



An escape room game-based innovation for the assessment of physiotherapy students: A qualitative study

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ABSTRACT

Background: Classic assessment methods present negative emotional alterations for students, such as stress, anxiety, fear and nervousness; these could be solved by applying the Escape Room, which is a promising tool where students experience positive emotions that are critical to learning.

Aim: To explore the experiences and perceptions of physiotherapy students regarding the use of an Escape Room game-based model for their assessment in contrast to conventional approaches.

Methods: A phenomenological-hermeneutical study was conducted. The assessment took place in two different modalities and on different days: 1) a traditional assessment method and 2) an assessment method incorporating a game-based model. All students participated in the two assessment processes. Fifty-six physiotherapy students took part in this study.

Results: The detailed analysis of the results allowed us to classify them into two main themes: 1) Strengths of the Escape Room as part of an assessment approach and, 2) Weaknesses of the Escape Room as part of an assessment approach. In turn, from these main themes emerged the sub-themes and their different units of meaning.

Conclusions: The results suggest that new teaching and assessment methodologies incorporating innovative models such as the Escape Room are effective in evaluating the skills and performance of physiotherapy students, which can be used to complement the traditional assessment methods.

1. Introduction

Health education in university contexts is characterized by constant evolution and innovation, focusing on the needs of the student, the needs of the patient and essential criteria, such as patient safety, teamwork, communication and human factors (Guckian, Eveson, & May, 2020), which are collected, among others, by the World Health Organization (WHO) as topics for the study plans (Backhouse & Malik, 2019). As a consequence, universities have implemented more dynamic and engaging teamwork structures for students in recent decades, where they can work on different capacities and competencies in experiences

that help to involve students through practice (Eukel, Frenzel, & Cernusca, 2017).

Gamification, known as the use of game elements for educational purposes (Zaphiris & Ioannou, 2018), is a trending resource used to put into practice the knowledge learned, as well as to evaluate the skills acquired (Guckian et al., 2020). There are different ways to include this type of teaching-learning strategy, such as through digital games, e-learning and serious games, among others. This process involves the use of reasoning games and mechanical games that are not linked, in a unique way, to the playful nature of the game concept per excellence (Roman et al., 2020). In the learning process, the acquisition of

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knowledge through the cognitive process based on remembering, understanding, applying, analyzing, evaluating and creating follows a set of rules and procedures required to successfully complete the game by reaching a goal, which is one more point in favor of the integration of games in the classroom (Echeverría et al., 2011). One of the increasingly popular gamification modalities is the Escape Room (ER) (Zhang et al., 2018); it was first created in Japan in 2007, and spread its popularity to Asia, Europe, Australia and North America in 2012 and 2013 (Sánchez-Martín, Corrales-Serrano, Luque-Sendra & Zamora-Polo, 2020). The ER is a game that consists in locking a group of participants in a room, where they have to work as a team to solve puzzles, riddles, problems and tasks by acquiring clues located throughout the space using critical reasoning, with a final objective in a limited time in order to be able to leave the room (Anguas-Gracia et al., 2021; Zhang et al., 2018). In the academic environment, ER games are simulations of commercial rooms that are often unaffordable for universities (Gordon, Trovinger, & DeLellis, 2019). However, the adaptation of the ER in the classrooms presents a low cost in its development, which makes it more attractive and feasible (Guckian et al., 2020). Fig. 1 depicts a brief description of the ER process.

Several studies have explored the impact of game-based teaching methods on university health sciences degrees (Gómez-Urquiza et al., 2019; Gutiérrez-Puertas et al., 2020; Roman, Ruiz-Gonzalez, Rodríguez-Arrastía, Granero-Molina, Fernández-Sola & Hernández-Padilla, 2022). These studies have reported a number of positive outcomes in the teaching-learning process, such as improved cognitive skills, enhanced feedback for teachers and students, promotion of teamwork and collaborative learning, and establishment of clear formative objectives (Abdulmajed, Park, & Tekian, 2015; Guckian et al., 2020). Moreover, these methods have been deemed successful in terms of boosting motivation and eliciting positive emotions, which can play a crucial role in enhancing academic performance compared to traditional methods such as oral presentations with audiovisual support (Sánchez-Martín et al., 2020).

