineffectiveness or even harm to women[1,2]. However, despite some years having passed since the implementation of the Good Practices, many professionals and institutions still ignore them or do not practice them. The difficulties in consolidating humanistic models focused on comprehensive care in the health services, associated with the lack of information and defense of human and women's rights, contribute to the persistence of a scenario in which pregnant women, who have already had other children, are often unaware of the new procedures and are subject to the will of professionals in the process of giving birth[3].

In this context, prenatal care assumes a unique importance. Prenatal care involves more than consultations, which are essential for the health of women and children, it represents the privileged locus for pregnant women to actively participate in actions based on reliable and updated information about the birth process, in the discussion about their rights and in the recognition of the care for their child[1,4,5]. One of the activities that must take place in prenatal care is the pregnant women group. The groups are a recommended educational activity in prenatal care, as they allow the pregnant woman to receive guidance from healthcare providers, share previous knowledge and experiences, and clarify doubts that may favor her security and empowerment in the birth process[3,6,7].

The knowledge that pregnant women need and can acquire in educational activities in prenatal services indicates the relevance of the personalized and collaborative construction of an individual care repertoire capable of sensitizing them to comprehend their rights in the birth process and making them protagonists of their birth[7]. The woman has the right over her body and, therefore, must know the practices that are recommended or not. The educational practice developed with the individual favors their freedom and brings benefits that reflect on their autonomy.[8] Sharing knowledge and actions, including health education, also breaks taboos of authoritarianism between providers and pregnant women. Helping women to acquire information prior to the birth process is a way of humanizing the care[9].

Health education is a valuable strategy that provides opportunities and favors pregnancy and childbirth in a pleasant and safe way, in addition to providing the woman with greater security. It is an opening for education that supports the pregnant woman in order to bring security to the gestational period and a delivery with fewer interventions[4,9]. There are numerous health education technologies. For example, the use of educational games and toys in the health area represents a powerful technological resource that enables changes in health improvement and represents an instrument to provide integrative care[3,10].

D'Avila created an educational game for pregnant women related to their rights during labor and delivery, based on good practices recommended by the Ministry of Health. The aim of this educational game is to prepare women for the birth process, so that they clearly understand the procedures that may or may not be performed, contributing to their autonomy and protagonism in this process.[3] What makes this educational game different to the few that exist related to labor and delivery, is the use of cards with images, as most games available for this public, use only statements with or without an image attached[3].

The educational game went through a content validation process, carried out by expert judges and applied with a small number of pregnant women, within the scope of validation[3]. However, it was not applied with a consistent sample of pregnant women and its effectiveness in terms of the aggregation of knowledge for the women was not evaluated, which motivated this study. Therefore, the aims of this study were: to verify the effectiveness of the educational game for pregnant women regarding their rights during labor and delivery; to compare the knowledge of pregnant women about their rights before and after performing the game; and to identify how they experienced this.

METHOD

This was a study with a quantitative approach and a secondary analysis of qualitative data from the responses of the participating pregnant women.[11] The study was developed in two Primary Health Units (PHUs) in the city of Guarulhos, state of São Paulo, which provide prenatal care for normal risk pregnant women. Data were collected by the main researcher and two undergraduate nursing students, co-authors of the study, from July to September 2019.

The sample was by convenience and the 51 pregnant women who attended consultations in the period determined for data collection participated, regardless of the gestational trimester. To compose the sample, the following inclusion criteria were adopted: being 18 years of age or over, being pregnant with normal risk, and agreeing to participate in the educational game. No exclusion criteria were defined.

Two instruments were used to collect the data. The first covered sociodemographic and obstetric data: age, self-defined race/ethnicity, marital status, education, family income, professional activity, religion, pregnancy, number of children, number of prenatal consultations, participation in a pregnant women's group, and guidance on labor and delivery. The second was a questionnaire created for this study, with 17 closed questions that were worth one point per correct answer and involved the content of the cards of the game. There were two open questions: one about their (the pregnant women) experience of participating in the educational game and another requiring the suggestion of one to five words that best expressed the experience of participating in the game, which constituted the collection of qualitative data for the study. These two questions were answered after the pregnant women participated in the educational game.

