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Original Article

Game2FamilyNursing: Study of a digital game to promote knowledge about family nursing

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ABSTRACT

Background & Aim: The practice of family-centered nursing care brings positive benefits to health care. This article aims to describe the perception and usability of a game to promote knowledge about family assessment and intervention.
Methods & Materials: A descriptive, cross-sectional study was conducted involving 102 nurses and nursing degree students in the second half of 2021. The evaluation was performed using the game usability instrument (System Usability Scale, SUS), the Intrinsic Motivation Inventory, and open questions about the game's advantages and disadvantages.
Results: The average score obtained by applying the SUS was high, with a mean of 81.37. In addition, high mean values were observed in all dimensions of the Intrinsic Motivation Inventory. Concerning the game's advantages and disadvantages, 198 codes were grouped into seven categories and 30 subcategories, highlighting more advantages than disadvantages.
Conclusion: Overall, participants evaluated the game positively. Our findings suggest that using "Game2FamilyNursing" could be helpful and contribute as an educational tool in family nursing training.

Introduction

Evidence shows that applying family nursing theory to clinical practice benefits the patient, family, and nursing professionals (1-4). However, the implementation of family nursing in clinical practice settings is still inconsistent and limited (1). Studies on nurses' attitudes towards families demonstrate the dichotomy between their discourses, which emphasize the importance of family-centered care, and actual clinical practices that remain focused on individuals (2,3,4). In recent decades, intending to adopt patient and family-centered models of care, several renowned national and international health organizations have recommended implementing policies and practices that promote the presence and involvement of family members as partners in care (5-7).

The systemic family approach in nursing considers how life's challenges affect the family unit, the family members, and the family's health (4). Therefore, life within a family context is an integrative experience of individual and collective health and illness (4,6). Accordingly, nursing needs to accommodate both the individual and collective focus to meet the needs of their patients (6). Therefore, nurses require a

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structure that allows them to transition to a "Thinking family'' (4), as the difficulty in translating this knowledge into clinical practice is still visible (1,8).

A factor that may contribute to this gap between theory and clinical practice could be a deficiency in nursing education for achieving competence in family nursing (1). The components of education in family nursing should include the definition of family and family-centered theories involving the reciprocal relationship between individuals, family, community, health, and illness (6,7).

In today's society, we are driven to learn from strong, interactive, innovative stimuli; therefore, we aim to find creative approaches for adult learning (9). The use of serious games improves learning outcomes more effectively when compared to traditional strategies (10). The development of health games has intensified in recent decades, in line with technological development. Games create a motivational space for participant learning, which is expected to last far beyond the game (11).

Given that many nurses recognize the need for more nursing education on family issues (9,1), we believe that it would be relevant to develop a digital game, "Game2familyNursing", to promote knowledge of family assessment and intervention. Educational games must be carefully planned to achieve learning outcomes (12). This article aims to describe the perception and usability of a game to promote knowledge about family assessment and intervention.

Methods

Game development process

In the first phases of the present study, the Family Nursing Games was developed: The game's themes were developed based on the work of the present authors (9); next, the game design involved the development of an App with a quiz-type game for androids; finally, the game was tested with an expert panel. These steps led to the creation of a valid prototype to be presented to the study participants.

The development of the game's themes was adapted from the board game Family Nursing Game, developed by the present authors (9). Based on these themes, the questions and categories of the Family Nursing Game were integrated, namely: concepts, family structure, family process, family assessment, family nursing, and family intervention (Figure 1). A new category entitled clinical cases was added to these topics.