However, despite all the points in favor of these new teaching methods, there are few studies on the use of educational games as an assessment system within the area of physiotherapy. In most cases, there are deficits in fundamental points in terms of the reliability and validity of the game as an assessment method, especially regarding the perception of the students themselves (Abdulmajed et al., 2015). The assessment is an effective resource for recognizing the teaching-learning process, with the aim of improving education through teacher-student feedback (Bell & Cowie, 2001). Different types of assessments can impact the quality of learning, and therefore, it is crucial to select the most appropriate form of evaluation taking into account factors such as student motivation, internalization of content, and anticipation of the learning process (Barberà Gregori, 2003). Some commonly used assessment methods include objective structured clinical examination (OSCE), objective structured practical examination (OSPE), and conventional practical examination (TPE) (Mard & Ghafouri, 2020). However, traditional assessment methods can often result in negative emotions such as stress, anxiety, fear, and nervousness for students (Selim, Ramadan, El-Gueneidy & Gaafer, 2012). ER as an assessment method offers a promising alternative, allowing students to experience positive emotions crucial for learning in a more relaxed environment (Morrell, Eukel, & Santurri, 2020; Sánchez-Martín et al., 2020). Additionally, ER can encompass all the necessary criteria for a good assessment, including coherence in the assessment program, meaningfulness for the student, clear objectives, integration of authentic tasks, student involvement, teacher-student relationship, opportunities for reflection and decision-making, and incorporation of assessment for learning itself (Barberà Gregori, 2003). Furthermore, ER emphasizes collaborative learning and teamwork (Guckian et al., 2020). Therefore, the aim of this study was to explore the experiences and perceptions of physiotherapy students regarding the use of an ER game-based model for their assessment in contrast to conventional approaches.

2. Methods

2.1. Design

This study was conducted from the perspective of Gadamer's hermeneutical phenomenology, which uses the interpretation of the text as a tool to understand the experiences and expectations of the participants (Gadamer, 2007).

2.2. Participants

The initial sample consisted of all students enrolled in the "General Procedures in Physiotherapy I" module (63 in total). The inclusion criteria were: (a) to be enrolled in the aforementioned module, (b) to be over 18 years old and (c) to take the final practical exam of said module (none of the students refused to participate in the study). The exclusion criteria were: (a) students who did not complete all the practical sessions of the module prior to the assessment, (b) students without a sufficient level of Spanish to perform both assessment tests normally and (c) students who had a positive COVID-19 test or who were in a quarantine period. Finally, after applying the inclusion and exclusion criteria, 56 students participated in the study (seven students were excluded from the study, with two due to COVID-19 confinement and the remaining five for not attending the required practical classes). All of them were informed about the characteristics and objectives of the study and, before participating in the study, they had to sign an informed consent (Fig. 2).

2.3. Procedure

The study was conducted with students after taking the practical exam of the "General Procedures in Physiotherapy I" module, which is a compulsory module of six European Credit Transfer and Accumulation System (ECTS) credits. The assessment took place in two different modalities and on different days: 1) a traditional assessment method and 2) an assessment method incorporating a game-based model (see [Suppl. Table S1](#)). All students participated in the two assessment processes. Thus, the experiences of the students with each of the two types of assessment were compared. The person in charge of carrying out the assessment of the module with the ER format was the main researcher.

2.4. Data collection

Sixteen semi-structured, individual, in-depth interviews and four focus groups (FGs) (with 10 students each) were conducted privately and anonymously with the participants. A semi-structured interview guide was created to structure the interviews. The process involved identifying the prerequisites for using a semi-structured interview, reviewing previous knowledge on the topic, testing the relevance of the elements in the guide, and finally presenting the complete interview guide (Kallio, Pietilä, Johnson & Kangasniemi, 2016). Individual interviews and FGs took place during the week after the completion of the final practical exam in one of the university laboratories. To avoid loss of information, all interviews and FGs were doubly audio-recorded for subsequent transcription and analysis (Green & Thorogood, 2014). At the same time, field notes of the highlights were taken. All the interviews started as follows, "From your point of view as a student, how do you value this assessment method using ER compared to traditional assessment?", and they ended with the question "Is there anything else you would like to add?". The average duration of the individual interviews was approximately 30 min, and the duration of the FGs was approximately 60 min. Data collection stopped once all the individual and group interviews were conducted with the students who had taken the exam. No problems were detected and no interviews needed to be repeated. The person in charge of conducting the interviews was J.M.-C., a researcher with more than 10 years of experience in qualitative research. None of the

