

Exploring the use of escape rooms in nursing: A comprehensive scoping review

Carla Sílvia Fernandes ^{a,*,1}, Maria Teresa Moreira ^{b,2}, Maria Salomé Ferreira ^{c,3},
Silvana Schwerz Funghetto ^{d,4}, Marina Morato Stival ^{d,5}, Andreia Maria Novo Lima ^{e,6}

^a Porto Higher School of Nursing, Center for Health Technology and Services Research (HealthRISE), Rua Dr. António Bernardino de Almeida 830, Porto 4200-072, Portugal

^b Fernando Pessoa Higher School of Health, Center for Health Technology and Services Research (CINTESIS@RISE), Institute of Research, Innovation and Development Fernando Pessoa Foundation (FP-I3ID, FP-BHS), rua Delfim Maia 334, Porto 4200-256, Portugal

^c School of Health, Polytechnic Institute of Viana do Castelo, The Health Sciences Research Unit: Nursing (UICISA:E), rua Moisés Alves de Pinho, Viana do Castelo 4900-314, Portugal

^d Faculty of Ceilândia, University of Brasília, Brazil

^e School of Health, Polytechnic Institute of Viana do Castelo, Faculty of Medicine of the University of Porto, Center for Health Technology and Services Research (CINTESIS@RISE), rua Moisés Alves de Pinho, Viana do Castelo 4900-314, Portugal

ARTICLE INFO

Keywords:

Nurses
Nursing students
Nursing
Escape room
Education

ABSTRACT

Aim: This review aims to map and analyze the various practical uses of escape rooms in nursing, both in the education of students and the ongoing practice of nursing professionals, highlighting existing gaps that may guide future research in this field.

Background: Escape rooms challenge players to solve puzzles and complete tasks within a set time frame and are being used in the training of healthcare professionals, particularly in nursing.

Design: A scoping review

Methods: A comprehensive scoping review was conducted following the Joanna Briggs Institute guidelines. Searches were conducted across multiple databases, including Medline, CINAHL, SCOPUS, Psychology and Behavioral Sciences Collection, Academic Search Complete, MedicLatina, Teacher Reference Center, Scielo and Cochrane, searching for articles in Spanish, English, or Portuguese from inception until June 2024.

Results: The review included 72 studies published between 2018 and 2024, predominantly from the USA, revealing a prevalent use of escape rooms in the initial training of nursing students. The most common themes included medical-surgical and emergency situations. Studies indicate significant outcomes in participant satisfaction, knowledge, teamwork, engagement and motivation, development of specific skills and improvement of clinical judgment.

Conclusions: Escape rooms offer significant potential to enrich nursing education. However, studies with greater methodological rigor are needed to definitively conclude their efficacy. The integration of these innovative resources must be adequately planned to ensure their educational purpose.

* Correspondence to: Rua Dr. António Bernardino de Almeida, nº 830, Porto 4200-072, Portugal.

E-mail addresses: carlafernandes@esenf.pt (C.S. Fernandes), tmoreira@ufp.edu.pt (M.T. Moreira), salomeferreira@ess.ipv.pt (M.S. Ferreira), silvanasf@unb.br (S.S. Funghetto), marinamorato@unb.br (M.M. Stival), amarialima@ess.ipv.pt (A.M.N. Lima).

¹ <https://orcid.org/0000-0001-7251-5829>

² <https://orcid.org/0000-0002-2554-697X>

³ <https://orcid.org/0000-0003-1685-9891>

⁴ <https://orcid.org/0000-0002-9332-9029>

⁵ <https://orcid.org/0000-0001-6830-4914>

⁶ <https://orcid.org/0000-0001-7535-9040>

<https://doi.org/10.1016/j.nepr.2025.104324>

Received 4 September 2024; Accepted 5 March 2025

Available online 10 March 2025

1471-5953/© 2025 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In recent years, there has been significant advancement with the introduction of "immersive games" into educational spaces (Fernandes et al., 2018, 2021), including the development of escape rooms (Fraguas-Sánchez, et al., 2022). Escape rooms are becoming increasingly popular in numerous contexts (Anderson et al., 2021). Initially conceived as a form of entertainment, escape rooms are timed activities where participants, organized in teams, search for clues and solve problems through various puzzles to "escape" (Eukel and Morrell, 2020; Quek, et al., 2024). This activity involves cooperative challenges in the real world, requiring players to move beyond interacting solely through screens and to collaborate in person with one another (Nicholson, 2018). These challenges, often involving cognitive puzzles such as ciphers, coded messages and combination locks, foster logic, creativity, critical thinking, communication skills and problem-solving abilities among participants (Fraguas-Sánchez, et al., 2022; Eukel et al., 2017).

Escape Rooms are a type of Escape Game, which consist of narrative challenges involving puzzles, tasks and a time limit. These can range from paper puzzles on a table to group activities focused on unlocking a locked box (Nicholson, 2018). The first escape room emerged in Japan in 2007 and quickly expanded, especially from 2012, to many countries worldwide (Makri et al., 2021). It is not well defined who was the first precursor of these activities, but they likely originated from a mix of different activities that share common elements, such as treasure hunts, point-and-click adventure games, or even adventure movies (Nicholson, 2018; Alejandre, et al., 2022). Interest in escape rooms as entertainment grew and after COVID-19, with the search for clinical and educational alternatives for healthcare professionals, the use of these rooms in educational and clinical contexts expanded, including in virtual versions (Anderson et al., 2021). The use of escape rooms in the context of experiential health allows participants to learn in practice, facing a problem or issue directly and discovering the appropriate response through the decisions they make (Anguas-Gracia et al., 2021). Various studies published on the application of escape rooms in healthcare professionals suggest that their use can improve knowledge acquisition, teamwork, skills and attitudes, promote critical thinking, thereby improving satisfaction and experience (Fraguas-Sánchez, et al., 2022; He et al., 2024; Quek et al., 2024; Hintze et al., 2023). In the context of nursing, escape rooms allow students to face and solve physical and mental puzzles or tests, acquire essential professional skills, practice teamwork skills and use multiple intelligences to solve problems (Anguas-Gracia, 2021). Over the last two years, there has been a significant increase in the literature on escape rooms in nursing education, demonstrating it to be an innovative and motivating approach for active and problem-centered learning, allowing nurses to observe and investigate practical issues in nursing and patient care, fostering the development of intrinsic clinical judgment skills to natural nursing thinking (Bonaduce, 2024; Gomez-Urquiza et al., 2019).

Due to the novelty of the escape room concept, there is a lack of research that rigorously reports and examines the potential educational use of these rooms and no comprehensive review has been conducted on the use of escape rooms in nursing, not just with nursing students but also with professionals. Aware of this need, our objective is to thoroughly examine and synthesize the existing literature on the use of escape rooms in nursing, identifying how these activities are applied both in the education of students and in the ongoing practice of nursing professionals. This review aims to map the various practical applications reported on the use of escape rooms in nursing and highlight knowledge gaps that could direct future research in the field.

2. Methods

2.1. Study design

An extensive scoping review was conducted following the guidelines

set by the Joanna Briggs Institute (Peters et al., 2024), aimed at mapping the diverse practical applications reported on the use of 'escape rooms' in nursing. This review not only focuses on the education of nursing students but also encompasses any applications relevant to the field of nursing. The results were presented using the PRISMA® - Preferred Reporting Items for Systematic Reviews and Meta-Analyses, 2020 (Page, et al., 2021). The research is registered at the following link (OSF registration <https://doi.org/10.17605/OSF.IO/VAZQ3>).

2.2. Search strategy

The research strategy was developed with the assistance of a librarian specialized in health. To maximize the scope of the search, both free-text terms and specific descriptors from each database were used. A broad range of terms and combinations was explored with the goal of identifying as many relevant studies as possible. The electronic search was conducted in databases such as Medline, CINAHL, SCOPUS, Psychology and Behavioral Sciences Collection, Academic Search Complete, MedicLatina, Teacher Reference Center, Scielo and Cochrane, searching for articles in Spanish, English, or Portuguese from inception until June 2024 (Appendix 1). Additionally, grey literature databases such as ClinicalTrials.gov were examined. The search for additional studies also included reviewing the reference lists of all publications selected for analysis, through a "backward citation search".

2.3. Inclusion and exclusion criteria

As inclusion criteria, this review encompassed articles discussing the use of escape rooms, not only as an educational tool for nursing students but from a broader perspective that includes both students and professional nurses, for any purpose. Studies included aimed at initial nursing training, postgraduate training, skill development, reflection on practices and encouragement of teamwork, among others. The escape rooms considered could be of any type, including physical, virtual and other formats. Regarding the types of studies, all were considered for inclusion regardless of their design, except those limited to reflections or editorials. The research was conducted without any temporal limitation. Articles not in English, Spanish, or Portuguese were excluded. Articles by authors who discussed the same escape room and the same sample in different publications and journals were also excluded. Finally, articles discussing the use of escape rooms to attract nursing students were eliminated.

2.4. Review process

The results of each search were uploaded via the web application Rayyan QCRI® (Rayyan QCRI; <https://rayyan.qcri.org/>, Qatar) to assist in the systematic review. After removing all duplicates, the studies were preliminarily assessed by two reviewers (X, Y) based solely on the title and abstract information to select studies for more detailed full-text analysis. The full texts were then retrieved and assessed for eligibility according to the defined criteria, a process also carried out by two independent reviewers (X, Y). Any discrepancies were resolved through consensus among other authors (B, Z, J) to confirm the eligibility of the publications.

2.5. Data extraction and analysis

Fig. 1 shows the process of identifying and including articles presented through PRISMA® (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). A data extraction table (Table 1) was used to organize the relevant studies. The information included: Authors, Country, Year, Aim, Method, Participants' number, Nurses, Nursing Students, Type of Escape Room, Escape Room Theme, Time, Instruments, Results and Limitations.

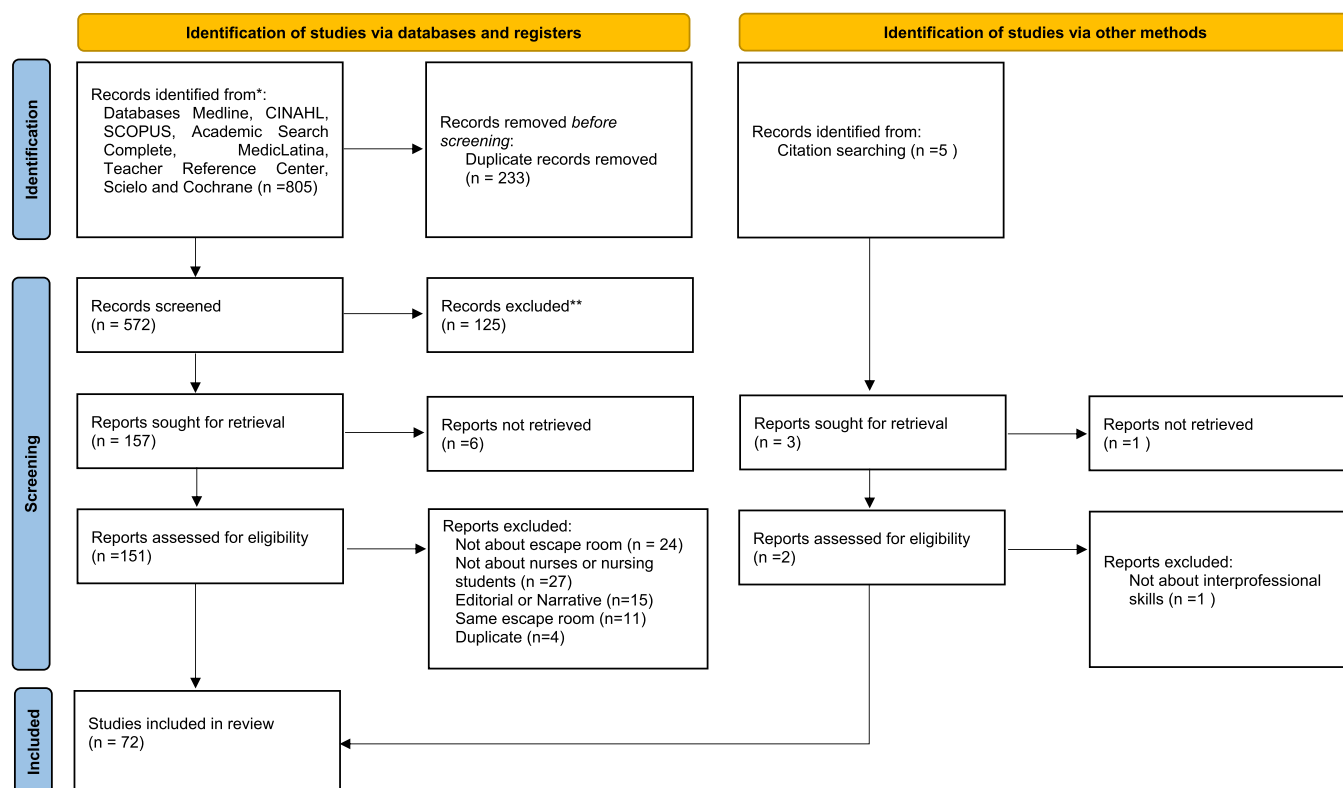


Fig. 1. Article identification and inclusion process—PRISMA diagram flow (2020).

3. Results

After the final selection of articles, a descriptive analysis can be conducted on the sample of 72 selected articles (Table 1).

3.1. Characteristics of the included studies

Of the 72 articles analyzed, the United States leads with 45 occurrences (62.50 %), followed by Spain with 11 (15.28 %), Brazil with 5 (6.94 %), Taiwan and Australia with 3 each (4.17 % each) and the United Kingdom, Portugal, Turkey, Canada and China with 1 occurrence each (1.39 % each) (Table 1). Although the research was conducted without a temporal limit, the publications range from 2018 to 2024. Of the 72 articles analyzed, 19 were published in 2023 (26.39 %), 16 in 2021 (22.22 %), 11 in 2022 and 11 in 2024 (15.28 % each), 8 in 2020 (11.11 %), 6 in 2019 (8.33 %) and 1 in 2018 (1.39 %), showing an increase in research activity in recent years. Pilot studies are the most common, representing 38.9 % of the total, followed by quasi-experimental studies with pre and post-tests, which account for 18.1 % and descriptive studies, which make up 15.3 %. These data may reflect a preference for initial exploratory approaches (Fig. 2).

