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The Effect of Escape Room Teaching Method on Nursing Students' Knowledge and Motivation in the Evaluation of Enhanced Recovery After Surgery Protocol: Cross-Sectional and Interventional Research

Cerrahi Sonrası Hızlandırılmış İyileşme Protokolünün Değerlendirilmesinde Kaçış Odası Öğretim Yönteminin Hemşirelik Öğrencilerinin Bilgi ve Motivasyonlarına Etkisi: Kesitsel ve Girişimsel Araştırma

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ABSTRACT Objective: In this study, it was aimed to determine the effect of using the "Escape Room" teaching game method on the knowledge and motivation levels of nursing students in the evaluation of the Enhanced Recovery After Surgery (ERAS) protocol. **Material and Methods:** After 80 students were given theoretical training including the ERAS protocol information, the next day, 56 students who agreed to participate in the research were divided into 11 groups (10 groups: 5, 1 group: 6). They played a game based on riddles and clues in line with the information given. A pre-test and post-test questionnaire consisting of 10 questions, including the students' theoretical knowledge level and the pre-operative phase of the ERAS procedure for learning with games and a Motivation Scale Questionnaire for the Students' Collaborative Game Learning Strategies, were applied. The study lasted a total of 2 days. The collected data were analyzed in the SPSS 23.0 statistical program. **Results:** It was found that 66.1% of the students participating in the study were female, the mean age of the students was 21.95±0.94 years, and the mean time to escape from the escape room was 5.32±2.02 minutes for all groups. It was determined that the post-test score average of the students regarding the questions asked within the scope of the ERAS protocol (7.33±1.66) was significantly higher than the pre-test score average (6.82±1.47) (p=0.05). Students' scores on the Motivation Scale for Cooperative Game Learning Strategies were also high (65.28±9.23, minimum-maximum: 15-75). **Conclusion:** The escape room learning method increased the theoretical knowledge acquired by the students. All students stated that they would like to experience a more complex and longer escape room.

Keywords: Escape room; motivation; game education; student nurse; ERAS

ÖZET Amaç: Bu çalışmada, Cerrahi Sonrası Hızlandırılmış İyileşme [Enhanced Recovery After Surgery (ERAS)] protokolünün değerlendirilmesinde "Kaçış Odası" öğretim oyunu yönteminin kullanılmasının hemşirelik öğrencilerinin bilgi ve öğrenme yöntemine yönelik motivasyon düzeylerine etkisinin belirlenmesi amaçlandı. **Gereç ve Yöntemler:** 80 öğrenciye ERAS protokolü içeren teorik eğitim verildikten sonra ertesi gün araştırmaya katılmayı kabul eden 56 öğrenci 11 gruba (1 grup: 5, 1 grup: 6) ayrıldı. Verilen bilgiler doğrultusunda bilmece ve ipuçlarına dayalı bir oyun oynadılar. Öğrencilerin teorik bilgi düzeyi ve oyunlarla öğrenmeye yönelik ERAS protokolünün ameliyat öncesi aşamasını içeren 10 sorudan oluşan ön test ve son test anketi ve öğrencilerin İşbirlikçi Oyun Öğrenme Stratejilerine Yönelik Motivasyon Ölçeği anketi uygulandı. Çalışma, toplam 2 gün sürdü. Toplanan veriler SPSS 23.0 istatistik programında analiz edildi. **Bulgular:** Araştırmaya katılan öğrencilerin %66,1'inin kız olduğu, yaş ortalamasının 21,95±0,94 yıl olduğu, kaçış odasından kaçma süresinin tüm gruplar için ortalama 5,32±2,02 dk olduğu belirlendi. Öğrencilerin ERAS protokolü kapsamında sorulan sorulara ilişkin son test puan ortalamasının (7,33±1,66) ön test puan ortalamasına (6,82±1,47) kıyasla anlamlı düzeyde daha yüksek olduğu tespit edilmiştir (p<0,05). Öğrencilerin İşbirlikçi Oyun Öğrenme Stratejilerine Yönelik Motivasyon Ölçeği puanları da yüksekti (65,28±9,23, minimum-maksimum: 15-75). **Sonuç:** Kaçış odası öğrenme yönteminin öğrencilerin edindiği teorik bilgileri artırdığı görülmüştür. Öğrencilerin tamamı daha karmaşık ve daha uzun bir kaçış odası deneyimi yaşamak istediklerini belirtti.