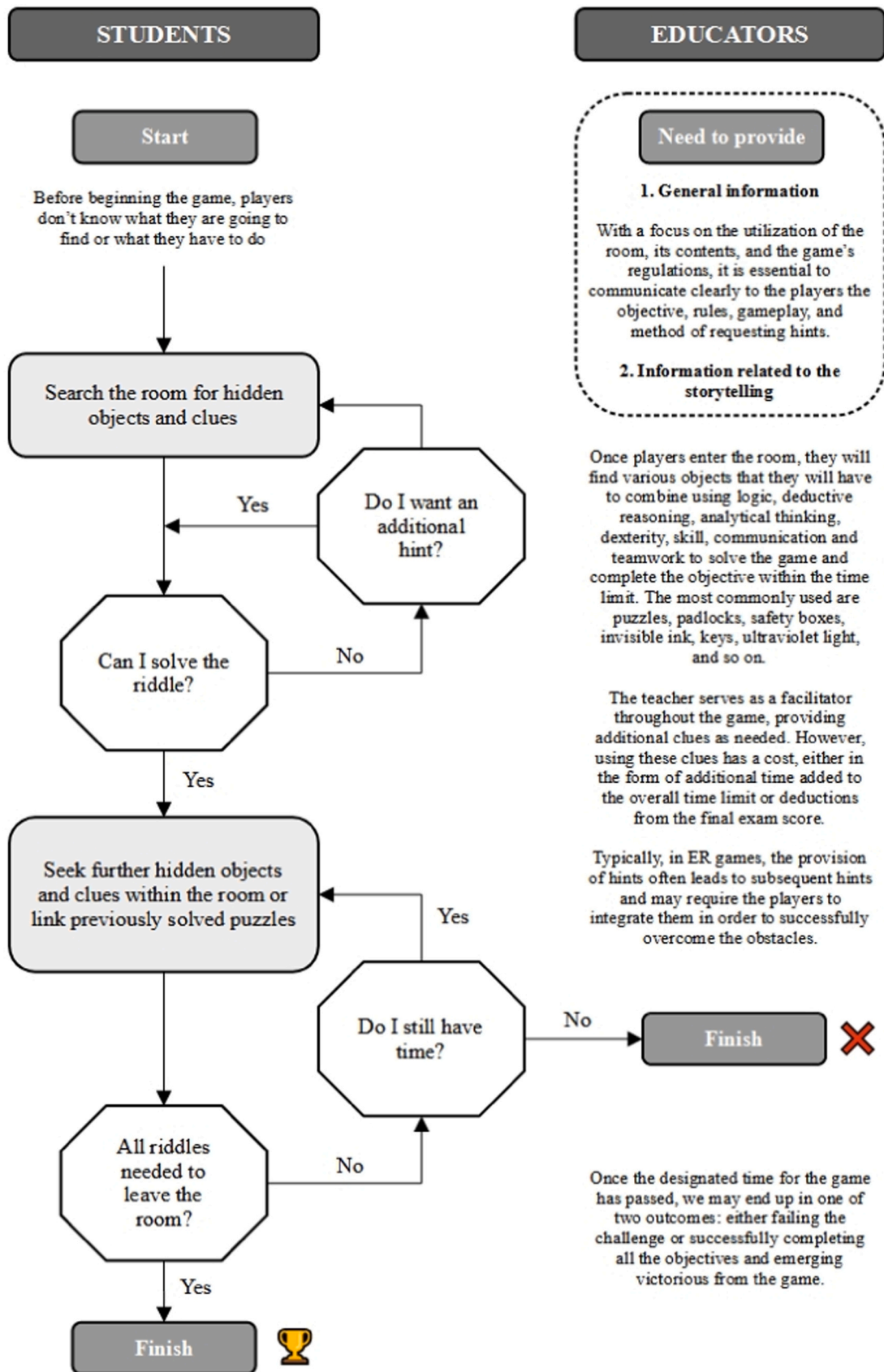


Fig. 1. Brief description of the ER process.