3.2. Characteristics of the participants

Regarding the participants of the study, 66.66 % (n = 48) of the studies pertain to the use of escape rooms for nursing students in their initial training process, while 31.94 % (n = 23) are related to use with nurses. The total number of participants in the studies reaches 2282, with a minimum of 5 and a maximum of 850, although some studies do not mention the number of participants (n = 10). 17 of the studies included a variety of healthcare professionals in addition to nurses and nursing students, such as physicians, pharmacists, nutritionists, physical therapists, students of medical radiation science, medicine, nutrition

and dietetics, occupational therapy, dental hygiene, dental therapy, health administration, among others.

3.3. Characteristics of escape room

In the set of articles analyzed, 53 of the escape rooms were physical (in-person), accounting for 73.61 % of the total, 17 were digital (online), representing 23.61 % and 2 were hybrid, both virtual and in-person, constituting 2.78 % of the sample (Fig. 3). Of the 17 escape rooms presented in a digital format, in 10 of these studies, the authors mention their use in this format due to the Covid-19 pandemic. As for the objectives of the escape rooms, their focus includes teamwork, communication, leadership, skill development and the enhancement of clinical judgment. In Fig. 3, we can observe the categorization of the distribution of themes addressed in the "Escape Rooms" from the articles analyzed. The most frequent theme is "Medical-surgical" with 15 occurrences, followed by "Emergency situation" with 13 occurrences and "Safety and Quality" with 10 occurrences. The time allotted for the escape room varied between 10 and 120 minutes; however, 19 of the studies do not specify its duration. In Fig. 3, we can see that the most common duration for the development of the escape room was 60 minutes in 17 of the studies and 30 minutes in 23 of the studies.

3.4. Outcomes

In the analysis of the 72 articles on the evaluation of escape rooms, a variety of assessment methods are observed. One of the most referenced tools included the frequent use of custom questionnaires created by the authors with Likert scales. Other methods used were "Debriefing," "Focus Group discussion," satisfaction evaluation, observation, or game scores, time to escape the room, or knowledge gained in tests. Various specific scales were also referenced, with the Gameful Experience Scale (GAMEX) being the most cited (in 5 of the studies). The positive

Table 1
Key Findings from Scoping Review Articles.

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Results	Limitation
E1	Spain	Acebo-Segúin et al. (2024)		Evaluate the effectiveness of an educational intervention (escape room) in acquiring and retaining knowledge related to the Infarction Code.	Quasi-experimental study with a pre/post-test	32 (12 physicians and 20 nurses)	✓		Physical/in-person The activity was conducted in person, where participants were divided into interdisciplinary groups and had to complete tasks related to the Infarction Code	Infarction Code divided into interdisciplinary groups	60 minutes	GAMEX questionnaire	Immediate Improvement: Knowledge tests improved by an average of 3.49 points post-activity. Long-Term Retention: Two months later, tests showed an average gain of 2.08 points.	Not mentioned
E2	United States	Adams, et al. (2018)		To engage and empower nurse residents and experienced nurses through an interactive game-based learning experience	Pilot study	213 nurses (167 nurse residents and 46 experienced Nurses)	✓		Physical/in-person Physical setup in a patient room with various puzzles and clues based on nursing tasks, incorporating critical thinking, teamwork, and communication skills.	Various nursing protocols and patient safety measures.	60 minutes	Observations by a moderator and a post-experience survey to evaluate the effectiveness and impact of the learning experience.	Participants demonstrated improved engagement and practical application of learned concepts. Median escape time for nurse residents was 31:52 minutes, and they required fewer additional clues compared to experienced nurses	Limitations included variable group sizes, restricting some nurses' participation, and variations in the availability of materials and spaces. Experienced nurses might struggle with outdated clues, and later groups could be pre-informed.
E3	Spain	Alejandro et al. (2022)		To ascertain the degree of learning and satisfaction among residents using an escape room on pediatric sepsis.	Observational study	48 (41 Pediatric medical and 7 nursing residents)	✓		Physical, in-person. Nicholson's RECIPE mnemonic (reflection, engagement, choice, information, play, exposition) for meaningful gamification was used to guide the general design with An introductory video	Pediatric sepsis.	60 minutes	Pre- and post-knowledge tests, a follow-up test three months later, and a satisfaction survey.	Improvement in test scores from pre (mean: 7.85/9) to post (mean: 8.75/9) and three-month follow-up (mean: 8.30/9). 18.8 % of participants did not finish within the 60-minute limit	The different levels of previous experience in recreational escape rooms
E4	Spain	Anguas-Gracia et al. (2021)		To evaluate the gameful experience of undergraduate nursing students participating in an escape room as	Descriptive study	126 third-year nursing students	✓		Physical, in-classroom. A physical escape room using a health case study to teach professional skills	Based on a stroke case study.	60 minutes	GAMEX questionnaire and a self-reported questionnaire.	Participants found the escape room to be an appropriate and innovative educational strategy, with average scores	The study did not analyze the impact of the escape room game on academic performance, and there was a

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				part of their course.					through puzzles related to a Stroke case.				above 3 in all GAMEX dimensions except for "Absence of Negative Effects."	possibility that later groups could have been pre- informed.
E5	Spain	Antón-Solanas et al. (2022)		To investigate nursing students' gameful experience while playing a digital escape room	Descriptive study	136 first-year nursing students		✓	Digital, online. Using Moodle and Google Meet, students had to solve six puzzles with specific game features to escape the room.	Pressure ulcers.	90 minutes.	GAMEX scale in Spanish version and a self- reported questionnaire assessing the outcome and learning achievements.	Enjoyment, Creative Thinking, and Absence of Negative effects scored above 3.0 on average. Students generally felt the game aided their learning with average scores around 3.34 for helping learn the subject, 3.41 for enjoyment, and 3.01 for exam preparation.	We were unable to guarantee that all the participants who completed the digital survey had been actively involved in solving the puzzles and completing the missions.
E6	United States	Barker et al. (2020).		To evaluate the use of an escape room as an active learning strategy to teach nursing students about fluid and electrolyte imbalances.	Pilot study	Not specified Nursing students		✓	Physical, in- classroom students had to correctly answer three questions, follow clues on fluid resuscitation to unlock a combination box, and select the right IV solution, leading to critical thinking tasks about patient care.	Fluid and electrolyte imbalances	45 minutes	Qualitative assessment	Positive feedback from students, with reports of increased confidence and understanding of the material.	Details on the number of participants and quantitative analysis of results were not specified.
E7	United States	Barner et al. (2023)		To examine the use of virtual escape rooms in developing nursing students' clinical judgment as an educational tool.	Pilot study	5 Nursing students		✓	Digital, online. The virtual escape room involved ten rooms, each simulating clinical challenges, ending with a review room where participants assessed their clinical judgment application throughout the scenarios	Heart failure, post-operative care, and fluid overload.	Not specified.	Lasater Clinical Judgment Rubric (LCJR) was used to evaluate the students' clinical judgment.	Participants showed a range of scores from 18.33 to 32.33 out of 44 on the Lasater Clinical Judgment Rubric, indicating varying levels of proficiency in clinical decision- making among the nursing students.	Limited participation rate, no enforced time limits during the activity

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E8		United States	Bonaduce, (2024).	To investigate the impact of an escape room simulation on the clinical judgment skills of nursing students.	Quasi-experimental study with a pre/post-test	47 Nursing students in second year		✓	Physical, in-classroom These activities, which include logic puzzles, jigsaw puzzles, and ciphers, focus on key nursing responsibilities like scheduling, patient acuity assessment, prioritization, and communication, all guided by Tanner's Model of Clinical Judgment.	Clinical judgment.	Not specified	Skalsky Clinical Judgment Scale (SCJS)	Significant improvement in SCJS scores post-simulation, indicating enhanced clinical judgment skills	The study utilized a convenience sample, limiting generalizability
E9		United States	Bonn et al. (2023)	To explore the effectiveness of using gamification, specifically a virtual escape room, to engage clinical nurses in quality improvement initiatives and enhance their involvement and motivation.	Descriptive study	75 nurses		✓	Digital, online. The escape room was designed with a 1990s theme, creating a visually engaging and narrative-driven experience. It was developed using the Articulate 360 platform to simulate an interactive learning environment.	Quality improvement in clinical settings	average escape time was 28 minutes	five-question postintervention evaluation	The evaluation of the virtual escape room project revealed that 67 % of nurses believed it would improve patient outcomes, 83 % found the format helpful for learning, 88 % could identify nursing quality indicators relevant to their work, and 85 % gained a better understanding of these indicators.	The participant evaluation was self-report only, so no causal relationship between learning or improved patient outcomes could be made
E10		United States	Bright and Ulmen, (2023)	To determine if escape rooms are an effective educational strategy, measuring knowledge gains and assessing student perceptions in both online and in-person formats.	Quasi-experimental study with a pre/post-test	83 Second-year nursing students.		✓	Both virtual and in-person. Used a case study involving patient safety; virtual rooms used Google Slides, while in-person rooms used physical elements like locked tackle boxes.	Patient safety and teamwork	35 minutes	5 multiple-choice questions, created by the researcher to measure learning. And a Likert scale survey evaluated students' perceptions of communication, teamwork, and critical thinking	Both groups showed significant improvements in test scores with no significant difference between delivery methods. Over 93 % felt integrated into the team, and over 83 % enjoyed the teamwork.	Not mentioned
E11		United States	Brown et al. (2019)	This teaching project describes the process of creating,	Descriptive study	33 third year nursing students		✓	Physical, in-classroom Instead of a locked room,	Urosepsis high-fidelity simulation scenario	60 minutes	Student surveys post-simulation with 12 agree/disagree questions	According to the 9 participants who responded to the questionnaire, the	The small sample size of this study is a considerable limitation.

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				implementing, and appraising the use of escape room concepts within a urosepsis high-fidelity simulation scenario.					Breakout locked boxes were incorporated into a clinical simulation			and two open-ended questions.	escape room simulation experience was an engaging teaching strategy.	
E12	Carmack, et al. (2022)	United States		To determine if a diabetes-themed escape room is an effective interprofessional education (IPE) tool for improving student perceptions of IPE and increasing knowledge of diabetes.	Quasi-experimental study with a pre/post-test	34 18 athletic training (AT) students. 16 nursing students		✓	Physical, in-person. An escape room featuring team-based puzzles and activities focused on diabetes care.	Diabetes management and education	60 minutes	Student Perceptions of Interprofessional Clinical Education-Revised (SPICE-R) and a Diabetes Knowledge Assessment.	Significant improvement in IPE factors and diabetes knowledge for AT students; nursing students had high baseline knowledge with less improvement post-intervention	The study had a small sample size, and there were issues with the last puzzle affecting the accuracy of the Diabetes Knowledge Assessment results.
E13	Çelik et al. (2023)	Turkey		To assess the impact of the Wound Care Escape Room (WCER) as a teaching game on nursing students' opinions and motivation.	Descriptive study	105 Second-year nursing students.		✓	Physical, in-person A hands-on, scenario-based activity designed to teach wound care concepts through teamwork and problem-solving in a lab setting.	Wound care	10 minutes	The questionnaire contains six questions prepared by the researcher to assess the opinions and motivations of students using a 5-point Likert scale.	The highest mean score was 4.7333 (± 0.57624) for enjoying the game, and all responses averaged above 4.5, indicating strong positive feedback.	The students who completed the game might have shared information using technology with those who had not yet played it.
E14	Chabrier et al. (2022)	Canada		To design, implement, and evaluate an escape room based on Accreditation Canada's Required Organizational Practices (ROPs) as part of hospital accreditation preparation.	Descriptive study	200 152 Nurses and 48 pharmacists		✓	Physical, in-person he game took place in a patient room with six puzzles related to different ROPs, using physical props like padlocks and ultraviolet light.	Accreditation Canada Required Organizational Practices (ROPs)	25 minutes	Satisfaction questionnaire	Successful teams needed an average of 1.32 clues, while unsuccessful teams needed 1.88 clues. High satisfaction was reported, though unsuccessful teams were less likely to agree that the game was relevant to their practice.	The study did not include a pre- and post-knowledge assessment. There was no debriefing, which could have enhanced the understanding of the knowledge gained.
E15	Chen et al., (2023)	China		To investigate the effects of adding an escape room game-based learning activity on nursing students' learning attitudes in a	Quasi-experimental study with a pre/post-test with control group	84 Second-year nursing students. (41 in the test group and 43 in the control group).		✓	Physical, in-person The escape room was set in a geriatric nursing training room	Safe Medication Care for the Elderly	40 minutes	Learning Attitude Scale (LAS) and Game Flow Experience Questionnaire (GFEQ).	The test group showed a significant improvement in learning attitude (mean score increase from 60.93 to 73.17,	During the implementation of the game, issues such as conflicts among students, slow progress due to lack of leadership, fatigue

(continued on next page)

Table 1 (continued)

iiId	Authors Country Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
		Gerontological Nursing course.									p < 0.001) and game flow experience (mean score increase from 63.27 to 81.29, p < 0.001) compared to the control group.	from the sole responsible teacher, and damage to items in the room arose, complicating the restoration and reuse of teaching tools.
E16	Cook and Camp-Spivey, (2022) United States.	To design, develop, and implement clinical experiences, including a virtual pediatric physical assessment checkoff and a pediatric escape room, that enhance nursing students' pediatric assessment skills,	Quasi-experimental study with a pre/post-test	53 Nursing students in the physical assessment checkoff and 75 in the pediatric escape room.		✓	Physical, in-person The escape room was conducted in person in a setting that simulated a hospital environment where students worked in small groups. A Laerdal SimJunior simulator was used, configured with abnormal lung sounds and an irregular breathing pattern to represent a pediatric patient.	Assisting a pediatric patient	25 minutes	Tool developed based on the literature.about skills	The study presented an improvement in students' confidence in assessment skills, dosage calculations, communication with, and interaction with the pediatric population, and teamwork	The use of self-reported measures, missing data from evaluation instruments, and the lack of design for statistical significance.
E17	Cunha,et al. (2023) Brazil	To analyze how nursing students feel in relation to their participation and learning in an online Escape Room activity	Descriptive study	73 students Second-year nursing students.		✓	Digital, online. The Escape Room conducted on the platform ZOOM® was based on a clinical case of a patient with acute myocardial infarction (AMI). The activity consisted of eight sequential tasks.	Acute myocardial infarction (AMI)	Not specified	Educational Practices Questionnaire	93.2 % of students' statements expressed that Escape Zoom favors teamwork, and 91.8 % agreed that the activity is effective for learning and would recommend it to other colleagues	A limitation was the need to adapt instruments typically used to evaluate simulations. Additionally, there is a need to compare student performance using the Escape Zoom strategy with other teaching-learning methods
E18	Silva et al. (2024) Brazil	To assess new active learning strategies, specifically two educational games (a card game and an escape room-type game), for training in	Descriptive study	850 Healthcare professionals, including physicians, nurses, respiratory therapists, and nursing technicians.		✓	Digital, online. Participants were placed in a fictional scenario related to infection prevention, where they needed to solve puzzles and challenges to	Infection prevention	Not specified	Likert scale questions about: quality, rating, and satisfaction. An open-ended question to gather qualitative feedback.	A high degree of satisfaction with the quality of the activities was achieved, with scores exceeding 88 % (rated as good or excellent experience). Additionally,	Lack of knowledge acquisition/ retention assessment, reliance on self-reported data, and the absence of a demographic analysis of participants.