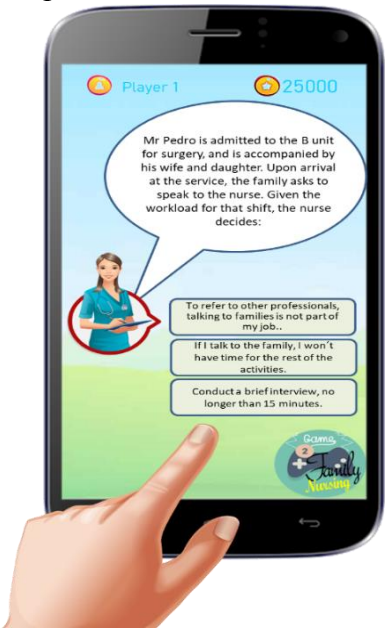

Figure 1. Game2FamilyNursing game categories

This last topic would include critical scenarios based on real-life situations that reflect the clinical decision-making process. Decision-making skills can be developed in the clinical cases presented.

For the game development process, the production stages of digital games were considered (13). In addition, a quiz-style was chosen as an adequate game strategy as it is easily integrated into a smartphone application. The present game was only developed for android.

After this phase, the game needed to be tested to identify possible errors and enable reformulation. For game testing, a panel of family experts was used. Participants for this stage were selected through convenience sampling. We invited researchers with experience in family nursing to evaluate the game and its contents.

Twenty experts participated in this stage, 18 women and two men, with an average of 25.8 years of professional experience. Five of the experts were from clinical practice and 15 from teaching and research. The testing in this stage led to some corrections of text statements and system usability errors, and new clinical cases were integrated. This stage led to the game prototype for evaluation with nurses and nursing students.

Study design

Game prototype evaluation

A study was carried out with nurses and nursing students implementing the Game2FamilyNursing prototype to evaluate the perception and usability of the prototype in the target group. Participants were asked to download "Game2FamilyNursing" from the play store and later evaluate the game by completing a questionnaire on Google forms®. The research was in line with ethical precepts and was approved by the Research Ethics Committee in May 2021 (ADHOC6212021).

Participants and setting

The population consisted of Portuguese nurses and nursing students. The invitation to participate in the study was made by disseminating the study on the website of the Portuguese Nursing Association (Order of Nurses), where nurses and nursing students responded to the invite. A non-probabilistic convenience sampling was used, given that the game was advertised on its website using social networks as sources for data collection. Portuguese nurses and nursing students were considered as inclusion criteria. The sample consisted of 102 participants.

Instruments

The data collection instrument was an electronic questionnaire carried out using Google® forms. A virtual Free and Informed Consent Term was inserted in the first part of the questionnaire. This consisted of a page explaining the research and requesting authorization to use the data. Next, the participants' sociodemographic and professional data was requested, including gender, age, academic qualifications, nursing specialization, area of practice, and experience with families. In addition, participants were invited to fill out two instruments, namely the game usability instrument (System Usability Scale-SUS) (14), and the Inventory of Intrinsic Motivation (IMIp) (15). The (SUS) instrument has excellent internal consistency (α= 0.80) (14). The calculation of Cronbach's alpha for the IMIp confirmed its general reliability (α= 0.82). Both instruments have been validated for the Portuguese population (14,15). Finally, participants were asked to answer two open questions about the advantages and disadvantages of the game.

In terms of the SUS game usability instrument, it was possible to determine the degree and usability characteristics of the game determined by the experts since this instrument presents ten statements, with the degree of agreement on a Likert scale of 1 to 5 points

(15). This instrument ranges from 0 to 100, with a midpoint of 68. The negative items of the scale were inverted for statistical analysis.

The IMIp was used to analyze the degree of willingness, or intrinsic motivation, of the experts to use the game. The IMI is an instrument developed to assess the intensity of individuals' intrinsic motivation for any activity (15). It presents 18 statements, organized into four subscales:"Pleasure/Interest, Competence, Effort/Importance, and Pressure/Tension" (14). The degree of agreement or disagreement was also completed on a Likert scale from 1 to 5. The negative items of the scale were inverted for statistical analysis.

Data analysis

The Statistical Package for the Social Sciences (SPSS) version 25 (IBM SPSS) was used to analyze demographic characteristics, descriptive statistics, and scale results. Results are presented as frequencies, percentages, means, and corresponding standard deviations.