Anahtar Kelimeler: Kaçış odası; motivasyon; oyun eğitimi; öğrenci hemşire; ERAS

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Traditional education methods provide nursing students with a solid foundation in transferring important theoretical knowledge, such as basic health sciences and nursing principles and the basic principles of health systems and diseases.[1]

Although traditional nursing education has significant advantages, it can now be made more effective by integrating modern technologies and student-centered learning approaches (simulation, virtual reality, games, computer-assisted, etc.).[2]

Interactive and innovative approaches in nursing education positively affect nurses' ability to receive education more effectively, improve their professional skills, and motivate them to learn.[3]

Although studies are showing that games and simulation teaching techniques improve cognitive, behavioral, and affective outcomes in undergraduate students contradiction continues.[1] For example, one study stated that games designed for nursing students resulted in lower learning outcomes for nursing students.[4] Another systematic review stated that although game-based education increases the level of learning, more studies are needed to investigate the use of specific games in nursing students.[4]

In nursing education, nurses' clinical decision-making and reasoning skills will be increased not by plain instructional training techniques but by the use of online and individual serious games together with traditional teaching and laboratory practices.[5] One of these, game-based learning, is used to contribute to students' acquisition of knowledge and skills as well as to increase their motivation.[6] Simulation games, web-based games, and videos are the most used methods in the literature in nursing education.[4] When looking at teaching methods based on different patient scenarios to increase clinical decision-making skills, an escape room is one of the methods used.[7,8]

The escape room teaching method was evaluated as a positive reason for preference due to its lower cost compared to clinical simulation or software-based teaching methods.[8]

Escape room games encourage communication, cooperation, and teamwork.[9] The escape room teaching technique increases higher education students' professional competency acquisition, such as teamwork, communication, and critical thinking.[10] The escape room game aimed to contribute to the increase of the student's psychomotor skills and problem-solving ability based on a theoretical framework, facilitating the achievement of course and program objectives.[11-13]

In surgical nursing education, both theoretical and clinical practices are carried out simultaneously, thus ensuring that knowledge is learned and reinforced.[13] Nurses have an important responsibility in developing protocols that improve surgical patient care.[14]

The Enhanced Recovery After Surgery (ERAS) protocol is a concept of multimodal perioperative interventions to accelerate the postoperative recovery of patients undergoing surgical protocols.[14] ERAS Protocols include many evidence-based elements to be applied in the perioperative period.[15] There is evidence in the literature showing that ERAS protocols reduce hospital stays and complications in major surgeries.[15] Nurses have an important responsibility in the implementation of these protocols in every process before, during, and after surgery.[14] It is extremely important for nursing students to know the ERAS protocol stages and to apply them in the clinic.[16]

The use of interactive methods is important in developing cognitive and psychomotor skills in students during the process of learning the ERAS protocol.[5] There are very few studies in the literature on escape rooms, one of the interactive methods, in the field of nursing and with nursing students.[3,15]

Escape room, also known as an escape game, puzzle room, exit game, or riddle room, is a game in which a team of players discover clues, solve puzzles, and complete tasks in one or more rooms to reach a specified goal within a limited time. The goal is usually to escape from the location where the game is being played.[17]

Originally conceived as a form of entertainment in Japan in 2010, escape rooms involve a timed activity in which participants work in teams to search for clues and solve multiple puzzles to "escape".[17,18]

This study aimed to evaluate the correct evaluation of the ERAS protocol in the escape room created

in the preoperative period and to evaluate the motivation of nursing students to learn with teamwork in line with their ability to use the stages of the ERAS protocol, in which they received theoretical knowledge in practice. The data obtained as a result of the study will guide future studies.

Research Questions

1. Does the Escape Room teaching method have positive effects in answering the ERAS protocol questions?

2. Does learning with cooperative play increase motivation in nursing students?

MATERIAL AND METHODS

STUDY DESIGN AND SAMPLE

The research population, which was designed as a descriptive, cross-sectional, quantitative interventional study, consisted of 3rd year nursing students (who have completed internal medicine and surgery courses) studying at Kocaeli Health and Technology University. The study sample consisted of 61% of the students who completed the nursing principles, internal medicine, and surgery courses, took the 3rd-year obstetrics and gynecology nursing course (n=96), and voluntarily participated in the Escape Room game.

DATA COLLECTION TOOLS

ERAS Protocol Questionnaire

The content of the test, which was prepared by an expert faculty member in the field of surgical diseases nursing, consisted of 10 multiple-choice questions about the preoperative steps of the ERAS protocol. The question form was reviewed by 5 faculty members specialized in the field of surgical diseases nursing.