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E19	Daniel et al. (2021)	United States		healthcare-associated infection prevention. To evaluate the effectiveness of using an escape room modality combined with simulation-based education to teach nurses the essentials of mock code (cardiac arrest management).	Quasi-experimental study with a pre/post-test	66 novice nurses	✓		"escape" from a simulated situation. Physical, in-person The escape room utilized the SimMan® 3 G simulator and involved solving nine puzzles and riddles that were directly related to steps in managing a cardiac arrest.	Mock cardiac arrest (code blue) scenario	60 minutes	skills checklists, and a customized evaluation survey to measure knowledge acquisition, skill performance, and participants' reactions.	there was a significant increase in hand hygiene compliance, rising from a baseline of 62–73 % over six months. The pretest–posttest results indicated a 29 % increase in average scores, with the mean test score improving significantly. 94 % or more participants agreed or strongly agreed with the positive evaluative statements regarding the escape room program.	Researchers need to use a sophisticated pretest–posttest with sound psychometric properties
E20	Daniels et al. (2022)	United States		To evaluate the perceptions and subsequent practice changes of inpatient caregivers following participation in a patient safety escape room	Descriptive study with immediate and delayed post-intervention surveys.	384 Nurses and patient care technicians.	✓		Physical, in-classroom The escape room utilized a combination of physical props, puzzles, and ciphers that teams had to solve to proceed through the scenario. Facilitators acted as patients and provided cues and feedback during the simulation.	Patient safety and fall prevention	35 minutes	A 5-point Likert scale from Eukel et al. (2017) assessed the educational value of the escape room. A delayed post-survey, also including open-ended questions, evaluated long-term impacts after 1–2 months.	The average overall perception score was 4.3 out of 5, indicating a highly favorable response. 77 out of 100 was the average score for the perceived level of change in daily practice as a result of the escape room.	The use of email for follow-up surveys was noted as less than ideal since many caregivers do not regularly check their work emails. Additionally, the study's reliance on self-reported data may introduce bias-
E21	Darby et al. (2021)	United States		To determine if nursing students were able to demonstrate competency related to identified learning needs through an obstetrical skills relay race incorporating an	Observational study	Not specified Nursing students	✓		Physical, in-person Integrated within a skills laboratory setting as part of a relay race. Included use of a Breakout box and other interactive and gamified elements to	Obstetrical skills	60 minutes	Formative assessment through direct observation of skills performance	The activity was perceived as exciting and motivating by both educators and students.	Not mentioned

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E22	Davenport and Irons, (2024)	United States		escape room element. o prepare nursing students for the Next Generation through the use of a virtual escape room that integrates case studies to enhance clinical judgment skills.	Pilot study	Not specified Nursing students		✓	facilitate the relay race Digital, online. Expose students to questioning to enhance their clinical judgment skills. Google Sites, Google Slides, Google Forms, and Google Sheets were used to create an interactive virtual environment.	Cardiovascular issues.	30 minutes	Structured group debriefings, assessing perceptions of clinical judgment improvement and knowledge attainment.	Positive feedback from faculty and students regarding the integration and effectiveness of the escape room in enhancing learning	The development of the virtual escape room was time-consuming, and the challenge of device-specific text input in Google Forms was noted as potentially affecting student progression.
E23	Ramalho et al. (2022)	Brazil		To report the experience of using an escape room as an educational and awareness strategy for the prevention of pressure injuries within a hospital context.	Pilot study	82 nurses, nutritionists, and physiotherapists.		✓	Physical, in-person Implemented within a hospital setting as part of an educational campaign.The setup included props and puzzles typical of escape rooms	Pressure injury prevention	Not specified	Semi-structured questionnaire applied online	Feedback from participants indicated a high level of satisfaction with the methodology and the creative approach to the topic.	The escape room was time-intensive and required adequate infrastructure
E24	Pereira et al. (2023)	Brazil		To report the application of the escape room game as a permanent education strategy for the prevention of pressure injuries in intensive care units	Descriptive study	59 Nurses		✓	Physical, in-person Implemented within a hospital setting as part of a structured educational initiative.	Prevention of pressure injuries	Not specified	Debriefing sessions about emotions and perceptions about the activity.	All participants (100 %) managed to escape the room within the stipulated time	Not mentioned
E25	Dunne, (2023)	United States		To describes the development and implementation of an escape room concept applied to cesarean section surgery education for one health systems perinatal nurse residency program.	Pilot study	100 Nurses		✓	Physical, in-person Utilized realistic medical equipment and props to simulate an operating room environment.	Cesarean section surgery	60 minutes	Feedback after the sessions, which included structured comments on the simulation's realism and effectiveness.	Participant feedback was overwhelmingly positive, with mentions of improved understanding and appreciation for the hands-on learning experience.	The need for more interactivity and realism was highlighted by participants, prompting adjustments to the equipment and setup for future sessions.
E26	Edwards et al. (2019)	United States		To utilize an escape room as an innovative teaching strategy to help nursing	Pilot study	Not specified Nursing students		✓	Physical, in-person Utilizing a linear approach where tasks must be	Maternity care, involving labor and delivery.	15 minutes	Feedback was collected after the sessions to gauge learning and satisfaction	The evaluations revealed that the escape room was a positive experience, that	Not mentioned

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Results	Limitation
				students enrolled in a maternity clinical course develop critical thinking and collaboration skills.					completed in sequence. Included simulation equipment such as a female manikin, medical instruments, and monitoring systems.				the objectives and rules were easy to understand and follow, and learning occurred.	
E27	Ferns et al. (2024)	Australia		To explore new ways of delivering interprofessional education through the use of escape rooms, focusing on non-clinical activities to enhance teamwork and communication among health professional students.	Pilot study	53 medical radiation science, medicine, nursing, nutrition and dietetics, occupational therapy, and physiotherapy students		✓	Physical, in-person Non-clinical scenarios set in everyday environments like a café, lecture theatre, and science laboratory to promote general teamwork and communication skills.	non-clinical activities to enhance teamwork	30 minutes	A form developed by the working party assessed both the design and value of the activity, featuring 15 statements on a five-point Likert scale.	The feedback was overwhelmingly positive, with students appreciating the non-clinical focus and the chance to practice interprofessional teamwork in a relaxed setting	The complexity of designing non-clinical activities that effectively incorporate interprofessional learning outcomes.
E28	Foltz-Ramos et al. (2021)	United States		To evaluate the effectiveness of an interprofessional escape room in improving teamwork and performance in simulation scenarios among health profession students.	Quasi-experimental study with a pre/post-test with control group	233 students (118 nursing students and 115 pharmacy students).		✓	Physical, in-person Utilized within a university simulation center, incorporating typical escape room elements like puzzles and tasks	acute care issues	30 minutes	The Observed Interprofessional Collaboration tool for performance assessment and the Interprofessional Socialization and Valuing Scale for measuring attitudes towards teamwork.	Median scores in simulation performance were higher for students who participated in the escape room prior to simulation. No significant difference was found in the change of perceptions of teamwork between groups. Debriefing also resulted in positive feedback from participants on using the escape room	The study did not explore how previous experience with escape rooms might influence performance,
E29	Frederick and Reed, (2021)	United States		To enhance the learning experience and improve exam scores of nursing residents by introducing an interactive escape room as part of the Periop exam review.	Quasi-experimental study with a post/test with control group	22 nurses		✓	Physical, in-person One group participated in a didactic session (n = 18), while another group engaged in both the didactic session and the escape room (n = 4). Focused on critical knowledge areas for operating	Operation Outbreak	60 minutes	Performance was assessed based on the final exam scores and pass rates, comparing the two groups and Debriefing	Debriefing also resulted in positive feedback from participants on using the escape room	The small sample size and heterogeneous groups

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E30	Friedrich et al., (2019)	United States		To implement an escape room within an interprofessional education curriculum to enhance communication and team dynamics among students from various healthcare professions.	Quasi-experimental study with a post-test	181 dental hygiene, dental therapy, healthcare administration, healthcare ethics, medicine, nursing, and pharmacy Students		✓	room nurses, including environmental cleaning, phases of anesthesia, and wound closure. Physical, in-person Designed to simulate a hospital scenario where students worked as a team to solve a patient case.	coronary intervention to enhance teamwork	45 minutes	A post-implementation survey collected feedback using a seven-point Likert scale and open-ended questions to assess students' views	The majority of students agreed that the escape room promoted teamwork and communication	This study design it is not possible to assess whether the students objectively increased their communication and teamwork skills
E31	Frost, North and Smith. (2020)	United States		To improve obstetric providers' and nurses' understanding, recognition, and timely treatment of maternal sepsis through an innovative escape room simulation.	Quasi-experimental study with a pre/post-test	126 80 nurses and 46 medical providers		✓	Physical, in-person Included high-fidelity manikins and medical equipment typical for a hospital setting.	Maternal sepsis	30 minutes	A self-developed five-item questionnaire was used to measure understanding of maternal sepsis before and after the intervention	The results showed a statistically significant improvement in knowledge regarding the treatment and identification of maternal sepsis.	The design of the escape room allowed some groups to skip intended steps, which could affect the consistency of the learning experience.
E32	Garwood (2020)	United States		To engage nursing students in learning through the use of an escape room, enhancing their skills in teamwork, analytical thinking, and problem solving	Pilot study	22 Second-year nursing students		✓	Physical, in-person Included physical props and puzzles relevant to nursing and emergency scenarios.	Emergency scenario	45 minutes	A postsurvey with five statements was used to gather data on students' perceptions	All students (100 %) agreed that the puzzles required teamwork, cooperation, critical thinking, and concentration.	Small and consisted of a convenient, Non random sample
E33	Gates and Youngberg-Campos, (2020)	United States		The article explores the use of an escape room format to rapidly validate new graduate nurses' knowledge and skills, while reducing the number of education days required by the organization.	Pilot study	169 Nurses		✓	Physical, in-person Utilized a combination of physical props, puzzles, and clinical equipment to simulate real-world nursing scenarios	Patient care and emergency	60 minutes	Debriefing sessions post-escape room activity	Participants demonstrated improved engagement and quicker validation of nursing skills.	Setting up the escape room required significant time and effort.

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E34	Gómez-Urquiza et al. (2019)	Spain		To analyze nursing students' opinions and motivation after participating in a "Nursing Escape Room" game, and to assess the educational impact of this teaching strategy.	Pilot study	105 Second-year nursing students		✓	Physical, in-person The escape room, named "The Florence Nightingale Code," was themed around debunking a falsified document claiming Florence Nightingale and Virginia Henderson were not nurses, thereby "saving" the nursing profession.	nursing profession	30 minutes	An ad hoc questionnaire administered after the game to evaluate students' perceptions	High levels of enjoyment and perceived educational value, with students indicating that the game helped them learn (mean score 4.8) and motivated them to study (mean score 4.5).	An ad hoc questionnaire was used to determine students' satisfaction with the escape room
E35	Gutiérrez-Puertas et al. (2020)	Spain		To understand the gameful experience and satisfaction of nursing students in evaluating their clinical skills using an escape room, compared to traditional evaluation methods.	Quasi-experimental study with a pre/post-test with control group	237 nursing students		✓	Physical, in-person The scenarios were designed around six topics or themes: wound healing, clinical safety, evidence-based nursing, basic life support, advanced life support, and assistance in a multi-casualty incident.	Clinical skills evaluation	30 minutes	The Gameful Experience Scale (GAMEX) was used to assess the gameful experience, and an ad hoc checklist was utilized to evaluate skills.d	The experimental group displayed higher gameful experience scores and satisfaction compared to the control group.	Data were not gathered about participants' previous experience with escape rooms or gamification.
E36	Hadenfeldt et al. (2021)	United States		To enhance the engagement and learning of nursing and other health professions students in pharmacology through an "Escape the Pharmacy" game	Pilot study	Not specified Nursing and other health professions students		✓	Physical, in-person Collaborative challenge within a classroom setting. The game involved physical puzzles and clues that integrated educational content on pharmacology.	Pharmacology, specifically safe analgesic administration.	Not specified	Student performance in the game	The game was intended to increase knowledge retention and student engagement	Not mentioned
E37	Haley and Palmer. (2020)	United States		To integrate escape room tasks into a baccalaureate nursing program to facilitate learning of Quality and Safety	Pilot study	7 Nursing students		✓	Physical, in-person Various clinical scenarios relevant to nursing, particularly focused on medical-surgical	Quality and Safety Education for Nurses (QSEN) competencies	From a few minutes to over an hour	Direct observation and informal post- task feedback	Positive feedback from students highlighted enhanced engagement and learning, especially in areas like critical	Not mentioned