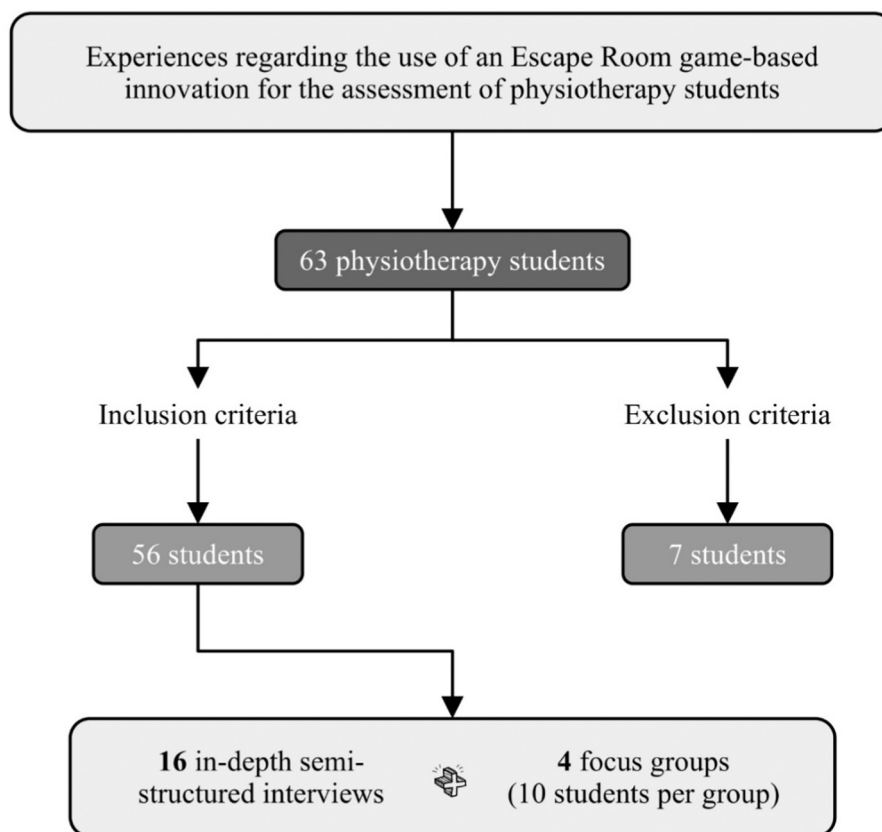


Fig. 2. Flowchart of the study design.

participants had coincided in any module with the researcher in charge of the interviews, and they knew neither him personally nor his motivations to participate in the study.

2.5. Data analysis

Individual and group interviews were then transcribed by another researcher (I.S.-H.). Using the ATLAS.ti 7.5 software, a hermeneutical unit was created for the grouping and analysis of these transcripts. The texts obtained were interpreted and encoded by I.S.-H. with the help of another two researchers (J.M.-C. and M.G.-S.), using thematic analysis techniques guided by the principles of Gadamer’s hermeneutics (Creswell & Creswell, 2018). The texts of the interviews were analyzed through an adaptation of the 5 stages developed by Fleming and collaborators (2003), according to the research method and using the hermeneutical philosophy as a tool for understanding the practice of Physiotherapy. The different themes, subtopics and units of meaning identified were extracted inductively with the aid of the detailed analysis of the transcripts of the different interviews. Similarly, the study participants had the opportunity to review the transcripts of their interviews to correct possible errors. To support the analysis of the obtained results, only the most relevant citations were considered.

2.6. Ethical considerations

This study was approved by the Ethics Committee of Nursing, Physiotherapy and Medicine Department at the University of Almeria (EFM 132/2021) and the data were used in accordance with Organic Law 3/2018, of December 5, on the Protection of Personal Data and guarantee of digital rights.

2.7. Rigor

The findings of this study were reported following the consolidated criteria for reporting qualitative research (COREQ) were followed (Tong, Sainsbury, & Craig, 2007). All the data were analyzed separately and triangulated between three researchers to guarantee their reliability, discussing the differences found until reaching a consensus.

3. Results

3.1. Participant characteristics

Finally, 56 of the 63 students in the initial sample met the inclusion criteria and took part in the study. The total sample consisted of 26

Table 1 Sociodemographic characteristics of the participants (N = 56).

Characteristics	n (%)	Mean (SD)	Range
Gender			
Female	26 (46.40)		
Male	30 (53.60)		
Age (years)		20.02 (4.16)	18 – 47
Female		19.73 (2.18)	18 – 26
Male		20.27 (5.38)	18 – 47
Number of times enrolled in the module			
First time	52 (92.86)		
Second time	4 (7.14)		
First participation in an Escape Room			
Yes	24 (42.86)		
No	32 (57.14)		

females (46.4%) and 30 males (53.6%), with a total sample mean age of 20.02 years (SD: 4.16). [Table 1](#) describes the remaining sociodemographic data.