The data resulting from the open-ended questions about the game's advantages and disadvantages were analyzed using Bardin's thematic content analysis (16), and data were organized for exploration of the material, analysis of results, inference, and interpretation. The categorical analysis performed was guided by the steps described by Bardin: pre-analysis, coding, categorization, and interpretation. The contents were organized and systematized in AtlasTi®.

Results

The sample consisted of 102 participants. Participants were predominantly female (85.3%), with a mean age of 42.01 years (SD=12.06) and an average of 19.56 (SD=11.5) years of professional experience (Table 1).

The average score obtained by applying the SUS was 81.37 (SD=8.7), with a minimum value of 63 and a maximum value of 100.

Table 2 shows the responses of the participants to the different items of the scale of the Portuguese version of the IMIp. Lower mean values were obtained in the dimension Perceived Competence/Effort (3.96), and the highest value was obtained for Pressure / Tension adaptation (4.25).

Table 1. Participants' characterization

Variables	N	%
Gender (N=102)		
Male	15	14.7
Female	87	85.3
Educational level *(N=102)*		
Secondary school (10 to 12 years)	8	7.8
Bachelor degree	1	1.0
Licensed degree	41	40.2
Master degree	28	27.5
PhD	24	23.5
Specialization (N=102)		
None	33	32.4
Community nursing	37	36.3
Medical-surgical nursing	15	14.7
Rehabilitation nursing	6	5.9
Child and pediatric nursing	7	6.9
Midwife nursing	2	2.0
Mental health and psychiatric nursing	2	2.0
Professional activity (N=102)		
Teaching	42	41.2
Nurse in clinical practice	47	46.1
Management	5	4.9
Other	8	7.8
Experience with families (N=102)		
No	38	37.3
Yes	64	62.7

Table 2. Frequency of Intrinsic Motivation Inventory (IMIp) dimensions

Dimensions	Mean	Mode	Max	Min
Interest/ Enjoyment	4.03	4.00	5	1.50
Perceived Competence/ Effort	3.96	4.00	5	1.60
Value/ Usefulness	4.18	4.20	5	3.20
Pressure/ Tension	4.25	4.25	5	2.75

The qualitative data obtained from the open questions about the advantages and disadvantages of the game were analyzed using the AtlasTi® software. From the content analysis, we found 198 codes that were grouped into seven categories and 30 subcategories. Table 3 illustrates the categories that emerged in the theme advantages: process, game characteristics, and impact. Regarding disadvantages, four subcategories emerged: none, game content, design, and outcomes. For this theme, it is noteworthy that 50 participants reported that there were no disadvantages to the use of the game.