The educational game used in the study was developed with the aim of preparing the women for the process of giving birth, so that they understood the procedures to which they would be submitted[3]. The game consists of 44 cards, 22 of which have affirmative statements about the good practices in childbirth care and women's rights in the pre-partum, birth and postpartum periods and 22 images corresponding to the statements. It is an association game, with the participants needing to correlate the statement of a card with its corresponding image. The game's facilitator need to encourage discussion of the content of the cards in order to resolve doubts and adjust the information in order to strengthen good practices[3].

Data collection was performed in three consecutive stages, before the game, during the game and again after the participation of the pregnant women in the game. The women were approached in the waiting room while awaiting the prenatal consultation and were invited to participate in the study, which involved answering the questionnaire, participating in the game in women's groups and answering the questionnaire again, as well as responding to the open questions for the qualitative data analysis. Data collection took approximately 50 minutes for each participant, including the group game. None of the pregnant woman refused to participate and all were very interested, as in the two PHUs selected there was no educational group for pregnant women.

The quantitative data were entered into Microsoft Excel® version 2016 and analyzed using the SPSS version 20 for Windows software. Descriptive data analysis was performed for the sociodemographic data, obstetric data and quantitative responses to assess the women's knowledge. Data normality was assessed using the Kolmogorov-Smirnov test. As normal distribution of data was not identified ($p < .05$), the non-parametric Wilcoxon test was used to compare the knowledge results of the pregnant women before and after the application of the educational game. The hypothesis that the pregnant women would show greater knowledge after the application of the educational game was tested. The level of significance considered was .05.

Due to the nature of the qualitative data obtained, a lexical analysis of the content of the answers of the 51 pregnant women was chosen in order to identify meanings and trends regarding the experience of participating in the educational game through textual statistics. Accordingly, this qualitative secondary analysis complemented the quantitative results and, to minimize the absence of a specific theoretical framework, we resorted to discussion based on current scientific studies that used games in health education.

The answers to the open questions of the study were transcribed verbatim by the two student researchers under the supervision of a researcher with productions in qualitative studies at the interface between Nursing, Health Promotion and Education. The data collected in this stage were stored and organized in a Microsoft Excel spreadsheet and transformed into a TXT document in Microsoft Notepad, version 1903, with Unicode Transformation Format 8-bit (UTF-8) encoding. After this data treatment, the *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* (IRAMUTEQ), 0.7 alpha 2 version, software was used to extract textual statistics for the elaboration of comparative graphs of the most representative nouns, adjectives, and verbs of the studied object, according to Bardin's recommendations on the use of full words in the lexical and syntactic analysis of the content of a textual corpus[12].

For the IRAMUTEQ analyses, lines of command of the pregnant women's answers were elaborated with the following variables: pregnant woman, age, marital status, education, remuneration, religion, pregnancy and previous participation in a pregnant women group. The Dendrogram of the Similitude Analysis was selected with the delimitation by communities (different colors) and the Prototypical Matrix of the evaluation of the Mean Order of Evocation (MOE) of up to 5 words related to their participation in the game and which were noted in the exact sequence that the women mentioned to the pair of student researchers.

The study was authorized by the Health Department of the city of Guarulhos, state of São Paulo, and approved by the Research Ethics Committee (CEP) under authorization number 3.362.305 and Certificate of Presentation for Ethical Assessment (CAAE), number 10492019.0.0000.5506. All the women signed the consent form.

RESULTS

The sample consisted of 51 pregnant women. The profile of the participants can be outlined as follows: mean age 27.1 years, minimum 18 and maximum 45, 45% were in the 3rd trimester of pregnancy, with a mean family income of R$1,672.00. The majority defined themselves as brown skin color (57.0%), had a partner (88.2%), had completed high school education (76.4%), had no paid work (62.8%), were evangelical (56.9%) and multiparous (56.9%). The majority (86.2%) reported not participating in a pregnant women group and not receiving guidance on labor (82.3%), or on childbirth (86.2%).