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				Education for Nurses (QSEN) competencies					content, including renal diseases. Utilized educational tools such as manikins for CPR, printed materials for case studies, and other medical equipment for simulations.				thinking and teamwork.	
E38	United States	Hebert (2023)		To implement educational escape rooms in a Doctor of Nursing Practice (DNP) program to enhance critical thinking and clinical judgment among students.	Pilot study	27 Second-year nursing students		✓	Physical, in-person The escape room scenarios were built around clinical cases, including a scenario of being trapped in a patient's apartment during a zombie apocalypse	critical thinking and clinical judgment about emergency and primary care	60 minutes	Student surveys and observational assessment	The majority of students (96 %) found the content relevant and beneficial for developing decision-making skills.	Not mentioned
E39	United States	Holland et al. (2019)		To evaluate a teaching strategy using a postpartum hemorrhage escape room to engage baccalaureate maternity nursing students	Mixed methods study	85 Nursing students		✓	Physical, in-person Included a manikin setup in a maternity simulation room, simulating a postpartum hemorrhage scenario.	Postpartum hemorrhage	Not specified	Surveys and focus group discussions	The majority of students reported improvements in knowledge and skills relevant to postpartum hemorrhage, effective teamwork, and communication	Self-reported data were used without longitudinal follow-up to measure long-term retention of skills and knowledge.
E40	Taiwan	Hsiao et al. (2024)		To develop and evaluate the effectiveness of an immersive cinematic escape room (ICER) instructional approach in enhancing disaster preparedness and self-efficacy among nurses.	Quasi-experimental study with a post-test with control group	115 nurses		✓	Physical, in-person Disaster preparedness, with scenarios related to medical station establishment, incident command system (ICS), personal preparedness and protection in disasters, and mass casualty triage (START).	Disaster preparedness	Not specified	Disaster Preparedness Scale and General Self-Efficacy Scale, with evaluations conducted before, one week after, and four weeks after the course.	The experimental group showed significant improvement in disaster preparedness compared to the control group. Self-efficacy improvements were noted but did not achieve statistical significance.	Potential biases due to pre-existing disaster preparedness education experiences among participants.
E41	Taiwan	Hsu et al. (2023)		To teach violence de-escalation skills to newly qualified nurses	Quasi-experimental study with a pre/post-test	106 nurses		✓	Digital, online. Utilized the Gather platform to simulate escape	Violence prevention and de-escalation	90 minutes	A multiple-choice questionnaire was administered pre-training, post-	Statistically significant improvement was noted in the	Small number of participants per session due to the

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				using an innovative online escape room-based lesson plan.					room scenarios that require solving puzzles related to violence de-escalation.	skills in clinical settings		training, and one-month post-training to evaluate the knowledge and skills	nurses' knowledge and skills from pre-test to post-test and maintained at the one-month follow-up,	platform's capacity
E42	Iverson, Jizba and Manning, (2023)	United States		To evaluate the effectiveness of an escape room as an educational tool for teaching critical care management skills to nurse practitioner students.	Pilot study	25 Nursing students		✓	Physical, in-person Included high-fidelity mannequins and a setup mimicking an acute care hospital environment.	Critical care management	45 minutes	Post-activity surveys and observational assessments	Post-activity surveys indicated positive student perceptions of the learning experience	The initial setup of the escape room was resource intensive.
E43	Jarvis and Tee (2023)	United Kingdom		To create an engaging and interactive escape room experience for student nurses that promotes teamwork, problem-solving, and application of nursing knowledge	Mixed methods study	Not specified Third-year Nursing students		✓	Both virtual and in-person. Utilized immersive suites for in-person scenarios and Adobe Captivate software for creating a virtual experience, which included filming and interactive design elements like 360-degree video footage	Clinical challenges and leadership skills	Not specified	student surveys and focus groups	Positive feedback from students highlighted the effectiveness of the escape room in improving engagement and practical skill application.	Need for significant technical support to implement the virtual elements effectively.
E44	Kubin (2020)	United States		To enhance nursing students' learning through the use of an escape activity in the classroom	Pilot study	132 Nursing students		✓	Physical, in-person utilizing escape boxes (lock boxes) instead of an entire room transformation.	Managing multiple patients in a pediatric acute care center	30 minutes	Successful completion of the activity, a unit examination following the activity, and comparisons of test item scores with a previous semester.	Most groups (94 %) successfully completed the activity. Content item test scores improved by 5.9 % from the previous semester, and most students (97 %) reported improved knowledge and ability to prioritize.	Time and cost involved in setting up the escape activity
E45	Kubin et al. (2021)	United States		To maintain high educational standards and minimize disruption for students by developing an	Pilot study	Not specified Nursing Students		✓	Digital, online. Google Forms, online videos, and other digital media were used to create a realistic	Child in diabetic ketoacidosis	Not specified	Student surveys	Students reported increased clinical reasoning, prioritization, communication, and critical thinking skills,	Potential technical issues, and the need for extensive faculty training to effectively implement and

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				innovative revised plan for facilitating clinical experiences within a virtual learning environment during the global pandemic.					simulation environment.				aligning with positive perceptions of the virtual activities similar to traditional clinical simulations.	manage virtual learning environments.
E46	United States	Lyman (2022)		To implement a virtual escape room mock code as a substitute for in-person education to continue education during a time of social distancing	Pilot study	Not specified Nurses	✓		Digital, online. Utilized online platforms and digital tools to simulate the mock code environment.	Mock code scenario, which is a simulated emergency situation	Not specified	Satisfaction and perceptions survey adapted from the Student Satisfaction and Self-Confidence in Learning Survey.	The results indicated that nurses felt satisfaction and self-confidence in learning, and that the virtual session provided education comparable to in-person sessions.	Survey tool was not originally designed for virtual simulation
E47	United States	Malatesta et al. (2024)		To evaluate the educational outcomes of nursing students using an educational escape room as a summative evaluation tool in a medical/surgical course	Pilot study	39 Nursing students		✓	Physical, in-person To evaluate learning outcomes such as recognizing abnormal vital signs of a decompensating patient, prioritizing nursing interventions, and collaborating with peers.	Medical/surgical nursing with scenarios requiring urgent patient care.	20 minutes	Observation and student feedback	: Most students agreed that the Escape room allowed them to meet the specified learning outcomes, demonstrating its effectiveness in a summative evaluation setting.	There was no prior data available for comparison to gauge the cohort's progress or performance effectively.
E48	Spain	Martínez-Galiano et al. (2024)		To evaluate the combination of "Objective Structured Clinical Examination" and an escape room as teaching methodologies in a scenario simulation for assessing students in sexual and reproductive health care.	Observational study	124 Nursing students.		✓	Digital, online. Students had to solve challenges and puzzles that were directly related to the curriculum content, encouraging critical thinking and practical application of knowledge.	Sexual and reproductive health care	Not specified	GAMEX (Gameful Experience in Gamification) scale	Statistical analysis showed significant engagement and satisfaction among students with high ratings on the GAMEX scale, particularly in fun and critical thinking.	Single setting of the study
E49	United States	McLaughlin et al. (2021)		To enhance the orientation process for new	Pilot study	23 nurses and care assistants	✓		Physical, in-person The scenario was	Infection control and emergency	Not specified	Post-activity surveys measured satisfaction and	Participants scored an average of 4.67 on	Not mentioned

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				healthcare staff by replacing traditional training with an interactive escape room focused on essential clinical skills and team communication.					a "Zombievirus" outbreak where participants needed to manage patient care without contracting the virus, ensuring application of proper personal protective equipment and other safety measures.	response in a hospital setting		confidence in skill application	satisfaction and 4.72 on confidence in applying skills. Communication scored slightly lower at 4.0. Feedback indicated a preference for the escape room over high-fidelity simulations due to its lower stress	
E50		United States	Millsaps et al. (2022)	To utilize escape rooms as an innovative educational tool in undergraduate nursing education to encourage teamwork, collaboration, and critical thinking	Pilot study	24 nursing students		✓	Physical, in-person Included practical tools for simulation and interactive elements such as locks, keys, and puzzles.	Stroke care and emergency response.	30 minutes	Pre- and post-test evaluation and debriefing	The results showed that there is significant evidence to conclude that the median score of the post-test was higher than that of the pretest,	Small number of participants
E51		Spain	Molina-Torres et al. (2022)	To evaluate the effectiveness of an escape room for enhancing anatomy-related knowledge retention in nursing students	Quasi-experimental study with a pre/post-test with control group	248 First-year nursing students		✓	Physical, in-person Included puzzles and interactive challenges that integrated anatomical knowledge.	Anatomy	15 minutes	Satisfaction surveys and structured anatomical examinations to compare knowledge retention between the experimental and control groups.	The experimental group showed significantly higher satisfaction and better performance in anatomy-related knowledge retention compared to the control group.	A lack of extensive research on the use of escape rooms in anatomy education
E52		Australia	Moore and Campbell, (2021)	To investigate the utility of an escape room as an educational tool that facilitates interprofessional practice knowledge and experience among health professional students.	Mixed methods single group pre-post design	50 students from Medical Imaging (n = 22) Medicine (n = 18) Nursing (n = 16) Occupational Therapy (n = 8) Pharmacy (n = 8) Speech Pathology (n = 4) Optometry (n = 2)		✓	Physical, in-person Included physical props and health-related puzzles	interprofessional practice	45 minutes	Pre and post-session surveys and knowledge quizzes	Showed effective and engaging learning outcomes, with improvements in students' understanding of interprofessional practice.	Longer term retention and application of knowledge could be a useful next step
E53		United States	Morrell and Eukel (2021)	To utilize a cardiac-themed escape room to enhance undergraduate	Pilot study	68 Nursing students		✓	Physical, in-person used a series of puzzles and clinical reasoning	Cardiac care	60 minutes	Guided debriefing post-game	The escape room improved students' content knowledge, confidence,	Logistical and resource demands of setting up and conducting the escape room

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				nursing students' mastery of cardiovascular content					activities structured around nursing education content and licensing objectives, integrated into a physical classroom setup.				critical thinking, and teamwork	
E54	Portugal	Oliveira et al. (2023)		To explore virtual reality game design specifically for the elicitation of emotions, using the Escape Room	Pilot study	Not specified Nursing students and individuals familiar with gaming		✓	Digital, online A virtual reality -based escape room that integrates interactive puzzles to evoke emotions, utilizing VR technology for an immersive experience.	Exploring emotionally charged scenarios	Not specified	Questionnaires to assess emotional responses and user experience.	The results focused on demonstrating the potential of virtual reality technology and the Escape Room genre as effective tools for eliciting emotions,	Not mentioned
E55	United States	Powers et al. (2023)		To explore nursing students' experiences with a home health escape room and assess how the activity impacted their learning, particularly preparing them for community-based care.	Mixed methods single group pre-post design	16 Nursing students		✓	Physical, in-person Home health care, focusing on common issues such as fall risks, food insecurity, and medication management in a home setting.	Home health care	30 minutes	Focus group discussions	Themes identified from the focus groups indicated that the escape room was effective in enhancing understanding of home health care, promoting teamwork, and applying classroom knowledge to practical settings.	A small sample size, potential response bias,
E56	United States	Reed and Ferdig, (2021)		To explore the effects of a medical-surgical escape room game on nursing students' anxiety levels	Quasi-experimental study with a pre/post-test	14 nursing students.		✓	Physical, in-person A medical-surgical simulation designed to orient students to nursing tools and equipment through game mechanics integrated with learning objectives.	Medical-surgical nursing	Not specified	State Trait Anxiety Inventory (STAI) for measuring anxiety and the EGameFlow scale for assessing game enjoyment	The study found a significant decrease in students' anxiety levels post-intervention (p = .013) and high levels of game enjoyment.	Novelty of the escape room which could influence anxiety measurements
E57	Spain	Rodriguez-Ferrer et al. (2022)		To evaluate the impact of a web-based escape room on raising	Quasi-experimental study with a pré/post-test	306 First year nursing students		✓	Digital, online Used a narrative-driven format to facilitate empathy	Awareness about severe mental illness	60 minutes	Attributional Style Questionnaire and	There was a significant reduction in stigmatizing	To determine whether the changes achieved in the

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E58	Spain	Roman et al. (2019)		awareness of severe mental illness among university students in healthcare To explore final year nursing students' perceptions and experiences using an Escape Room as an evaluation method during an Objective Structured Clinical Examination (OSCE).	with control group Qualitative study	95 nursing students		✓	and understanding of severe mental illness, delivered through a web-based platform. Physical, in-person Themed around practical nursing skills related to patient care, creating a scenario where students had to apply their clinical knowledge in a simulated environment.	Objective Structured Clinical Examination (OSCE).	Not specified	a motivation questionnaire Focus group discussions	attitudes towards severe mental illness in the experimental group compared to the control group The three main themes, which were mapped to the conceptual framework, were student learning outcomes, emotional impact on students and conclusions on the serious games experience.	experimental group could be perpetuated over time. Would have been interesting to explore the assessors' own perceptions
E59	United States	Sarage et al. (2021)		To enhance teamwork and medication safety behaviors among nursing students using an escape room simulation.	Pilot study	95 nursing students		✓	Physical, in-person Used a combination of puzzles, riddles, clues, and lifelines to enhance learning about medication safety.	Medication safety	30 minutes	Quality and Safety Education for Nurses (QSEN) competencies for evaluation, along with Promoting Excellence and Reflective Learning in Simulation (PEARLS) for debriefing.	Positive student response was noted, indicating enhanced understanding and engagement	Not mentioned
E60	United States	Scott et al. (2023)		To implement a virtual escape room as an innovative teaching strategy in the didactic setting to increase student engagement, foster teamwork, and help students apply knowledge in practice.	Pilot study	73 nursing students		✓	Digital, online Use of a virtual escape room built with PowerPoint featuring multiple navigation options and multiple-choice questions based on unfolding case studies.	medical-surgical nursing	75 minutes	Electronic survey	97–99 % of participants reported increased confidence in their knowledge, greater engagement in the game with teammates, and improved ability to apply knowledge in practice. 91 % preferred the virtual escape room format over traditional lecture review.	Some student responses indicated that the pace of the activity was too fast and the environment was too noisy.
E61	United States	Seymour et al. (2023)		To enhance trauma care knowledge and	Pilot study	153 Nurses(n = 100), Emergency	✓		Physical, in-person High-fidelity	Trauma care	45 minutes	Scale survey to assess knowledge acquisition, skill	High levels of agreement (94–98 %) from	Some teams focused more on beating the time