Experts were given a draft of the survey and asked to evaluate the appropriateness of each question by scoring each question between 1-4 (1: not at all appropriate, 4: completely appropriate). After the obtained scores were evaluated in the content validity index, the necessary changes were made in line with expert opinions, and the survey was given its final form. The content validity index of the ERAS Questionnaire was determined as 0.99.

The students were given a pre-test before entering the Escape Room and a post-test immediately after leaving the room. In the tests, correct answers were given 1 point, and wrong answers were given 0 points. The highest score in the survey was determined as 10, and the lowest score was 0. It is assumed that the higher the total score in the survey evaluation, the better the preoperative process regarding the ERAS protocol has been learned.

ERAS Protocol Questionnaire

1. Which of the following is not one of the objectives of the ERAS protocol?

2. Which of the following should not be done for bowel cleansing in the preoperative period?

3. Which is the correct definition of patient information?

4. Who/whom should inform the patient?

5. “Patients undergoing major surgery should be operated on after maximizing their general condition”. Which of the following is the term that fits this sentence?

6. Which of the preoperative fasting recommendations of the American Society of Anesthesiologists is correct for a patient who will be operated at 10:00 am?

7. What should be applied for preoperative optimization?

8. What should be questioned in preoperative thromboembolism prophylaxis in major surgeries?

9. What should be the time to start thromboembolism prophylaxis in the preoperative period in gynecologic cancer surgeries?

10. How should antimicrobial skin prophylaxis be according to ERAS protocols?

Motivation Scale for Cooperative Game Learning Strategies

Developed by Manzano-León et al. and originally named “Questionnaire on Motivation for Cooperative Playful Learning Strategies”, the scale was translated into Turkish as “Motivation Scale for Cooperative Playful Learning Strategies” and Küçükibiş and Eskiler conducted its Turkish validity and reliability in 2022.[19,20]

The scale, which consists of 15 items and is prepared in a five-point Likert type, is scored between 1-5 (1: Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly agree). The scale consists of 4 sub-dimensions (factors): "task motivation", "learning", "teamwork", and "flow". The lowest score that can be obtained from the scale is 15, and the highest score is 75. In the study of Küçükibiş and Eskiler, it was found that the average variance extracted (AVE) values of the sub-dimensions of the scale varied between 57 (learning) and 0.60 (teamwork), the Composite Reliability (CR) values varied between 0.75 (teamwork) and 0.88 (task motivation and flow), and the Cronbach's alpha value was 0.96.[17] In our study, the AVE values of the sub-dimensions of the scale of the Motivation Scale for Cooperative Game Learning Strategies varied between 0.75 (learning) and 0.74 (teamwork), the CR values ranged between 0.83 (teamwork) and 0.92 (task motivation and flow), and the Cronbach's alpha value was 0.96.

Study Application

One day before the game application, 80 students were given a 2-hour theoretical lesson on the ERAS protocol. The next day, 24 students were excluded from the study because they did not want to participate. 56 students who agreed to participate in the study were divided into 11 groups (10 groups: 5 students, 1 group: 6 students) and asked 10 questions regarding the stages of the ERAS Protocol preoperative period as part of the pre-test.

The simulation laboratory room was set up as an escape room by the researchers. The room was likened to a patient room in a clinic. Before entering the escape room, students were briefed about the game case in the debriefing room of the simulation laboratory: demographic and medical information of a patient who was to undergo gynecological surgery was read. Then, they were informed about the escape room theme and that they would have 10 minutes to complete 6 tasks using the clues given to them.

The 6 stations created in the room were numbered numerically from 1 to 6. There were question/answer cards at each station and a clue on the back of the correct answer card to reach the next station. The first clue was given by the observer who gave the information in the information room.

The first clue was finding that the "Patient Information Form", which is the first step of preoperative preparation according to ERAS protocols, was in the patient information file. The student who found the correct answer reached the 2nd clue on the back of the form. The 2nd station included questions on health maintenance, the 3rd station on bowel cleansing, the 4th station on the fasting period before surgery, the 5th station on venous thromboembolism prophylaxis, and the 6th station on the suitability of antimicrobial prophylaxis for the ERAS protocol. At each station they came to, there was a question paper and 3 separate answer envelopes. When they found the correct answer option outside the envelopes, they went to the next station with a clue pointing to the next station in the envelope. They were asked to complete the specified instructions and clues in numerical order. The student group that completed the 6 stages escaped from the escape room. The process steps of each group were timed by an impartial observer determined by the researchers. The students who left the room were asked to fill out the Motivation Scale for Learning Strategies with Collaborative Games and 10 questions regarding the stages of the ERAS Protocol preoperative period as part of the post-test.