The detailed analysis of the results allowed us to classify them into two main themes: 1) strengths of the ER as part of an assessment approach, and 2) weaknesses of the ER as part of an assessment approach. In turn, several subtopics and units of meaning emerged from these main themes, which can be seen in detail in [Table 2](#), together with the most relevant quote for each of them.

3.2. Theme 1. Strengths of the escape room as part of an assessment approach

Gamification is increasingly present in higher education and has proved to be a very effective resource for increasing students' interest and motivation in their learning process. Gamification in general, and ER in particular, are increasingly popular as a complement to traditional learning methods, providing the student with the possibility of recreating a simulated reality similar to the clinical environment that helps them to develop new skills and facilitates learning.

3.2.1. Subtheme 1.1. Strengths of the escape room – psychological implications

Exam stress provokes a series of negative emotional reactions among students. It is true that a minimum level of anxiety is necessary to be able to increase the degree of concentration; however, when the degree of concentration is too high, the negative effect it exerts on performance constitutes a serious problem. The ER as an assessment method seems to help students to better control this level of stress before exams ([Table 2](#), Topic 1.1.1).

Exams are one of those situations that generate performance anxiety, which is the feeling of great pressure to do things well in a situation where performance is fundamental. By incorporating a game-based model into the assessment process, students feel less pressured than with the traditional assessment approaches ([Table 2](#), Topic 1.1.2).

The demands to which university students are exposed with work overload and lack of time to cover everything, coupled with other factors such as the new academic environment or changes in learning methodologies, causes them emotional and physical exhaustion, which sometimes stops them from achieving their objectives ([Table 2](#), Topic 1.1.3).

When students face an exam, the feeling of not being able to think clearly can appear, i.e., a “mental block” due to the anxiety caused by the exam itself that prevents him/her from organizing his/her thoughts, minimizing the possibility of solving the problem or finding the correct answer ([Table 2](#), Topic 1.1.4).

Self-confidence is essential when trying to overcome any challenge, and exams are one of the biggest challenges that students must face. It is about knowing, internally and from the confidence provided by studying, that it is possible to pass the exam and demonstrate everything that has been learned ([Table 2](#), Topic 1.1.5).

The application of gamification in non-playful environments, allows the student to find both the learning process and the assessment process more attractive and exciting, encouraging both participation in the former and the desire to study in order to get it right in the latter ([Table 2](#), Topic 1.1.6). In the same way as in the previous point, when learning is enjoyable and fun, it generates a positive experience in the student that facilitates the internalization of knowledge ([Table 2](#), Topic 1.1.7).

3.3. Subtheme 1.2. Strengths of the escape room – educational implications

Gamification is a very powerful resource that allows educators to make their classes more attractive and interesting for students, thereby improving the learning process and maintaining the motivation of their

students throughout the process, including also the moment of assessment ([Table 2](#), Topic 1.2.1).

Camouflaging learning with the appearance of a game will allow educators to provide their students with a more relaxed environment in which there is no pressure or fear of failure, allowing them to enjoy their learning process ([Table 2](#), Topic 1.2.2).

The expectation that is generated with the game allows the faculty member to focus the student's attention, which inevitably leads to a greater acquisition of knowledge. Overcoming boredom and awakening the student's curiosity is essential for the learning process ([Table 2](#), Topic 1.2.3).

Another advantage of gamification is that it allows recreating situations very close to reality, placing the student in contexts that are very similar to those that may be encountered in their future ([Table 2](#), Topic 1.2.4).

The motivation generated in the student to reach the reward established by the rules of the game allows them to continue to achieve their objectives, turning the learning process into something much more dynamic and attractive, which makes the acquisition of knowledge more efficient ([Table 2](#), Topic 1.2.5).

The interest that the student arouses in the competitive aspect of the game and the desire to do it well make the learning process less arduous, pushing the student to want to acquire the necessary knowledge to achieve their objectives ([Table 2](#), Topic 1.2.6).

In the particular case of the ER, the student has the opportunity to check how their colleagues are developing in a near-real clinical situation, which allows them to learn from each other and acquire new tools for the resolution of problems ([Table 2](#), Topic 1.2.7).

The educator-student bond is one of the fundamentals on which academic learning is based. A good relationship between educators and their students is strongly related to better academic performance ([Table 2](#), Topic 1.2.8).