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
				processes among emergency department staff at non-designated trauma centers by providing a creative and engaging learning opportunity through an escape room format		Department technicians (n = 25), and respiratory therapists (n = 28)			mannequins and real-time monitoring and interaction tools.			competency, teamwork, and confidence.	participants on improved knowledge, confidence, communication, and teamwork.	rather than thoroughly following the Trauma Nursing Process, suggesting a potential distraction from learning objectives
E62	United States	Shustack, (2023)		To explore the experiences and perceptions of students learning about Social Determinants of Health (SDOH) through the use of a digital escape room	Descriptive Study	35 Nursing students		✓	Digital, online Utilized Google Sites™, Google Docs™, Google Forms™, and online resources to create an immersive and interactive digital environment.	Social Determinants of Health (SDOH)	35 minutes	Post-activity online survey to assess students' experiences and perceptions	Survey results indicated high student satisfaction, with average scores on various aspects of learning and engagement ranging from 4.56 to 4.94 out of 5.	Absence of a prior assessment of students' knowledge
E63	United States	Smith and Davis (2021)		To create a virtual pharmacology escape room for pre-licensure nursing students	Pilot study	90 Nursing students		✓	Digital, online Utilized Google Forms and embedded YouTube videos for interactive and multimedia content.	Pharmacology	Not specified	Survey assessing the impact on learning and satisfaction	Positive feedback from students indicating that the virtual escape room was helpful for learning and reviewing pharmacology	Rapid transition to online formats, which may affect the depth and engagement compared to in-person activities.
E64	United States	Smith and Paul (2021)		To utilize the Escape Room as a clinical make-up activity to promote content retention and enhance clinical thinking and judgment among nursing students.	Pilot study	10 Nursing students.		✓	Physical, in-person Utilized puzzles, cryptograms, and scenario-based tasks without specific mention of advanced technological tools about diabetic ketoacidosis, aspiration pneumonia, and wound dehiscence.	Medical scenarios	60 minute	Survey using a Likert-scale tool designed by the authors,	Positive feedback from students regarding the effectiveness of the Escape Room in enhancing content retention and clinical judgment.	Small sample size
E65	Brazil	Soares, et al. (2023)		To describe a learning experience based on interactive escape room activities designed to engage and train nursing and physician teams	Observational study	Not specified Nurses, physicians, and medical residents		✓	Physical, in-person Utilized real-world surgical equipment and settings to simulate actual surgical procedures.	Safe surgery practices	Not specified	Observational data and participatory feedback	Promising results were observed, indicating potential benefits in using the Escape Room for educational purposes in the hospital setting.	Not mentioned

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E66	Stoller et al. (2022)	United States		on the practice of safe surgery. To design an escape room as an active learning experience for geriatric resource nurses, focusing on delirium education	Quasi-experimental study with a pré/post-test	21 nurses	✓		Physical, in-person Utilized physical props and clinical equipment to simulate real-world clinical settings.	Delirium management in geriatric patients.	30 minutes	Participant feedback and survey about knowledge	Pre-test and post-test scores related to delirium knowledge showed a 31.9 % improvement.	Not mentioned
E67	Valdes et al. (2021)	United States		To evaluate the effectiveness of an escape room simulation in improving communication, leadership, and teamwork skills among nursing students.	Quasi-experimental study with a pré/post-test	10 Nursing students		✓	Physical, in-person Included various puzzles, riddles, locked boxes, and teamwork challenges that required critical thinking and collaboration.	Sherlock Holmes, for teamwork, communication, and leadership.	60 minutes	Pre and post assessments using the TeamSTEPPS® Teamwork Attitudes Questionnaire, feedback through self-reflective questions	Statistically significant improvements in observed teamwork and leadership skills (pre-mean: 18.5, post-mean: 35.0, $p < .001$)	Small sample size
E68	Vázquez-Calatayud,et al. (2024)	Spain		To assess the impact of case-based learning and escape room activities on decision-making skills in postgraduate nursing students across academic and clinical environments.	Descriptive study	66 Nurses	✓		Physical, in-person Participants were divided into groups and placed in separate rooms, each containing various puzzles and riddles related to the course content.	Real-world clinical scenarios and ethical dilemmas	120 minutes	An ad hoc online questionnaire was used to assess participants' perceptions of the activities and their academic scores in postgraduate studies.	Positive responses on questionnaires indicated high enthusiasm and perceived effectiveness of the activities.	Which is non-experimental and non-randomised,
E69	Vladinov and Foronda, (2024)	United States		To assess the feasibility and acceptability of using virtual escape rooms through augmented reality and virtual reality to introduce novice anesthesia nurses learners to anesthesia equipment.	Descriptive study	87 student registered nurse anesthetists.	✓		Digital, online Used augmented reality and virtual reality headsets and hand controllers for interaction within the virtual environment.	Anesthesia equipment and procedures	20 minutes	Surveys were used to assess the user-friendliness, effectiveness, and acceptability	In the augmented reality group, 98 % found it user-friendly and 84 % found it effective for learning anesthesia equipment. In the virtual reality group, 95 % found it user-friendly and 98 % said it helped them understand the equipment.	Small sample size, due to the single-site,
E70	Willis, et al. (2024)	Australia		To evaluate how advanced clinicians, specifically intensive care outreach nurses,	Mixed methods single group pre-post design	12 nurses.	✓		Physical, in-person Utilized physical props like letter locks, directional locks, decoder	Crisis resource management	30 minutes	Post-escape room online survey and focus group discussions	67 % of participants found the escape room fun, and 75 % expressed a desire to participate in	Small sample size

(continued on next page)

Table 1 (continued)

iiId	Authors	Country	Year	Aim	Method	Participants N	Nurses	Nursing Students	Type of escape room	Escape Room Theme	Time	Instruments	Resultts	Limitation
E71	United States	Wynn, (2020)		experience an escape room scenario designed to consolidate crisis resource management The article aims to enhance students' clinical reasoning and prepare them to provide effective care for patients experiencing Acute Kidney Injury by using an escape room	Pilot study	24 Nursing students.		✓	wheels, and clinical simulation tools to create a realistic and interactive environment. Physical, in-person Simulation with ICU equipment and environment, including mannequins and access to simulated electronic health record platforms.	Acute Kidney Injury	30 minutes	Pre-test and post-test assessments, and debriefing	The mean pre-test score was 73.5 %, which increased to 86 % on the post-test.	The amount of time required for preparing the escape room and ensuring that learning objectives were met was considered a limitation.
E72	Taiwan	Yang et al. (2023)		To identify the efficiency of escape room activities in enhancing nursing students' retention of maternity-related knowledge and their overall learning performance	Quasi-experimental study with a pré/post-test with control group	42 Nursing students in total (21 in the experimental group and 21 in the control group).		✓	Digital, online The virtual platform included features such as timers, digital locks, and interactive prompts that guided students through the escape room experience, simulating the pressure and urgency of real clinical situations.	Maternity care and assessment	50 minutes	Pre-test and post-test questionnaires to assess learning achievements	The experimental group (mean rank = 30.36) showed significantly higher learning achievement compared to the control group (mean rank = 12.64), with U = 34.50, z = -4.81 (p < 0.001).	Not assess the motivation or perceived usefulness of the educators

outcomes of implementing escape rooms were highly evidenced by the authors across the 72 articles. From the analysis of the main results (Fig. 4), the feedback and satisfaction of the participants ($n = 42$), improvement in knowledge ($n = 25$), teamwork ($n = 18$), increased engagement and motivation of participants ($n = 15$), enhancement of specific skills ($n = 9$), as well as the enhancement of clinical judgment ($n = 6$) were highlighted.

4. Discussion

Recognizing the importance of this topic, our study sought to map and explore the literature on the use of escape rooms in nursing, examining their application in both academic training and professional practice, with the aim of identifying practical applications and highlighting gaps that may guide future research. It is worth noting in this study the comprehensive research and extensive documented literature reflected in the final sample of 72 articles.

4.1. Study characteristics and participant insights

Although we did not set any temporal limits, it is observed that their use has been documented since 2018. These data are comparable to applications of these resources in the training of other health professionals, with references starting in 2017 (He, et al., 2024; Quek et al., 2024; Hintze et al., 2023). It should be noted that the use of these resources began in 2007 in Japan, initially only linked to entertainment, which was later applied to the training of health professionals (Makri, Vlachopoulos, & Martina, 2022). Regardless of whether they are implemented in person, remotely, or through digital technologies, escape rooms are expected to grow in the coming years due to the popularity of gamification, which is attractive to Millennials and Generation Z (Quek et al., 2024; Guckian et al., 2020). The studies under review predominantly focus on the integration of escape rooms in the training of nursing students (66.66 %), mainly at the beginning of their academic training. The use of escape rooms in the formative process in these contexts is used to enable students to actively participate in problem-solving (Anguas-Gracia et al., 2021). Furthermore, the implementation of escape rooms in the education of health professionals demonstrates improvements in knowledge acquisition, clinical skill development, promotes critical thinking, teamwork, communication, leadership and increases student satisfaction, their engagement and the overall educational experience (Gómez-Urquiza, et al., 2019; Quek et al., 2024; Fraguas-Sánchez, et al., 2022; He et al., 2024; Hintze et al., 2023). In another scope, a significant proportion of the research, (23 studies), extends the application of escape rooms to nurses in clinical practice. The inclusion of qualified healthcare professionals in escape rooms reflects the recognition of their value in continuous training, improving clinical skills and teamwork (Anderson et al., 2021; Rodríguez-Ferrer et al., 2022; He et al., 2024). Perhaps for this reason, 11 of the studies conducted for the continuous training of nurses include other disciplinary groups. Escape rooms can improve the active application of teamwork, communication and cooperation (Anderson et al., 2021; Daniel et al., 2020; Ferns et al., 2024), which is fundamental in healthcare where coordinated care is essential for patient outcomes. Effective teamwork is crucial to provide safe and high-quality patient care, a goal that can be achieved with the implementation of escape rooms (Jaspers, et al., 2024). The broad interdisciplinary participation in some studies reflects a growing recognition of the potential of escape rooms to serve as a versatile educational strategy with an impact on health training, professional development, quality and safety of care. Completing an escape room activity requires participants to work as a team to find hidden clues and solve challenging puzzles to escape before time runs out, producing an environment conducive to teamwork and communication. (Brett Rocha and McMullen, 2024).

4.2. Attributes of escape rooms in nursing training

Regarding the characteristics of escape rooms, most were developed in a physical format ($n = 53$), using a variety of techniques and resources. Realistic health scenarios are used (Çelik et al., 2023; Ramalho et al., 2022; Pereira et al., 2023), employing diverse techniques to promote learning (Edwards et al., 2019; Ferns et al., 2024; McLaughlin et al., 2021). These may include high-fidelity mannequins and equipment to simulate clinical environments (Daniel, et al., 2021; Dunne et al., 2023), as well as puzzles and tasks that encourage critical thinking and collaboration (Adams, et al., 2018; Carmack, et al., 2022; Chabrier, et al., 2022). Timers and clues are also integrated into the activities to increase engagement and simulate the pressure of real-life situations (Garwood, 2020; Malatesta et al., 2024). Additionally, it is important to use facilitators who provide guidance and continuous assessments to support learning (Daniels, et al., 2022; Quek et al., 2024). The role of the facilitator in the escape room varies, but primarily involves guiding teams through the room, providing hints, ensuring compliance with the rules and offering knowledge as needed (Hintze et al., 2023).

Despite the higher frequency of results in physical support, there is a notable presence of escape rooms in digital formats ($n = 17$), justified in 12 of the studies by the COVID-19 pandemic (Kubin et al., 2021; Smith and Davis, 2021; Bonn et al., 2023; Jarvis and Tee, 2023; Antón-Solanas et al., 2022; Cunha et al., 2023). Digital escape rooms are increasingly used to support the training of health professions, across a wide range of cognitive, affective and psychomotor domains (Pornsakulpaisai, et al., 2023). Originally focused on challenging logic puzzles, digital escape rooms have evolved into fully immersive environments with high-quality props and effects, allowing participants to transition from real-life contexts to game contexts, becoming absorbed in a specific narrative or problem (Makri et al., 2021). In the studies analyzed, digital escape rooms use technologies such as Google Forms, Google Slides, Articulate 360 and platforms like ZOOM® and Gather to create interactive virtual environments, allowing the simulation of clinical challenges and the application of clinical judgment in fictional scenarios (Bonn et al., 2023; Cunha et al., 2023; Davenport and Irons, 2024; Oliveira et al., 2023; Smith and Davis, 2021).

4.3. Impacts of escape room interventions

The positive impact of the use of escape rooms by nurses and nursing students was substantially evidenced throughout the 72 studies. The predominant areas of influence include participant satisfaction (Adams, et al., 2018; Chabrier et al., 2022; Darby et al., 2020; Shustack, 2023; Vladinov and Foronda, 2024; Wynn, 2020; Yang et al., 2023), knowledge (Acebo-Seguín et al., 2024; Alejandre et al., 2022; Antón-Solanas et al., 2022; Bonn et al., 2023; Carmack, et al., 2022), teamwork (Bright and Ulmen, 2023; Stoller et al., 2022; Friedrich et al., 2019; Powers et al., 2022), participant engagement and motivation (Brown et al., 2019; Çelik et al., 2023; Gómez-Urquiza et al., 2019; Martínez-Galiano et al., 2024), development of specific skills (Daniel et al., 2021; Holland et al., 2023; Hebert, 2023; Jarvis and Tee., 2023) and enhancement of clinical judgment (Barner et al., 2023; Bonaduce, 2024; Davenport and Irons, 2024; Haley and Palmer., 2020). Results from other reviews on the use of escape rooms in health professional training show that the perceptions of participants were evaluated in most studies, with extremely positive assessments (Hintze et al., 2023; Quek et al., 2024; Jaspers, et al., 2024; He et al., 2024). Although participants' perceptions and satisfaction with an activity are important considerations, they should not be used as a substitute for learning or skill development (Hintze et al., 2023).

4.4. Escape room research and design

In this final phase of discussion, we address some concerns and challenges associated with the research and design of escape rooms.