Table 3. Qualitative data analysis

Theme	Category	Subcategory	Units
Advantages	**Process (n=19)**	Diversification of learning methods (n=4)	Use of games allows diversification of learning methods (P40)
		Instant feedback (n=2)	Immediate feedback (P69)
		Motivation (n=6)	Can lead to greater motivation (P68)
		Didactic (n=3)	Very didactic (P13)
		Use in different contexts (n=2)	Can be used in any context (P56)
		Practical and coherent (n=2)	Coherent and practical method (P76)
	Game features (n=52)	Dynamic (n=5)	Has a dynamic character (P7)
		Playful (n=8)	The fact that it is playful helps in teaching concepts and practices in caring for families (P51)
		Layout (n=2)	Very interesting game layout (P49)
		Usability (n=11)	Easy usability (P13)
		Attractiveness (n=8)	Allows consolidation of content in an attractive way (P63)
		Structure by categories and clinical cases (n=4)	The interesting division by thematic categories and clinical cases (P58)
		User-friendly (n=8)	Easy access and user-friendly (P62)
		Interactive (n=6)	It has a dynamic and interactive character (P7)
	Impact (n=31)	Improve critical thinking (n=9)	The game has the advantage of clinical cases and the development of critical thinking. (P27)
		Knowledge organization (n=4)	Knowledge systematization (P36)
		Integrate knowledge in practice (n=4)	The integration of important knowledge for clinical practice (P34)
		Deep knowledge (n=10)	Deepens concepts and their applicability (P2)
		Improve learning and skills (n=4)	Facilitator of learning and skill development through play, which in itself is positive and more is learned (P61)
Disadvantages	**None (n=50)**		I have no unfavorable aspects of learning to point out (P52)
	Game contents (n=14)	Complex language (n=6)	Complex language (P64)
		Link with Calgary model (n=2)	It is very much tied to the Calgary Model (P62)
		Need previous Knowledge (n=6)	It presupposes theoretical knowledge of the area (P18)
	Design (n=18)	Sound (n=3)	The use of sound may limit its use in some contexts (P92)
		Monotony (n=3)	The game is monotonous (P22)
		Must include progress chart (n=3)	It should have a progress chart on the questions, so the player knows how many are left to the end (P16)
		Need for e-Inclusion (n=4)	Difficulties of some people with the use of technologies (P70)
		Need more complexity level (n=5)	It needed more complexity (P79)
	Outcomes (n=14)	Game as a distraction (n=6)	Can be a distraction for those who lack self-control (P67)
		Unsupervised learning (n=4)	The teacher may have no control over the learning he provides (P44).
		Discouraged learning (n=4)	If the person doesn't know how to answer and gets it wrong a lot, they can become demotivated (P63)

Discussion

This article aims to describe the perception and usability of a game to promote knowledge about family assessment and intervention. The development of this game stemmed from the need described by nurses, from a variety of health care settings, for additional education on caring for the family during illness experiences to promote positive patient outcomes (17). Furthermore, as also noted by other authors, difficulties in applying family nursing theory to practice may result from insufficient or inadequate educational programs (1). Nurses need knowledge and skills about how the family process develops within and in the context of care (17,18). The literature and knowledge base for the area of 'family nursing' offers valuable insights and tools that can help nurses (18).

Nowadays, educational technology is an integral part of the learning process (19,20) and can be present at all levels of education, from school to universities, in different types and forms (20). The present study is used to review knowledge about family assessment and intervention. Regarding the results of this study, the population included showed very good results when using this technology. In addition, minor adverse events were scarce.

To guarantee learning environment, specific dimensions need to be considered to provide effective learning; one of these dimensions is the usability of educational technologies (20). Usability is a critical element of the digital game development process and directly influences the user experience (19). The study results showed that the game available on the Play store was positively appraised, as demonstrated by both the quantitative and qualitative data. In particular, the mean value of 81.37 (SD=8.7) on the System Usability Scale constitutes strong evidence that most participants had a very positive perception of the game's usability. Values between 80.8–84.0 are considered "A" or excellent, (14) an aspect particularly relevant for game quality in education as educational effectiveness is greatly affected by the usability perceived by the user (20). As other authors note, ensuring proper usability, these resources can be used as a supplementary educational tool for health care professionals and students (21).

Another aspect that plays a crucial role in learning and must be considered is intrinsic motivation (22), which was assessed with the IMIp in the present study. High average values were observed in all dimensions of the family nursing game: Pressure/ Tension (4.25), Value/Usefulness (4.18), Interest/Enjoyment (4.03), Interest/Enjoyment (4.03), and Perceived Competence/Effort (3.96). The IMI consists of four subscales. While the first three refer to positive facets of intrinsic motivation, the "Pressure/Tension" dimension reflects a negative facet, which in this specific case was inverted for comparison with the other dimensions of the scale, as proposed by Fonseca et al. (15). The "Pressure/Tension" dimension can be understood as a negative predictor of intrinsic motivation, assessing whether participants feel pressure to succeed in an activity (23). In this case, high values reflect less pressure and tension in the game. The average value of the dimension "Value / Usefulness" (4.18) is also highlighted. This dimension incorporates the idea that people internalize and develop more self-regulatory activities when an experience is valuable and useful (22,23).