In the answers to the questions formulated, based on the game cards, the percentage of correct answers of the pregnant women, before the educational action (Game), was low, only six (6) questions (35.2%) had ≥80% of correct answers. The questions with the most correctly responses were: the woman must be informed about everything that will happen to her during labor and delivery and, during labor, delivery and postpartum, the woman has the right to have a companion, with 98% of correct answers.

Other questions with good responses were about procedures and personal care: in the maternity ward, the provider can perform the pelvic exam (90.2%); the pregnant woman can take a bath during labor (80.4%). The questions regarding the right baby's rights with the most correct answers were: After the birth, the baby must stay with the mother in the room at all times (88.2%) and after the birth, the baby must nurse from the mother during the first hour of life (80.4%). The results after the educational action (Game) are inverted, since the percentage of correct answers was ≥90% in 94.1% of the questions.

Table 1 shows that the Wilcoxon test identified that the mean knowledge of pregnant women after the educational activity was higher
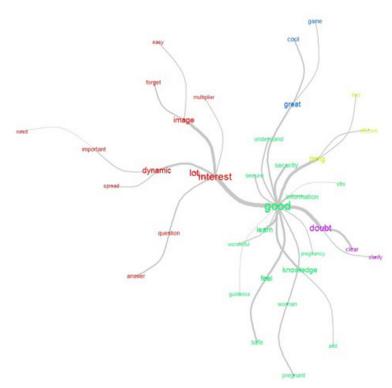
Figure 1. Dendrogram with communities related to the experiences of the pregnant women in the "Educational game for pregnant women". Guarulhos, SP, Brazil, 2019. Note: Image generated by software not being possible to maintain the original image after translation. Keywords: Good (bom); more (mais); doubt (dúvida); helping (ajuda); much (muito); image (imagem); interesting (interessante); coisa (things); knowledge (conhecimento); information (informação).
Source: Designed by the authors based on the similitude analysis of the IRAMUTEQ software.

Table 1. Comparison of knowledge assessment before and after the educational activity (*n*=51). Guarulhos, São Paulo, Brazil, 2019.

Variable	N	Mean	SD[a]	Median	*p*-value[b]
Knowledge before the game	51	29.8	2.2	30	.000
Knowledge after the game	51	33.3	1.3	34	

[a]Standard deviation; [b]Wilcoxon test
Source: Prepared by the authors

Table 2. Evaluation of the satisfaction with the game and new information received (*n*=51). Guarulhos, SP, Brazil, 2019.

Variables	N	%
Liked participating in the game		
A lot	40	78.4
More or less	09	17.7
Not much	02	3.9
Received new information		
A lot	44	86.2
Some	04	7.9
A little	03	5.9

Source: Prepared by the authors

than the mean knowledge before the activity (*Z*=-5.924; *p*=.000). There was a significant difference when comparing the assessment of the knowledge of the pregnant women before and after the game (*p*=.000), confirming the hypothesis that their knowledge would be greater after the educational action.

Table 2 presents the evaluation of the participation in the game by the pregnant women. The majority (78.4%) really enjoyed participating and reported that they received a lot of new information (86.2%).

In addition to Table 2, the lexical analysis showed textual statistics to comprehend the experience of the pregnant women. The IRAMUTEQ summary indicated 51 texts, with 921 occurrences, 169 forms and 70 hapax (single occurrence words), with an overall mean of occurrences per text of 18.06.

The similarity analysis (Figure 1) allowed the visualization of the co-occurrences of words with each other and the grouping of

terms that can favor the understanding of potential relationships and aspects that are limited to the experience of the game to promote the health of pregnant women.

The central word "good" (*bom*) was clustered with terms that highlight the learning of the pregnant women, the security of information and the ways to better understand the relevant content for the care of pregnant women regarding labor and delivery.