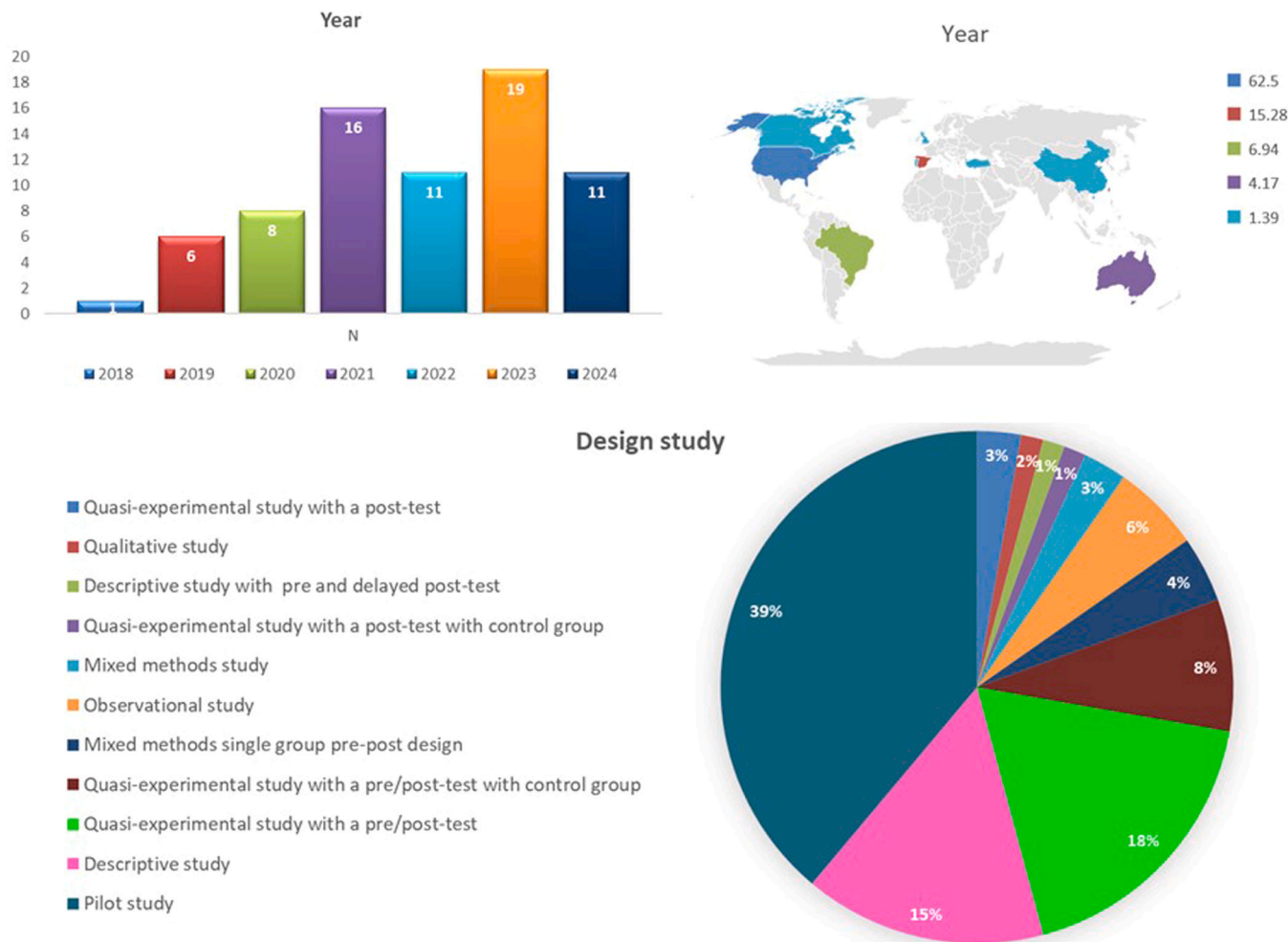


Fig. 2. Characteristics of the included studies.

Some authors of the studies reveal limitations related to methodological aspects of research, particularly study design (Friedrich et al., 2019; Martínez-Galiano et al., 2024; Shustack, 2023; Vázquez-Calatayud et al., 2024), sample type and size (Barner et al., 2023; Valdes et al., 2021; Smith and Davis, 2021; Haley and Palmer, 2020) and assessment tools (Cook and Camp-Spivey, 2022; Cunha, et al., 2023; Holland et al., 2023), among others (Rodríguez-Ferrer et al., 2022; Anguas-Gracia et al., 2021; Malatesta et al., 2024), which compromise the generalizability of the results. Indeed, as visible in Fig. 2, only 6 studies used a quasi-experimental design with pre/post-test and control group, although without reference to the process of randomization and random sample selection (Chen et al., 2023; Foltz-Ramos et al., 2021; Gutiérrez-Puertas et al., 2020; Rodríguez-Ferrer et al., 2022; Molina-Torres et al., 2022; Yang et al., 2023). It is crucial to conduct more rigorous research using a randomized controlled trial model to assess the effectiveness of escape rooms and their design features (Hintze et al., 2023). Moreover, further investigations should explore the long-term retention of knowledge and skills acquired (Quek et al., 2024; Rodríguez-Ferrer et al., 2022; Malatesta et al., 2024).

In the realm of methodological concerns, when developing interventions with escape rooms, it is crucial to carefully consider the evaluation instruments used. Often, there is a tendency to create ad hoc questionnaires which, although tailored to the specific context of the study, are not validated to ensure the consistency and reliability of results (Gómez-Urquiza et al., 2019; Gutiérrez-Puertas et al., 2020; Smith and Paul, 2021). Or the use of self-report instruments that rely on

participants' personal perception, which can introduce bias, where participants may respond in a way they believe to be socially acceptable or favorable (Valdes et al., 2021; Bonn et al., 2023; Silva et al., 2024; Daniels et al., 2022).

Furthermore, the design of escape rooms must be meticulously planned to ensure alignment between the challenges and educational objectives. The COMET Framework (Context, Objectives, Materials, Execution and Team Dynamics) is an example of a step-by-step approach to designing escape rooms for healthcare professionals, which can be a useful resource to ensure alignment between educational goals and activities (Dittman et al., 2022). In the conception and development of escape rooms, authors point out other difficulties, such as the time required for development, the resources demanded and the complexity involved (Davenport and Irons, 2024; Ramalho et al., 2022; Ferns et al., 2024; Iverson, et al., 2023; Jarvis and Tee, 2023). Other limitations related to the development of escape rooms, reported by the authors, include the need for briefing and debriefing with participants (Chabrier et al., 2022), the fact that escape rooms can only be performed by small groups of 4–6 members (Hsu et al., 2023), the possibility of conflicts arising among members due to leadership difficulties (Chen et al., 2023), not being able to ensure that all participants engage equally in the intervention (Antón-Solanas et al., 2022) and the need to mandatorily integrate facilitators (Roman et al., 2019). Despite the challenges presented, authors consider the use of escape rooms extremely beneficial, highlighting their potential for training nurses and nursing students. Indeed, the use of escape rooms has gained considerable

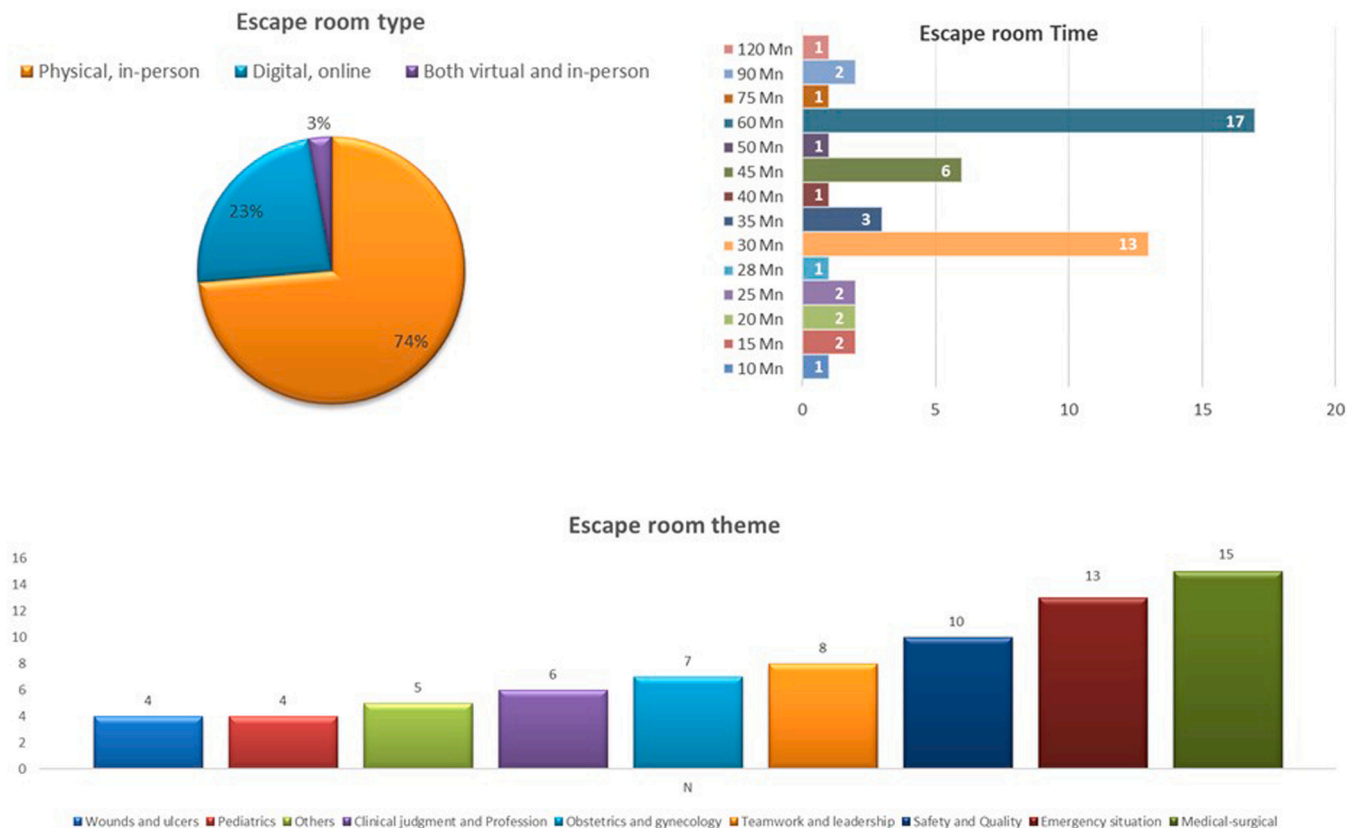


Fig. 3. Characteristics of Escape room.

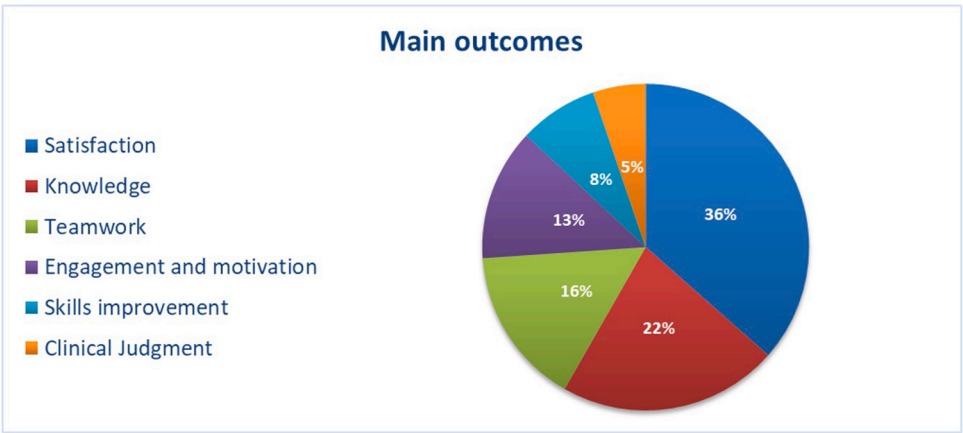


Fig. 4. Main Outcomes of Escape room.

expression in the training of healthcare professionals, where players, typically in teams of four to six, collaborate to solve puzzles using clues, hints and strategies to escape a room (Makri et al., 2021).

4.5. Limitations

Despite our efforts, this study has some limitations. Firstly, only articles in English, Portuguese and Spanish were included and it is possible that relevant articles in other languages may have been inadvertently excluded. On the other hand, some studies lacked a description of all research elements, limiting the data that could be extracted. For example, some studies did not include the characteristics and demographics of the samples used, such as educational level, previous experiences, number of participants, etc. Additionally, the lack of

methodologically robust studies limits the generalization of the results. Finally, some studies evaluated the use of escape rooms in multidisciplinary groups but did not relate the results by specific groups, which complicates the determination of the effectiveness of these interventions for populations in the study.

5. Conclusion

Throughout this comprehensive scoping review, it was possible to map the various practical applications reported on the use of escape rooms in nursing, not only among students but also in clinical application. The article highlights the emerging role of escape rooms as a useful, dynamic and interactive tool for nursing education, as well as their implications for participant satisfaction and engagement. It also notes

improvements in knowledge, teamwork, specific skill enhancement and the refinement of clinical judgment.

Healthcare and educational institutions should consider integrating escape room activities into their training plans. Future studies should aim to employ more robust methodological approaches, such as clinical trials. Finally, this review offers educators and researchers reflections and future guidance to work towards successful integration of escape rooms in nursing education.

Funding

The authors received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors for this research. This research received no external funding.

CRediT authorship contribution statement

Funghetto Silvana Schwerz: Investigation, Methodology, Validation, Writing – review & editing. **Stival Marina Morato:** Conceptualization, Methodology, Writing – review & editing. **Ferreira Maria Salomé:** Conceptualization, Data curation, Formal analysis,

Investigation, Methodology, Writing – review & editing. **Lima Andreia:** Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. **Moreira Teresa:** Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Fernandes Carla:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

Not applicable.

Informed Consent Statement

Not applicable.