DATA ANALYSIS

In the analysis of the data, the sociodemographic data of the students were evaluated in terms of number, percentage, questionnaire pre-test, post-test, and the total mean score of the responses to the scale. The mean, standard deviation, median, Kolmogorov-Smirnov test for conformity to normal distribution, Wilcoxon test for the comparison of the total score before and after the escape room experience, and Mann-Whitney U test for the comparison of the difference between 2 independent groups were evaluated in the IBM SPSS Statistics (USA) statistical package program. The relationship between ERAS test results and Students' Motivation for Cooperative Game Learning Strategies was examined with Spearman correlation analysis.

ETHICAL CONSIDERATIONS

Ethics committee approval was obtained from the Kocaeli Health and Technology University Human Research Ethics Committee (date: August 8, 2022; no: 9/6). It was recorded with clinical trials no:

TABLE 1: ERAS Questionnaire total score distribution before and after Escape Room (n=56)

	X̄±SD	Median (25th-75th)	Minimum-maximum	Test*/p value
ERAS Questionnaire pre-test	6.82±1.47	7 (6-8)	1-9	Z=-2.024/ **p=0.043**
ERAS Questionnaire posttest	7.33±1.66	8 (6.25-8.75)	2-10	

*Wilcoxon test; ERAS: Enhanced Recovery After Surgery; SD: Standard deviation

NCT05830526 and performed per the criteria of the Declaration of Helsinki. During the implementation of the study, informed consent, including the subject of the study, was obtained from the students included in the sample. Students who refused to participate in the study were not included in the study.

RESULTS

It was determined that 66.1% of the students participating in the study were female, 33.9% were male, the mean age of the students was 21.95±0.94 (minimum: 20-maximum: 24), and 96.4% of them wanted to experience more escape rooms as a teaching method, while 3.6% did not want to experience escape rooms. The average escape time of students in 11 groups from the escape room was calculated as 5.32±2.02 minutes (minimum: 2.50-maximum: 9.24 minutes). As a result, all students escaped from the room and stated that they would like to experience a more complex and longer escape room. It was determined that there was no significant relationship between age and the total scale and sub-dimensions of the Motivation Scale for Cooperative Game Learning Strategies (p>0.05). The comparison of the students' Cooperative Game Learning Strategies and the Motivation Scale was also not found to be statistically significant (p>0.05). The total score distribution of the ERAS Questionnaire responses of the students participating in the study regarding the preoperative period before and after the escape room is shown in Table 1. Accordingly, it was determined that the mean total score of the ERAS Questionnaire increased after the escape room experience (p<0.05) (Table 1).

It was determined that the total mean score of the Motivation Scale for Students' Collaborative Game-Based Learning Strategies was 65.28±9.23. The mean score for the "task motivation" sub-dimension was found to be 21.94±3.17, while the mean score for the "learning" sub-dimension was 21.92±3.34. Additionally, the mean score for the "teamwork" sub-dimension was 12.64±2.10, and the mean score for the "flow" sub-dimension was 8.76±9.23 (Table 2).

It was found that the mean total score and the mean score of all sub-dimensions of the motivation

TABLE 2: Mean scores of Motivation Scale for Cooperative Game Learning Strategies (n=56)

	X̄±SD	Minimum-maximum
Scale total	65.28±9.23	15-75
Task motivation	21.94±3.17	5-25
Learning	21.92±3.34	5-25
Teamwork	12.64±2.10	3-15
Flow	8.76±9.23	2-10

SD: Standard deviation

TABLE 3: Mean Scores of Motivation Scale for Cooperative Game Learning Strategies compares to gender and age (n=56)

		Motivation Scale for Cooperative Game Learning Strategies				
	n (%)	Task motivation X̄±SD	Learning X̄±SD	Teamwork X̄±SD	Flow X̄±SD	Scale total X̄±SD
Gender						
Woman	37	21.91±2.15	22.05±2.39	12.43±1.59	8.75±1.03	65.16±5.70
Male	19	22.0±4.63	21.68±4.74	13.05±2.85	8.78±1.90	65.52±13.98
Test*/p value		276/0.182	308/0.443	242/ 0.053	298/0.318	271/0.162

*Mann-Whitney U test; SD: Standard deviation

scale related to the learning style of the students participating in the study were at a high level, and there was no significant difference related to gender ($p>0.05$) (Table 3).