3.4. Theme 2. Weaknesses of the escape room as part of an assessment approach

Gamification inevitably presents a series of disadvantages that will largely depend on the group in which it is applied. Undoubtedly, for educators, it will involve a great effort of preparation and the dedication of many resources. On the part of the students, the game format can cause a series of problems, such as not giving it the necessary importance, being overcompetitive or losing motivation once it is no longer a novelty, among many other examples.

3.4.1. Subtheme 2.1. Weaknesses of the escape room – psychological implications

Some people have many problems when they feel out of their comfort zone. The fear of novelty and not knowing what awaits them can become a real problem, producing both physical and psychological symptoms. Anxiety and nervousness can block them, preventing them from demonstrating everything they have learned ([Table 2](#), Topic 2.1.1 and 2.1.2).

Overly shy or insecure people may fear public speaking, a very common form of anxiety. It can affect them in various ways, from a trembling voice to a total blockage that prevents them from speaking out a single word ([Table 2](#), Topic 2.1.3).

The countdown of the clock can lead to great stress in some students, if these nerves grip them and they are not able to evade the idea of how much time they have left, they may become unable to concentrate and organize their ideas to pass the exam ([Table 2](#), Topic 2.1.4).

3.4.2. Subtheme 2.2. Weaknesses of the escape room – educational implications

Collaborative work has a wide list of advantages. Having said that, one of the team members may neglect their share of responsibility, either due to overconfidence in their teammates or because they act

Table 2
Themes, subthemes, meaning units and representative quotes.

Themes	Subthemes	Meaning units	Representative quotes	
1. Strengths	1. Psychological implications	1. Less tension and stress	"The traditional assessments that I usually undergo imply high-stress situations that causes me to become terribly ill, with vomiting and headaches. But this time it has not happened to me!" (I16)	
		2. Less pressure	"I believe that the fact of being a game-like assessment allows you to enter more relaxed, feel less pressure, do everything more calmly, and not feel as judged as you would in a normal and current exam" (I3)	
		3. Less emotional and physical fatigue	"Previous assessments involved much more mental fatigue and had an effect that extends beyond the performing because the emotional and physical fatigue is much greater. I believe that the learning is far less, aside from the tension and sometimes anguish that many times you feel while doing it" (FG2-P10)	
		4. Absence of mental blocks	"I loved that the assessment could be in groups since I generally freeze, but because I was certain that my classmates could help me, it didn't happen to me this time" (I8)	
		5. Greater sense of security	"It is a different method of assessing our competences, we are calmer and more self-confident, and we are not as driven by pressure, allowing us to demonstrate what we truly know" (FG3-P6)	
		6. More exciting than the traditional assessment approach	"For me, the Escape Room approach has made even studying more thrilling, since I anticipate what challenges we could experience in the exam" (FG1-P3)	
		7. Funny and entertaining	"It's been a lot of fun! We learned a lot by doing things in such a practical way" (I4)	
		1. Learning is more appealing and interesting	"It is a great strategy to immerse oneself in a real-life situation with patients, which makes us lot more engaged in learning and appealing to us" (FG1-P9)	
	2. Educational implications	2. Enjoy learning	"I believe it is a dynamic and beneficial methodology that can be used for both assessing and learning different physiotherapy techniques. Students feel more at ease and secure when the exam is treated as a game, allowing them to have fun while learning" (FG3-P8)	
		3. Sensation of increased learning	"I realize I have learnt much more than in other modules simply because it is in a game-like format, and the hilarious moments remain etched in our brain, making it more difficult to forget knowledge" (I1)	
		4. More akin to a real-life clinical situation	"This form of assessment has made me focus more on being the closest thing to a real clinical situation. In the traditional exam, I have not managed to put myself so much in the situation" (FG4-P5)	
		5. More dynamic and effective	"I find it is far more dynamic and effective than traditional assessment methods since you do not perceive you are taking an exam" (I14)	
		6. Making studying easier and soothing	"Despite the fact that the content and weight on the final grade for the subject were substantially higher, the study of this part of the subject was far more entertaining and effortless" (FG4-P4)	
		7. Peer-based learning	"Another benefit is that, in addition to what you learn in your exam, you can learn a lot from watching your classmates perform in a real clinical environment" (I10)	
2. Weaknesses	1. Psychological implications	8. Improving the student-teacher bond	"This type of assessment, in my opinion, considerably improves the student-teacher bond. An entertaining setting helps in the improvement of interpersonal interactions" (I5)	
		1. Nervousness and tension as a result of a lack of understanding of the process	"In my case, the fact that I was not confident how the exam would go made me more apprehensive than usual" (FG1-P4)	
		2. Fear of novelty	"Being something new to me and having never taken an assessment like this before, I was concerned about how I would react" (I7)	
		3. Increased tension for insecure or shy people	"Personally, I consider myself an insecure person, and having a "public" staring at me and evaluating me can make me feel even more uncomfortable, causing me to stutter and mix words, creating a loop because it makes me even more uneasy" (I13)	
		4. The stopwatch makes you be a bundle of nerves	"Seeing the countdown on the projector screen was one of the things that made me the most nervous during the exam" (FG2-P6)	
		2. Educational implications	1. Studying less because of confidence in classmates	"I trusted myself, thinking I could rely on my classmates, and I studied less than I should have." (I11)
			2. The weakness of one has an effect on everyone	"What seems a little unfair to me is that if one of the group members does not study enough, the final grade of the others can suffer the effects" (FG2-P9)
			3. Compatibility with other subjects	"It is also true that I do not believe this method of assessment is consistent with subjects that are considerably more theoretical, such as physiology. In these instances, I feel the traditional assessment is preferable" (I15)