Appendix I. Search strategy

Medline

((MH "Nurses") OR (MH "Students, Nursing") OR (MH "Nursing, Practical") OR (MH "Nursing Care") OR (MH "Education, Nursing") OR (MH "Nursing Education Research") OR (MH "Nursing") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

CINAHL

((MM "Registered Nurses") OR (MH "Nurses") OR (MH "Students, Nursing") OR (MH "Practical Nursing") OR (MH "Nursing Care") OR (MH "Education, Nursing") OR (MH "Registered Nursing Practice") OR (MH "Nursing Knowledge") OR (MH "Nurse Educators") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

SCOPUS

((("Registered Nurses") OR ("Nurses") OR ("Students Nursing") OR ("Practical Nursing") OR ("Nursing Care") OR ("Education Nursing") OR ("Registered Nursing Practice") OR ("Nursing Knowledge") OR ("Nurse Educators") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

Psychology and Behavioral Sciences Collection

((DE "NURSE training") OR (DE "NURSES") OR (DE "NURSING") OR (DE "NURSE educators") OR (DE "NURSE practitioners") OR ("Nurs*") OR ("Nursing")) AND (("DE "ESCAPE rooms") OR ("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

Academic Search Complete

((DE "NURSE training") OR (DE "NURSES") OR (DE "NURSING") OR (DE "NURSE educators") OR (DE "NURSE practitioners") OR ("Nurs*") OR ("Nursing")) AND (("DE "ESCAPE rooms") OR ("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

MedicLatina

((("Registered Nurses") OR ("Nurses") OR ("Students Nursing") OR ("Practical Nursing") OR ("Nursing Care") OR ("Education Nursing") OR ("Registered Nursing Practice") OR ("Nursing Knowledge") OR ("Nurse Educators") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

Teacher Reference Center

((("Registered Nurses") OR ("Nurses") OR ("Students Nursing") OR ("Practical Nursing") OR ("Nursing Care") OR ("Education Nursing") OR ("Registered Nursing Practice") OR ("Nursing Knowledge") OR ("Nurse Educators") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

Scielo

((("Registered Nurses") OR ("Nurses") OR ("Students Nursing") OR ("Practical Nursing") OR ("Nursing Care") OR ("Education Nursing") OR ("Registered Nursing Practice") OR ("Nursing Knowledge") OR ("Nurse Educators") OR ("Nurs*") OR ("Nursing")) AND (("escape game") OR ("serious escape game") OR ("breakout box") OR ("breakout game") OR ("exit game") OR ("puzzle room") OR ("gaming room") OR ("escape room") OR ("adventure room") OR ("escape puzzle") OR ("escape box") OR ("quest room") OR ("riddle room")))

(continued on next page)

(continued)

Medline
game”) OR (“exit game”) OR (“puzzle room”) OR (“gaming room”) OR (“escape room”) OR (“adventure room”) OR (“escape puzzle”) OR (“escape box”) OR (“quest room”) OR (“riddle room”))
Cochrane
((“(((“Registered Nurses”) OR (“Nurses”) OR (“Students Nursing”) OR (“Practical Nursing”) OR (“Nursing Care”) OR (“Education Nursing”) OR (“Registered Nursing Practice”) OR (“Nursing Knowledge”) OR (“Nurse Educators”) OR (“Nurs”) OR (“Nursing”)) AND (“escape game”) OR (“serious escape game”) OR (“breakout box”) OR (“breakout game”) OR (“exit game”) OR (“puzzle room”) OR (“gaming room”) OR (“escape room”) OR (“adventure room”) OR (“escape puzzle”) OR (“escape box”) OR (“quest room”) OR (“riddle room”))

Data availability

Not applicable.

References

- Acebo-Seguín, C., Jiménez-Jiménez, S., Valdés-Castillo, A., Berenguer-Almudaina, M., Castillo-García, J., 2024. The effectiveness of the escape room as an educational methodology in the infarction code. *Enfermería Clin. (Engl. Ed.)* 34 (3), 187–193. <https://doi.org/10.1016/j.enfcl.2024.05.003>.
- Adams, V., Burger, S., Crawford, K., Setter, R., 2018. Can you escape? creating an escape room to facilitate active learning. *J. Nurses Prof. Dev.* 34 (2), E1–E5. <https://doi.org/10.1097/NND.0000000000000433>.
- Alejandre, C., Corniero, P., Claret, G., Alaez, C., Esteban, E., Jordan, I., 2022. New resident training strategy based on gamification techniques: an escape room on sepsis in children, 1503–N.PAG Children 9 (10). <https://doi.org/10.3390/children9101503>.
- Anderson, M., Lioce, L., M. Robertson, J., O. Lopreiato, J., A. Díaz, D., 2021. Toward defining healthcare simulation escape rooms. *Simul. Gaming* 52 (1), 7–17. <https://doi.org/10.1177/1046878120958745>.
- Anguas-Gracia, A., Subirón-Valera, A.B., Antón-Solanas, I., Rodríguez-Roca, B., Satústegui-Dordá, P.J., Urcola-Pardo, F., 2021. An evaluation of undergraduate student nurses' gameful experience while playing an escape room game as part of a community health nursing course. *Nurse Educ. Today* 103, 104948. <https://doi.org/10.1016/j.nedt.2021.104948>.
- Antón-Solanas, I., Rodríguez-Roca, B., Urcola-Pardo, F., Anguas-Gracia, A., Satústegui-Dordá, P.J., Echániz-Serrano, E., Subirón-Valera, A.B., 2022. An evaluation of undergraduate student nurses' gameful experience whilst playing a digital escape room as part of a FIRST year module: a cross-sectional study (N.PAG). *Nurse Educ. Today* 118. <https://doi.org/10.1016/j.nedt.2022.105527>.
- Barker, N., Kaulback, M., Yocom, D., 2020. Fluid and electrolyte escape room. *J. Nurs. Educ.* 59 (5), 298. <https://doi.org/10.3928/01484834-20200422-14>.
- Barner, J., Beer, R., Edwards, T., 2023. Exploring the impact of escape rooms on clinical judgment to improve patient outcomes: a quality improvement project. *Teach. Learn. Nurs.* 18 (2), 304–307. <https://doi.org/10.1016/j.teln.2022.12.006>.
- Bonaduce, S., 2024. Escaping traditional instruction: the use of escape room simulation to enhance nursing students' clinical judgment skills. *Teach. Learn. Nurs.* 19 (2), e427–e431. <https://doi.org/10.1016/j.teln.2024.01.008>.
- Bonn, J., Mulkey, D., Goers, J., 2023. Using gamification to engage clinical nurses in quality improvement. *J. Nurses Prof. Dev.* 39 (5), E148–E153. <https://doi.org/10.1097/NND.0000000000000898>.
- Brett Rocha, McMullen, 2024. Mechanics escape room: escaping the monotony of solving problems. *J. Civ. Eng. Educ.* 150 (3). <https://doi.org/10.1061/JCECD.EIENG-2032>.
- Bright, E., Ulmen, B., 2023. Escaping lecture: does delivery method of an escape room matter? *Nurse Educ.* 48 (6), 343–344. <https://doi.org/10.1097/NNE.00000000000001444>.
- Brown, N., Darby, W., Coronel, H., 2019. An escape room as a simulation teaching strategy. *Clin. Simul. Nurs.* 30, 1–6. <https://doi.org/10.1016/j.ecns.2019.02.002>.
- Carmack, J., Jochum, J., Moore, E.S., Toon, J., 2022. Interprofessional diabetes escape room with nursing and athletic training students. *J. Interprof. Educ. Pract.* 27, 100498. <https://doi.org/10.1016/j.xjep.2022.100498>.
- Çelik, G.K., Çalhan, K., Ertural, F., Odabaşı, G., 2023. The impact of using the wound care escape room as a teaching game on the opinions and motivation of nursing students. *J. Educ. Res. Nurs. / Hem. şirelikte Eğitim ve Araştırma Derg.* 20 (4), 318–322. <https://doi.org/10.14744/jern.2022.22378>.
- Chabrier, A., Difabrizio, A., Parisien, G., Atkinson, S., Bussièrès, J.-F., 2022. Design and development of an escape game as a knowledge transfer tool in preparation for an accreditation visit in a health care facility. *Can. J. Hosp. Pharm. / J. Can. De. La Pharm. Hosp.* 75 (4), 251–258. <https://doi.org/10.4212/cjhp.3163>.
- Chen, D., Liu, F., Zhu, C., Tai, C., Zhang, Y., Wang, X., 2023. The effect of an escape room game on college nursing students' learning attitude and game flow experiences in teaching safe medication care for the elderly: an intervention educational study. *BMC Med. Educ.* 23 (1), 945. <https://doi.org/10.1186/s12909-023-04961-3>.
- Cook, T.C., Camp-Spivey, L.J., 2022. Innovative teaching strategies using simulation for pediatric nursing clinical education during the pandemic: a case study. *Acad. Med.* 97 (ement 3), S23–S27. <https://doi.org/10.1097/ACM.00000000000004538>.
- Cunha, M.L.R., Dellé, H., Bergamasco, E.C., Rocha e Silva, T.A.A., 2023. Nursing students' opinion on the use of Escape ZOOM® as a learning strategy: observational study. *Teach. Learn. Nurs.* 18 (1), 91–97. <https://doi.org/10.1016/j.teln.2022.09.005>.
- Daniel, L., Valko, J., McAtee, T.J., N-Wilfong, D., 2021. Using an escape room modality to teach mock code essentials. *J. Contin. Educ. Nurs.* 52 (3), 118–122. <https://doi.org/10.3928/00220124-20210216-05>.
- Daniels, D.A., Caruso, S., Morrell, B., Eukel, H.N., 2022. The safety showdown: perceptions and practice change of inpatient caregivers after a patient safety escape room. *J. Nurses Prof. Dev.* 39 (3), 136–142. <https://doi.org/10.1097/NND.0000000000000888>.
- Darby, W., Bergeron, P., Brown, N., DeFoor, M., Jones, B., 2021. Escape room relay race: “go for the gold” in formative assessment. *J. Nurs. Educ.* 59 (11), 646–650. <https://doi.org/10.3928/01484834-20201020-09>.
- Davenport, N., Irons, A.-M., 2024. Virtual escape rooms: method of preparation for the next generation NCLEX. *Teach. Learn. Nurs.* 19, e59–e63. <https://doi.org/10.1016/j.teln.2023.08.021>.
- Dittman, J.M., Amendola, M.F., Ramraj, R., Haynes, S., Lange, P., 2022. The COMET framework: a novel approach to design an escape room workshop for interprofessional objectives. *J. Interprof. Care* 36 (1), 161–164. <https://doi.org/10.1080/13561820.2020.1870442>.
- Dunne, B.M., 2023. Cesarean section escape room for a perinatal nurse residency program. *J. Nurses Prof. Dev.* 39 (6), E176–E179. <https://doi.org/10.1097/NND.0000000000000948>.
- Edwards, T., Boothby, J., Succeralli, L., 2019. Escape Room: Using an Innovative Teaching Strategy for Nursing Students Enrolled in a Maternity Clinical Course. *Teach. Learn. Nurs.* 14 (3), 251–253. <https://doi.org/10.1016/j.teln.2019.05.001>.
- Eukel, H., Morrell, B., 2020. Ensuring educational escape-room success: the process of designing, piloting, evaluating, redesigning and re-evaluating educational escape rooms. *Simul. Gaming* 1. <https://doi.org/10.1177/1046878120953453>.
- Eukel, H.N., Frenzel, J.E., Cernusca, D., 2017. Educational gaming for pharmacy students—design and evaluation of a diabetes-themed escape room. *Am. J. Pharm. Educ.* 81, 6265.
- Fernandes, C.S., Angelo, M., Martins, M.M., 2018. Giving voice to caregivers: a game for family caregivers of dependent individuals. *Rev. da Esc. De. Enferm. da U S P* 52, e03309. <https://doi.org/10.1590/S1980-220X2017013903309>.
- Fernandes, C.S., Lourenço, M., Vale, B., 2021. Patient card games in palliative care: integrative review. *bmjopen-2021-003300*. Advance online publication BMJ Support. Palliat. care. <https://doi.org/10.1136/bmjopen-2021-003300>.
- Ferns, J., Hawkins, N., Little, A., Hamiduzzaman, M., 2024. The escape room experience: exploring new ways to deliver interprofessional education. *Innov. Educ. Teach. Int.* 61 (3), 516–527. <https://doi.org/10.1080/14703297.2022.2158900>.
- Foltz-Ramos, K., Fusco, N.M., Paige, J.B., 2021. Saving patient x: a quasi-experimental study of teamwork and performance in simulation following an interprofessional escape room. *J. Interprof. Care*. <https://doi.org/10.1080/13561820.2021.1874316>.
- Fraguas-Sánchez, A.I., Serrano, D.R., González-Burgos, E., 2022. Gamification tools in higher education: creation and implementation of an escape room methodology in the pharmacy classroom. *Educ. Sci.* 12 (833). <https://doi.org/10.3390/educsci12110833>.
- Frederick, A.N., Reed, J.A., 2021. Operation outbreak: a periop 101 exam review escape room. *Simul. Gaming* 52 (1), 88–95. <https://doi.org/10.1177/1046878120948922>.
- Friedrich, C., Teaford, H., Taubenheim, A., Boland, P., Sick, B., 2019. Escaping the professional silo: an escape room implemented in an interprofessional education curriculum. *J. Interprof. Care* 33 (5), 573–575. <https://doi.org/10.1080/13561820.2018.1538941>.
- Frost, K., North, F., Smith, K., 2020. Interprofessional Simulation to Improve the Understanding of Obstetric Sepsis. *J. Nurses Prof. Dev.* 36 (6), E18–E26. <https://doi.org/10.1097/NND.0000000000000679>.
- Garwood, J., 2020. Escape to learn! An innovative approach to engage students in learning. *J. Nurs. Educ.* 59 (5), 278–282. <https://doi.org/10.3928/01484834-20200422-08>.
- Gates, J.A., Youngberg-Campos, M., 2020. Will you escape? validating practice while fostering engagement through an escape room. *J. Nurses Prof. Dev.* 36 (5), 271–276. <https://doi.org/10.1097/NND.0000000000000653>.
- Gomez-Urquiza, J.L., Gomez-Salgado, J., Albendin-Garcia, L., Correa-Rodriguez, M., Gonzalez-Jimenez, E., Cañadas-De la Fuente, G.A., 2019. The impact on nursing students' opinions and motivation of using a “nursing escape room” as a teaching game: a descriptive study. *Nurs. Educ. Today* 72, 73–76. <https://doi.org/10.1016/j.nedt.2018.10.018>.