Considering the educational health action, the pregnant women mentioned security in the guidelines, the management of emotions during the pregnancy, the dynamics of the educational game, images favorable to memorization, openness to clarifying doubts, the construction of aggregating knowledge, the innovation in the ways of caring and the need to incorporate similar strategies in the PHU.

The similitude analysis highlighted the relevance of the imagery aspects and the use of dialogic approaches to engage the participants through educational materials that innovate teaching and learning in educational contexts, with a focus on increasing knowledge about good practices and ways to defend the rights of pregnant women.

The prototypical matrix represents the frequency (*f*) and the mean order of evocation (MOE) and demonstrates the specific relevance of each word associated by the pregnant women after their participation in the educational game (Table 3). Accordingly, there was evidence of a positive reaction towards the educational game and the use of an unprecedented strategy for the reaction assessment inspired by the Free Word Association Technique (FWAT)[13].

In the central core, the terms were more frequent (≥6.96) and promptly mentioned by the pregnant women (≤2.35). The first peripheral terms were frequent, however, they were reported in positions above 2.35 in the MOE and indicate how much the game represents an innovative, dynamic and necessary approach to promote meaningful learning. In the zone of contrast, the terms were less frequent, although quickly evoked to express the construction of knowledge and helpfulness of the professionals who performed the educational game. Finally, the second peripheral terms were the least frequent and positioned above 2.35 in the MOE, reinforcing the positive evaluation and the suggestion for greater incorporation of the educational game in the healthcare of pregnant women.

DISCUSSION

The importance of pregnant women groups in prenatal care has been definitely proven in previous publications[14-16]. The discussion of themes related to childbirth and newborn care enrich and empower women, making them more secure and prepared for the process of giving birth[14-16]. The pregnant women group is a light technology, usually has a low cost, enables important gains for women's health, complements the consultation information and increases the quality of the care.

Table 3. Matrix of the prototypical analysis of the reaction evaluation regarding participation in the "Educational game for pregnant women". Guarulhos, 2019.

Central Core			First Peripheral		
Word	*f (≥6.96)*	MOE (≤2.35)	Word	*f (≥6.96)*	MOE (>2.35)
Good	30	1,5	Help	16	2,4
Interesting	19	2,1	New	13	2,7
Very good	11	1,5	Required	10	3,4
Safety	10	2,3	Appreciated	8	3,1
			Dynamic	8	2,8
Zone of contrast			Second Peripheral		
Word	*f (<6.96)*	MOE (>2.35)	Word	*f (<6.96)*	MOE (>6.96)
Knowledge	3	2,3	Nice	5	3,8
Aggregator	2	1,5	Dynamic	3	3,3
Amazing	2	1,5	important	3	3
Helpful	2	2	Liked it	3	3,3
-	-	-	Multiplier	3	3
-	-	-	Efficient	2	2.5
-	-	-	Productive	2	2.5
-	-	-	Happy	2	3

Source: Prepared by the authors

This group approach constitutes a privileged space to discuss fears, express insecurities, clarify doubts, share experiences and reflect on related difficulties, especially for pregnant adolescents and primiparous women[17].

However, the results of this study demonstrate that this strategy was not valued, since most of the pregnant women reported that they had not participated in groups and more than 80% of them reported not having received guidance on labor and delivery, since the activity groups for pregnant women did not exist in the units studied. This was certainly reflected in the poor results identified in the stage prior to the educational game.

Accordingly, the opportunity was lost to improve women's knowledge about their rights, about good practices in the care of labor and delivery and about care for their child, which would give them greater security in coping with situations at the time of hospitalization.

The proposed game proved to be efficient, as there was a statistically significant improvement in women's knowledge before and after its application. Most of the pregnant women enjoyed participating in the activity and recognized that they gained new knowledge. In this way, the game fulfilled the idea of working towards a collective objective and the educational action was characterized as a pedagogical strategy in the health area[18].

The concept of health education was adopted as a social practice that strives for dialogue, the problematization of the real context, respect for people and the exchange of knowledge, especially during the prenatal period[19]. In this sense, the present game represents an educational resource that allowed the alternation between an informative action to promote the knowledge of participating pregnant women and a possible bridge to a more complex educational action with potential for individual and collective transformation in the context of primary healthcare.