selfishly and attempt to benefit from the efforts of others, without doing their part. In this situation, the weakness of one can have a negative impact on the others (Table 2, Topic 2.2.1 and 2.2.2).

Certainly, there are modules in which it can be much easier to apply the game format, both in the classroom and in the assessment, and no matter how difficult it may seem a priori, any module can be gamified. Another different aspect is that, for certain types of modules, students may continue to prefer traditional assessment strategies (Table 2, Topic 2.2.3).

4. Discussion

This study aimed to explore the experiences and perceptions of physiotherapy students regarding the use of an ER game-based model for their assessment in contrast to conventional approaches. Emotions have

frequently been investigated in relation to academic performance and it is well-known that exams can be a source of stress for a significant number of students, resulting in feelings of anxiety and fear of poor results. This can lead to negative outcomes such as anxiety, depression, and lower academic performance (von der Embse, Jester, Roy & Post, 2018). The detailed analysis of the results allowed dividing them into two large themes from which several subtopics and units of meaning emerged. On the one hand, the psychological aspects experienced by students were also evaluated. The results showed that students reported lower levels of tension and stress both in preparing for the exam and during its administration, aligning with the findings of Chen and colleagues (2015), who explored the associations between different learning approaches, assessment methods and perceived stress in medical students. These results are also similar to those of other studies in which the ER was used with health sciences students (Liu et al., 2020;

Reed & Ferdig, 2021). Secondly, students claimed to handle the pressure of an exam much better, which is in line with the results of the study of Gómez-Urquiza and collaborators (2019), where the use of the ER promoted teamwork and the ability to function under pressure.

Regarding emotional and physical fatigue, students declared that they suffered a greater burden of both with the traditional assessment method and felt much better with the ER, a result that agrees with the study of Sánchez-Martín and collaborators (2020), in which the emotional response of students to different methods of teaching innovation was analyzed, with gamification presenting the highest levels of positive emotions. Our findings also emphasized the lack of negative mental states that are commonly associated with stressful situations. This aligns with the findings of López-Belmonte and colleagues (2020), who concluded that students who underwent training through ER game-based model obtained better results than those who used traditional methods in several indicators and experienced a lack of negative effects in their learning process. These results are also similar to those of other studies that used the ER with Pharmacy students (Eukel et al., 2017) and nursing students (Gutiérrez-Puertas et al., 2020).

Regarding the feeling of security or self-confidence, students pointed out that the decrease in perceived pressure made them feel much more capable of demonstrating what they really knew, in the same way that the aforementioned studies found similar results in terms of the decrease in stress and pressure at the time of the exam (Chen et al., 2015; J. Gómez-Urquiza et al., 2019). Finally, the students jointly highlighted how exciting, attractive and fun this new assessment methodology was compared to the traditional method, as other studies have shown as one of the strengths of the ER game-based model (Dacanay, Sibrian, Wyllie, Sorrentino & Dunbar, 2021; Goodman & Landgren, 2021).