Along with these results, the qualitative data revealed that the participants valued the game elements. This was visible in the theme ‘advantages’ when evaluating responses to the open questions. For example, regarding the Process category, two subcategories stand out: Motivation (n=6) and Diversification of learning methods (n=4). These aspects were illustrated well in different quotes. This is in

line with what Sardi et al. note: games use a trend that focuses on applying game mechanics to non-game contexts to stimulate participants to integrate a bit of fun, generating motivational and cognitive benefits (24).

Overall, a series of advantages were listed regarding the game's characteristics, including dynamic, playful, game layout, usability, attractiveness, user-friendly, interactive, structure by categories, and clinical cases. Regarding the latter, case study analysis is an active, problem-based, student-centered learning and helps develop critical thinking skills (25). The implemented case study as a teaching strategy in the family nursing game significantly positively affected the perception of teaching effectiveness (26).

Among the advantages reported is the subcategory "Improve critical thinking (n=9) and Deep knowledge (n=10)," in the impact category. Although immediate knowledge acquisition is relevant and can be demonstrated, long-term retention of the most relevant information is equally important (11,27). At this level, there is good evidence that the game promotes the acquisition of knowledge and helps develop strategic skills and critical thinking (24), which go beyond the game (9).

Participants also listed various disadvantages, although, of note, 50 participants reported no disadvantages. Of the disadvantages listed by users, the subcategory "Complex Language" (n=6) and "need previous knowledge" (n=6) stood out in the "Game Content" category. In the "design" category, the subcategory that stands out is "Need for e-inclusion" (n=4) and "need more complexity level" (n=5). Finally, the subcategory "Game as a distraction" (n=6) is also noted in the results category. Indeed, several disadvantages of games have been discussed, including the design, the need for conscious planning, and the complexity and costs of its development, which may require skills, specific resources, and resources for their use (12).

Although no applications with games on this particular topic were found, other studies on nursing games reveal positive results, such as the game developed by Gutiérrez-Puertas et al. to acquire knowledge about basic and advanced life support techniques (28). In conclusion, the use of gaming can be useful in any area or level of study by nurses and nursing students to learn and remediate knowledge (29) actively.

Limitations

The implications of our results suggest that Game2FamilyNursing can be a valuable teaching and learning strategy and a helpful educational tool in family nursing training. However, some methodological limitations should be noted. The design of this study did not allow us to assess the effectiveness of the game, which needs evaluating in further stages through a randomized control study. In addition, the sample size in the study was small, possibly because participants could choose whether or not to participate in the study. These authors reported that country, age, gender, and practice areas were associated with nurses' attitudes towards the importance of family in nursing care. Therefore these factors need to be considered in further game development (30). Therefore, we cannot draw firm conclusions from our findings.

Conclusion

The study results for the Game2FamilyNursing game showed more positive than negative data. Some of the negative items will be readjusted to apply in the next step of the game development. It is imperative to review the methodologies used in nurses' training to bring theory closer to practice. The game's usability was demonstrated, and it was perceived as a useful

tool among the participants. Therefore, this study provided preliminary evidence that Game2Familynursing can be used as a supplementary educational tool to deepen knowledge about family assessment and intervention. The use of innovation and creativity through games can be a strategy to meet these goals. Serious games are an effective way of teaching. Despite the benefits of these resources, games must be carefully planned for their intended purposes to combine entertainment with skills training and increase the level of knowledge. We emphasize that it is essential to incorporate active methodologies in the training of nurses about family, namely games and digital resources. Finally, the components of family nursing education should include the definition of family and family-centered theories involving the reciprocal relationship between individuals, family, community, health, and illness.

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Conflicts of interest

The authors are solely responsible for the content and writing of the paper. The authors report no conflicts of interest.

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