The effectiveness of the game as an educational action in the incorporation of knowledge was also proven in a study similar to the current one, which verified the effectiveness of the game on the knowledge of adolescents about contraception[20]. Another study with adolescents concluded that the game was an educational technology that added knowledge for adolescent mothers regarding care of their child[21].

Publications show that the educational game can contribute to the programming of effective and efficient teaching contingencies, both in the health education of patients and providers[22,23]. After the validation of the game content, some authors concluded that this type of educational resource can cause changes in attitude and behavior in different health areas for those who conduct it[24,25].

Regarding the qualitative aspects, the national and international literature presents a gap in the evaluation of experiences in educational games related to the care of pregnant women.

Therefore, this study indicates a promising area for new and in-depth investigations on the usability of this educational technology and the experience of the users of different health services, as well as expanding the use of the IRAMUTEQ functions, with the choice of the Prototypical Matrix according to the recommendations of researchers of the area[26].

In a study carried out in Bangladesh, researchers identified themes relevant to the participants regarding the performance of care groups in prenatal care, including the comprehensive approach of healthcare providers, socialization, learning to deal with discomfort, the interpersonal relationship in the services, the preparation for childbirth and the participative presence of mothers comprising central aspects for educational actions in health, such as the proposal of the game in this study[27].

A study investigating the perception of pregnant and puerperal women in the context of the role of pediatric dentists in the Family Health Strategy emphasized the relevance of educational actions to promote the health of women and children, without disregarding their families and communities[28]. Through the theoretical approach, the use of games that involve imagery elements, collaboration and autonomy of the participants can strengthen educational strategies in primary healthcare.

CONCLUSIONS AND IMPLICATIONS FOR THE PRACTICE

From the results obtained, it was concluded that the game was effective and promoted a positive and motivating experience for the women that participated in this educational action in the context of primary healthcare. Therefore, it is expected that the use of this game in prenatal guidance, contributes to the woman's autonomy and frees her from the unilateral decisions that occur in procedures during labor and delivery, in most cases, due to the women's lack of knowledge about their rights.

In this study, the collection of qualitative data through a survey can be understood as a limitation and may have induced automatic or "expected" responses from the pregnant women. For this reason, the lexical analysis consisted of a coherent modality to explore the content of the responses obtained from the 51 pregnant women who participated. The sample size can be considered another limitation of the study, as the collection of data on aggregated knowledge took place immediately after the game. Accordingly, it is suggested that the game can be used in further studies and with greater spacing of time between the educational action and the data collection.

Employing educational resources such as this card game with images representing the pregnancy period can make guidance in groups of pregnant women more effective, engaging and visually attractive, with a focus on the active participation of women in scenarios that care, protect and educate in healthcare networks.

AUTHOR'S CONTRIBUTIONS

Study design. Carla Gisele D'Avila. Kecia Larisse Bezerra da Silva Oliveira. Ronald Morais Castro. Rosa Aurea Quintella Fernandes.

Data collection or production. Carla Gisele D'Avila. Kecia Larisse Bezerra da Silva Oliveira. Ronald Morais Castro.

Data analysis. Kecia Larisse Bezerra da Silva Oliveira. Ronald Morais Castro. Alfredo Almeida Pina-Oliveira. Noélle de Oliveira Freitas. Rosa Aurea Quintella Fernandes.

Interpretation of results. Kecia Larisse Bezerra da Silva Oliveira. Ronald Morais Castro. Alfredo Almeida Pina-Oliveira. Noélle de Oliveira Freitas. Rosa Aurea Quintella Fernandes.

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Responsibility for all aspects of the content and the integrity of the published article. Carla Gisele D'Avila. Kecia Larisse Bezerra da Silva Oliveira. Ronald Morais Castro. Alfredo Almeida Pina-Oliveira. Noélle de Oliveira Freitas. Rosa Aurea Quintella Fernandes.

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