DISCUSSION

The escape room is dynamic teamwork that is against time and allows freedom of movement.[17] The pedagogical effect of escape room games is important in the context of saving other teaching resources and time costs.[21] This innovative teaching method supports the learning process as participants think critically by reasoning about the task they have to complete.[22] In the studies conducted, it is emphasized that the escape room, which is a student-centered teaching method, encourages students to learn by increasing their interest.[23]

In this study, the correct answers given by nursing students regarding the preoperative period after the escape room experience were higher than the correct answers they gave before the escape room experience, which is similar to the findings of previous studies in terms of its positive effect on increasing knowledge.[24] For this reason, it is emphasized that such teaching strategies based on games have a positive effect on nursing students' learning processes.[23-25]

Game-based learning is more effective than traditional teaching methods in terms of retention of knowledge, motivation, development of meaningful learning, critical thinking, and decision-making skills in students.[13] Abumettleq et al. reported that game-based teaching was effective in improving nursing students' knowledge of advanced recovery protocol after surgery.[4] In a study comparing traditional teaching and teaching with games, it was stated that although there was no difference between the pretest and posttest knowledge levels, the motivation and satisfaction levels of the students who were taught with games were high.[26,27] However, traditional methods still constitute the majority of methods used in nursing education. Using active education methods provides effectiveness in the permanence of knowledge. Yilmaz et al. found an increase in the students' cooperation, motivation, and knowledge levels in the Surgical Nursing course's game teaching method aimed at clinical practice knowledge level.[14] The findings of this study suggest that more such game-based learning methods should be included in nursing education. The fun and game-based nature of the escape room is a strength of this teaching method and facilitates learning by increasing the motivation of the participants.[28,29]

Students have difficulty attending these sessions and being motivated even when active learning elements are used along with traditional teaching methods.[26] In this study, it was found that the mean total score of the Motivation Scale for Collaborative Game Learning Strategies and the mean scores of all sub-dimensions were at a high level. It is stated that a high score in the sub-dimensions of the scale, "task motivation", affects the successful completion of the process.[30] It has been stated that a high score in the "learning" sub-dimension can positively affect the increase in the knowledge level of students.[19] In this study, the scores of the students in the post-test were found to be significantly higher. Teamwork is a key factor in education and increases motivation.[31] The "flow" subscale indicates how students are concentrated on the task that needs to be completed in the escape room experience. In this study, a high score in the "flow" sub-dimension indicated that students were focused on the escape room experience. It is stated that high scores in the "flow" sub-dimension will positively affect the learning process.[19]

In this study, students expressed their desire to have more complex and longer experiences with this innovative teaching method of the escape room. The high level of satisfaction of the students with the escape room is parallel to the research findings of Woodworth et al.[32] However, further research is needed to determine the permanence of the increase in student's knowledge level after the escape room experience.

LIMITATIONS

The limitation of the study is that it cannot be generalized with the data obtained since the study was conducted at a single university and with students from a single course.

CONCLUSION

In the study, the escape room experience increased the students' knowledge level and learning motivation with the teaching technique. Since the escape room is an educational method that can increase cooperation and interaction between team members, problem solving and creativity skills, it can be useful in the education and training of nursing students.

However, the long-term effectiveness of this method should be evaluated. In addition, more studies are needed to apply different escape room education scenarios, especially in surgical nursing.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Refiye Akpolat, Füsun Terzioğlu, Azzet Yüksel, Tuğba Özdemir;* ***Design:*** *Refiye Akpolat, Füsun Terzioğlu, Azzet Yüksel, Tuğba Özdemir;* ***Control/Supervision:*** *Refiye Akpolat, Füsun Terzioğlu;* ***Data Collection and/or Processing:*** *Refiye Akpolat, Azzet Yüksel, Tuğba Özdemir;* ***Analysis and/or Interpretation:*** *Refiye Akpolat, Azzet Yüksel, Tuğba Özdemir;* ***Literature Review:*** *Refiye Akpolat, Azzet Yüksel;* ***Writing the Article:*** *Refiye Akpolat, Azzet Yüksel, Tuğba Özdemir;* ***Critical Review:*** *Refiye Akpolat, Füsun Terzioğlu.*

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