The second area of focus in the study pertains to purely educational aspects and is comprised of the following units of meaning. Firstly, the students highlighted that the learning process was much more attractive and interesting with the ER game-based model approach, as in a study in which nursing students carried out a relay race of obstetric competences with an ER element as a formative assessment method (Darby, Bergeron, Brown, DeFoor & Jones, 2020). Secondly, the students highlighted how they had enjoyed learning, in the same way as in the study of Alonso and Schroeder (2020), as well as vascular surgery medical students in the study of Kinio and collaborators (2019). These results are similar to those of previously mentioned studies (Dacanay et al., 2021; Gómez-Urquiza et al., 2019; Gutiérrez-Puertas et al., 2020). The third aspect that was noted by the students was the perception of having enhanced their learning, similar to the findings in studies conducted with dental students (Aubeux et al., 2020), nursing students (Smith & Paul, 2020), and pharmacy students (Kavanaugh et al., 2020), among others.

Another aspect that was significantly emphasized by the students was the fact of getting much closer to a real clinical situation, managing to focus more on the learning objective. This is in agreement with the results of Robertiello and collaborators (2021), who highlighted that creating a simulation experience with the theme of an ER, with the aim of guiding students towards the environment and the simulation equipment, is an interactive manner of preparing students for the real clinical situation. In addition, another study carried out with radiology residents highlighted how feasible it is to create a portable and inexpensive ER as a novel educational platform that resembles a real clinical situation in the best way possible (Jambhekar, Pahls, & Deloney, 2020). Another important aspect for the students was that this new methodology had made it easier for them to study and learn, which is in line with Clauson and collaborators (2019).

In addition to all of the foregoing, our results suggest that the use of ER as an assessment method leads to improved performance outcomes. For educators, this feedback on the method's efficacy is positive, as students reported improvement in their relationship with teachers and increased engagement in the learning process. This can be partly attributed to active involvement of students in the ER assessment

process, which they perceived to be more dynamic and effective than traditional methods. These findings are in line with the study by Blankenship and collaborators (2021), who demonstrated the effectiveness of the Escape Box format of ER in promoting student engagement and learning in continuing education programs with multidisciplinary teams. There are many studies that also provide evidence of the effectiveness of ER as a learning methodology, indicating that they can also reinforce the essential competencies of the student and serve as an effective method to involve students in active learning (Alonso & Schroeder, 2020; Daniel, Valko, McAtee & N-Wilfong, 2021). Likewise, our participants emphasized the advantages of working collaboratively and being able to learn from their peers in a realistic clinical setting. Graduates of health science degrees must work collaboratively with other peers as an indispensable part of multidisciplinary healthcare teams. In this sense, numerous studies confirm that the ER format promotes teamwork and all the competences that are developed in collaborative work (Gordon et al., 2019; Guckian et al., 2020; Robertiello et al., 2021).

4.1. Limitations

Despite the positive findings of the study, several limitations should be considered. Firstly, the small sample size may affect the significance of the results. Additionally, the study was conducted with a specific group of students and in a specific subject, limiting the generalizability of the findings. Furthermore, the face-to-face interview format, although anonymous, may introduce response bias. Additionally, the single administration of both group and individual interviews could not account for any changes in opinion over time. Having said that, there are several strengths worth mentioning. Firstly, the results of the evaluation using an ER game-based model as a method of assessment were exceptional, as reflected in the high ratings received from the students. Due to the positive experience during the assessment process, the students felt more confident and self-assured, as the relaxed environment resulted in reduced levels of stress, tension, and physical and emotional fatigue. The students found the new assessment method appealing, exciting, and fun, which increased their engagement and involvement. It is important to note that the ER assessment method provides a realistic scenario for evaluating competence in higher education, as demonstrated by the results of this study.

5. Conclusions

The results suggest that incorporating innovative strategies in teaching and assessment methodologies, such as gamification in general, and the ER game-based model in particular, are effective in assessing the competences and performance of physiotherapy students and can be used to complement the traditional assessment methods. The improvement of stress and tension levels, and creating a relaxed environment for effective evaluation, may address performance issues by enhancing students' psychological well-being. Further studies should explore the potential of using this assessment resource in physiotherapy and health sciences programs, particularly in contexts where students may be vulnerable.

Ethical considerations

The study was approved by the Ethics Committee of Nursing, Physiotherapy and Medicine Department at the University of Almería (EFM 132/2021).

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Declaration of Competing Interest

No conflict of interest has been declared by the authors.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.stueduc.2024.101331](https://doi.org/10.1016/j.stueduc.2024.101331).

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