- Gómez-Urquiza, J.L., Gómez-Salgado, J., Albendín-García, L., Correa-Rodríguez, M., González-Jiménez, E., Cañadas-De la Fuente, G.A., 2019. The impact on nursing students' opinions and motivation of using a "Nursing Escape Room" as a teaching game: a descriptive study. *Nurse Educ. Today* 72, 73–76. <https://doi.org/10.1016/j.nedt.2018.10.018>.
- Guckian, J., Evesson, L., May, H., 2020. The great escape? The rise of the escape room in medical education. *Future Healthc. J.* 7 (2), 112. <https://doi.org/10.7861/ghj.2020-0032>.
- Gutiérrez-Puertas, L., Márquez-Hernández, V.V., Román-López, P., Rodríguez-Arrastia, M.J., Ropero-Padilla, C., Molina-Torres, G., 2020. Escape rooms as a clinical evaluation method for nursing students. *Clin. Simul. Nurs.* 49, 73–80. <https://doi.org/10.1016/j.ecns.2020.05.010>.
- Hadenfeldt, C.J., Naylor, H.M., Aufdenkamp, M.A., 2021. Escape the pharmacy: an active learning strategy for the nursing pharmacology classroom. *Nurs. Educ. Perspect.* 42 (6), E161–E162. <https://doi.org/10.1097/01.NEP.0000000000000742>.
- Haley, B., Palmer, J., 2020. Escape tasks: An innovative approach in nursing education. *J. Nurs. Educ.* 59 (11), 655–657. <https://doi.org/10.3928/01484834-20201020-11>.
- He, Y., Chen, X., Ma, H., Zhao, R., Zhou, H., Yang, Y., 2024. Effectiveness of escape room in medical education: a systematic review and meta-analysis. *Games Health J.* <https://doi.org/10.1089/g4h.2023.0070>.
- Hebert, D., 2023. Implementation of educational escape rooms in a nurse practitioner doctoral curriculum. *J. Prof. Nurs.* 45 (1), 8–13. <https://doi.org/10.1016/j.profnurs.2023.01.001>.
- Hintze, T.D., Samuel, N., Braaten, B., 2023. A systematic review of escape room gaming in pharmacy education. *Am. J. Pharm. Educ.* 87 (5), 100048. <https://doi.org/10.1016/j.ajpe.2022.09.007>.
- Holland, T., Kuhnly, J.E., McKelvey, M., Prast, J., Walter, L., 2023. Evaluation of a postpartum hemorrhage escape room: a multisite study. *Simul. Gaming* 54 (3), 252–275. <https://doi.org/10.1177/10468781231166016>.
- Hsiao, C.-C., Huang, C.-Y., Lai, F.-C., Chen, T.-L., Cheng, S.-F., 2024. Development and evaluation of an immersive cinematic escape room for disaster preparedness and self-efficacy among nurses. *Clin. Simul. Nurs.* 91, 101541. <https://doi.org/10.1016/j.ecns.2024.101541>.
- Hsu, H.-J., Chou, Y.-T., Wu, H.-C., Jen, H.-J., Shen, C.-H., Lin, C.-J., Chen, R., 2023. An online escape room-based lesson plan to teach new nurses violence de-escalation skills. *Nurse Educ. Today* 123, 105752. <https://doi.org/10.1016/j.nedt.2023.105752>.
- Iverson, L., Jizba, T., Manning, L., 2023. Beat the clock! implementation and evaluation of an escape room. *J. Nurse Pract.* 19 (2023), 104523. <https://doi.org/10.1016/j.nurpra.2022.12.007>.
- Jarvis, S., Tee, D., 2023. Creating an escape-room experience for student nurses. *Nurs. [Online]* 119 (4) (Retrieved from). (www.nursingtimes.net).
- Jaspers, G.J., Borsci, S., van der Hoeven, J.G., Kuijer-Siebelink, W., Lemson, J., 2024. Escape room design in training crew resource management in acute care: a scoping review. *BMC Med. Educ.* 24 (1), 819. <https://doi.org/10.1186/s12909-024-05753-z>.
- Kubin, L., 2020. Using an escape activity in the classroom to enhance nursing student learning. *Clin. Simul. Nurs.* 47, 52–56. <https://doi.org/10.1016/j.ecns.2020.07.007>.
- Kubin, L., Fogg, N., Trinka, M., 2021. Transitioning child health clinical content from direct care to online instruction. *J. Nurs. Educ.* 60 (3), 177–179. <https://doi.org/10.3928/01484834-20210222-11>.
- Lyman, K., 2022. Implementation of a virtual escape room mock code to comply with social distancing. *Nurse Educ. Today* 110, 105273. <https://doi.org/10.1016/j.nedt.2022.105273>.
- Makri, A., Vlachopoulos, D., Martina, R.A., 2021. Digital escape rooms as innovative pedagogical tools in education: a systematic literature review. *Sustainability* 13 (8), 4587. <https://doi.org/10.3390/su13084587>.
- Malatesta, T., Hebert, D., Cornine, A., Amoah, R., 2024. Evaluating nursing students' outcomes in an educational escape room: escape a night of rapids! *Teach. Learn. Nurs.* 19 (1), 34–38. <https://doi.org/10.1016/j.teln.2023.08.012>.
- Martínez-Galiano, J.M., González-Cabrera, M., Rodríguez-Almagro, J., Hernández-Martínez, A., 2024. Evaluation of knowledge and competencies in sexual and reproductive health care using an escape room with scenario simulations. *Nurs. Rep.* 14 (2), 683–694. <https://doi.org/10.3390/nursrep14020052>.
- McLaughlin, J.L., Reed, J.A., Shiveley, J., Lee, S., 2021. Escape room blueprint: central orientation contagion crisis. *Simul. Gaming* 52 (1), 24–30. <https://doi.org/10.1177/1046878120954493>.
- Millsaps, E.R., Swihart, A.K., Lemar, H.B., 2022. Time is brain: Utilizing escape rooms as an alternative educational assignment in undergraduate nursing education. *Teach. Learn. Nurs.* 17 (4), 323–327. <https://doi.org/10.1016/j.teln.2022.01.013>.
- Molina-Torres, G., Cardona, D., Requena, M., Rodríguez-Arrastia, M., Roman, P., Ropero-Padilla, C., 2022. The impact of using an "anatomy escape room" on nursing students: a comparative study. *Nurse Educ. Today* 109, 105205. <https://doi.org/10.1016/j.nedt.2021.105205>.
- Moore, L., Campbell, N., 2021. Effectiveness of an escape room for undergraduate interprofessional learning: a mixed methods single group pre-post evaluation. *BMC Med. Educ.* 21 (220). <https://doi.org/10.1186/s12909-021-02666-z>.
- Morrell, B., Eukel, H.N., 2021. Shocking escape: a cardiac escape room for undergraduate nursing students. *Simul. Gaming* 52 (1), 72–78. <https://doi.org/10.1177/1046878120958734>.
- Nicholson, S., 2018. Creating engaging escape rooms for the classroom. *Child. Educ.* 94 (1), 44–49. <https://doi.org/10.1080/00094056.2018.1420363>.
- Oliveira, I., Carvalho, V., Soares, F., Novais, P., Oliveira, E., Gomes, L., 2023. Development of a virtual reality escape room game for emotion elicitation. *Information* 14 (514), 1–33. <https://doi.org/10.3390/info14090514>.
- Page, M.J., Moher, D., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., et al., 2021. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *BMJ* 372, n160. <https://doi.org/10.1136/bmj.n160>.
- Pereira, I. de S., Feitosa, Y.S., de Oliveira, T.M., Alencar, L.M., Nicodemos, R.L., Gonçalves, N.D., Feitosa, M.E.E., 2023. Escape room for prevention of pressure injury in ICU: experience report. *Rev. Enferm. Atual. Derme* 97 (3), e023139. <https://doi.org/10.31011/read-2023-v.97-n.3-art.1868>.
- Peters, M.D.J., Godfrey, C., McInerney, P., Munn, Z., Tricco, A.C., Khalil, H., Scoping Reviews, 2020–2024. In: Aromataris, E., Lockwood, C., Porritt, K., Pilla, B., Jordan, Z. (Eds.), *JBIM Manual for Evidence Synthesis*. JBI. <https://doi.org/10.46658/JBIMES-24-09>.
- Pornsakulpaisal, R., Ahmed, Z., Bok, H., de Carvalho Filho, M.A., Goka, S., Li, L., Patki, A., Salari, S., Sooknarine, V., Yap, S.W., Moffett, J., 2023. Building digital escape rooms for learning: from theory to practice. *Clin. Teach.* 20 (2), 1–6. <https://doi.org/10.1111/tct.13559>.
- Powers, K., Brandon, J., Townsend-Chambers, C., 2022. Preparing nursing students for home health using an escape room: a qualitative study. *Nurse Educ. Today* 108, 105215. <https://doi.org/10.1016/j.nedt.2021.105215>.
- Quek, L.H., Tan, A.J.Q., Sim, M.J.J., Ignacio, J., Harder, N., Lamb, A., Chua, W.L., Lau, S. T., Liaw, S.Y., 2024. Educational escape rooms for healthcare students: a systematic review. *Nurse Educ. Today* 132, 106004. <https://doi.org/10.1016/j.nedt.2023.106004>.
- Ramallo, A.O., Camargo, J.D., Mazócoli, E., Barbosa, C.M.R., Prado, N.R.O., Marin, A., 2022. Escape room as a sensitization and education strategy about pressure injury prevention. *ESTIMA, Braz. J. Enteros. Ther.* 20, e2022. <https://doi.org/10.30886/estima.v20.1211.IN>.
- Reed, J.M., Ferdig, R.E., 2021. Gaming and anxiety in the nursing simulation lab: a pilot study of an escape room. *J. Prof. Nurs.* 37 (3), 298–305. <https://doi.org/10.1016/j.profnurs.2021.01.006>.
- Rodríguez-Ferrer, J.M., Manzano-León, A., Cangas, A.J., Aguilar-Parra, J.M., 2022. A web-based escape room to raise awareness about severe mental illness among university students: randomized controlled trial. *JMIR Serious Games* 10 (2), e34222. <https://doi.org/10.2196/34222>.
- Rodríguez-Ferrer, J.M., Manzano-León, A., Fernández-Jiménez, C., Aguilar-Parra, J.M., Cangas, A.J., Luque de la Rosa, A., 2022. The use of digital escape rooms in nursing education. *BMC Med. Educ.* 22 (1), 901. <https://doi.org/10.1186/s12909-022-03879-6>.
- Roman, P., Rodríguez-Arrastia, M., Molina-Torres, G., Márquez-Hernández, V.V., Gutiérrez-Puertas, L., Ropero-Padilla, C., 2019. The escape room as evaluation method: a qualitative study of nursing students' experiences. *Med. Teach.* 41 (11), 1287–1293. <https://doi.org/10.1080/0142159X.2019.1687865>.
- Sarage, D., O'Neill, B.J., Eaton, C.M., 2021. There is no I in escape: using an escape room simulation to enhance teamwork and medication safety behaviors in nursing students. *Simul. Gaming* 52 (1), 40–53. <https://doi.org/10.1177/1046878120976706>.
- Scott, G., Bowers, T., Gibbs, S.P., Creed, J.M., Pate, L.B., 2023. Ready. Set. game: using nursing knowledge to escape the virtual room in the didactic setting. *Nurs. Educ. Perspect.* 00 (00), 1–2. <https://doi.org/10.1097/01.NEP.0000000000001162>.
- Seymour, A., Borggren, M., Baker, R., 2023. Escape the monotony: gamification enhances nursing education. *J. Emerg. Nurs.* 49 (6), 805–810. <https://doi.org/10.1016/j.jen.2023.06.004>.
- Shustack, L., 2023. Student experience and perceptions of learning social determinants of health using a digital escape room. *Teach. Learn. Nurs.* 18, e229–e232. <https://doi.org/10.1016/j.teln.2023.07.007>.
- Silva, M.L., Franco, F.F., Vieira, J.A., da Silva, J.F., Santos, G.C.S.D., Cunha, B.M., Vernal, S., 2024. Using active learning strategies during a quality improvement collaborative: exploring educational games to enhance learning among healthcare professionals. *BMJ Open Qual.* 13, e002427. <https://doi.org/10.1136/bmjopen-2023-002427>.
- Smith, M.M., Davis, R.G., 2021. Can you escape? The pharmacology review virtual escape room. *Simul. Gaming* 52 (1), 79–87. <https://doi.org/10.1177/1046878120966363>.
- Smith, V.R., Paul, P.A., 2021. Escape room: innovative teaching strategy to stimulate critical thinking/judgment in nursing students. *Nurs. Educ. Perspect.* 42 (6), 154–155. <https://doi.org/10.1097/01.NEP.0000000000000700>.
- Soares, R.V., Barel, P.S., Leite, C.C., Santos, L.L., Specian Junior, F.C., Carvalho, E.R., Gianotto-Oliveira, R., Cecilio-Fernandes, D., 2023. Implementation of escape room as an educational strategy to strengthen the practice of safe surgery. *J. Surg. Educ.* 80 (7), 907–911. <https://doi.org/10.1016/j.jsurg.2023.04.016>.
- Stoller, A., Iannuzzo, S., Davis, K., 2022. Escaping delirium: designing an escape room active learning experience for geriatric resource nurses. *Geriatr. Nurs.* 47, 283–285. <https://doi.org/10.1016/j.gerinurse.2022.07.019>.
- Valdes, B., McKay, M., Sanko, J.S., 2021. The impact of an escape room simulation to improve nursing teamwork, leadership and communication skills: a pilot project. *Simul. Gaming* 52 (1), 54–61. <https://doi.org/10.1177/1046878120972738>.
- Vázquez-Calatayud, M., García-García, R., Regaira-Martínez, E., Gómez-Urquiza, J., 2024. Real-world and game-based learning to enhance decision-making. *Nurse Educ. Today* 140, 106276. <https://doi.org/10.1016/j.nedt.2024.106276>.
- Vladinov, G.M., Foronda, C., 2024. Feasibility and acceptability of virtual escape room simulations for novice anesthesia learners in augmented vs. virtual reality. *Clin. Simul. Nurs.* 92, 101555. <https://doi.org/10.1016/j.ecns.2024.101555>.
- Willis, E., McLean, N., Thompson, A., Shofay, A., Ranse, K., 2024. Advanced clinicians' experience of participation in an escape room scenario designed to consolidate crisis

- resource management principles: an exploratory pilot study. *Aust. Crit. Care* 37 (2), 281–287. <https://doi.org/10.1016/j.aucc.2023.06.003>.
- Wynn, L., 2020. An escape room simulation focused on renal-impairment for prelicensure nursing students. *Teach. Learn. Nurs.* 15 (1), 1–5. <https://doi.org/10.1016/j.teln.2020.09.006>.
- Yang, C.-L., Chang, C.-Y., Jen, H.-J., 2023. Facilitating undergraduate students' problem-solving and critical thinking competence via online escape room learning. *Nurse Educ. Pract.* 73, 103828. <https://doi.org/10.1016/j.nepr.2023.103828>.