

Original article. Effects of extracurricular martial arts practice on the trait of anger among boys and girls aged 9-12 years old. Vol. 10, n.º 2; p. 349-376, May 2024. <https://doi.org/10.17979/sportis.2024.10.2.10626>

Indoor-Outdoor Gamified School Proposal to generate Healthy Habits Propuesta escolar gamificada en interior y exterior para generar hábitos saludables

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Abstract

It is important to bear in mind that sedentary lifestyles and unhealthy habits have been influencing the classroom in recent years, and at the same time methodologies have emerged that aim to respond to them. Gamification is one of these innovative methodologies that uses games to work on non-playful aspects in the classroom. Their possibilities are infinite, as they depend on the imagination and desire of the teaching staff when it comes to creating new challenges. Based on a scientific literature review on curricular competences, gamification and the terms scape room and educational breakout, an intervention was carried out to test the benefits of using gamification in a Primary Education classroom to promote healthy and active habits. The sample consisted of 96 students from three primary school in Coruña and Pontevedra during 2022-2023. The practical proposal was carried out in four weeks in several indoor and outdoor sessions, and consisted of the collaboration and active participation of the subjects studied, who had to overcome a series of challenges. The mechanics, dynamics and components of this game created a game scene in which the students had to stop a threat and try to establish a healthy lifestyle. A 15-item health and care questionnaire and a self-assessment target were used for data collection. The participants obtained

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significant improvements in physical, mental and social health and healthy habits. Gamification is considered an appropriate methodology for the achievement of healthy and active habits in primary school, but it is necessary to continue studying this methodology from an early age.

Keywords: Healthy habits, natural environment, gamification, primary education.

Resumen

Es importante tener en cuenta que el sedentarismo y los hábitos poco saludables están influyendo en las aulas en los últimos años, y al mismo tiempo han surgido metodologías que pretenden dar respuesta a ellos. La gamificación es una de estas metodologías innovadoras que utiliza el juego para trabajar aspectos no lúdicos en el aula. Sus posibilidades son infinitas, ya que dependen de la imaginación y ganas del profesorado a la hora de crear nuevos retos. A partir de una revisión científica sobre competencias curriculares, gamificación y los términos scape room y breakout educativo, se llevó a cabo una intervención para comprobar los beneficios del uso de la gamificación en un aula de Educación Primaria para promover hábitos saludables y activos. La muestra estuvo formada por 96 alumnos de tres centros de primaria de Coruña y Pontevedra durante 2022-2023. La propuesta práctica se llevó a cabo durante cuatro semanas en varias sesiones interiores y exteriores, y contó con la colaboración y participación activa de los sujetos estudiados, quienes debieron superar una serie de desafíos. La mecánica, dinámica y componentes de este juego crearon una escena de juego en la que los estudiantes debían detener una amenaza e intentar establecer un estilo de vida saludable. Para la recopilación de datos se utilizó un cuestionario de salud y cuidados de 15 ítems y un objetivo de autoevaluación. Los participantes obtuvieron mejoras en resultados positivos en salud física, mental y social y hábitos saludable. La gamificación es una metodología adecuada para conseguir hábitos saludables y activos en la educación primaria en periodos cortos de intervención, pero es necesario tomarlo con cautela, analizar la carga docente y su adaptabilidad, e investigar incluso desde edades más tempranas.

Palabras clave: hábitos saludables, entorno natural, gamificación, educación primaria.

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Introduction

Currently, we are experiencing a change in behavior in the different areas of our lives, which are characterized by encouraging unhealthy lifestyle habits, such as, for example, the abusive consumption of junk food or an increase in sedentary activities to the detriment of physical activities. As a result, problems such as eating disorders are occurring more and more frequently, as well as other harmful consequences for the health and integral development of young people. In this first reflection, several authors take a position (Fernández et al., 2015; Lois & Rial, 2016), who agree in their respective studies that bad healthy habits are increasing considerably in developed countries, including Spain.

The concept of health has evolved according to the historical and cultural moment, social system and level of knowledge (Guerrero & León, 2008), and currently differs from the idea that has been held since previous times. Originally it was known as the absence of disease, so a healthy life was presented as a dichotomy between health and disease, without conceiving biological, psychological and social aspects. But to discuss health, it is necessary to talk about disease. The disease comes from the Latin "infirmitas" and means "lack of strength." The World Health Organization – WHO (2022) tells us that disease is the "process and stage in which living beings experience a condition that affects their well-being, changing their ontological condition of health".

In this sense, the Proinapsa Institute (MSPS Colombia, 2014, p 17-18), considers health education as "a process of generating learning, not only for individual self-care, but also for the exercise of citizenship, mobilization and the collective construction of health in which people and the different sectors of development participate". One of its objectives is to provide the population with the necessary knowledge, skills, abilities and currents of opinion, aimed at achieving changes or modifications in behaviors that are harmful to health and reinforcing those that are healthy. The WHO (2023) links health promotion to the transmission of messages that modify people's behaviour aimed at generating good lifestyle habits such as, for example, eating healthy foods, hydrating correctly, sleeping the necessary hours and performing responsible physical activity. On the other hand, Sevil et al. (2019) highlights the importance of an Education for Health (EFH) from school, because just as the family environment exerts a lot of influence on

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the establishment of healthy lifestyle habits in children, the school also plays a very important role in promoting them, since it is the teachers who maintain direct contact with the students in physical training. "health is created and lived in the context of everyday life: in schools, work and recreation" (WHO, 1986, p.4).

As stated in Organic Law 8/2013 (LOMCE), education administrations must promote the daily practice of sports and physical exercise by students during the school day, under the terms and conditions that guarantee adequate development to promote an active, healthy and autonomous life, in accordance with the recommendations of the competent authorities. Likewise, in Organic Law 3/2020 (LOMLOE), the Education Administration will introduce measures to ensure that physical activity and healthy eating are part of the behaviour of children and young people. In order to promote and consolidate healthy lifestyle habits, these administrations will promote the daily physical activity of students during their school day, provided that, in accordance with the recommendations of the competent bodies, their adequate development is guaranteed to promote a healthy life. and autonomous living, encouraging healthy eating habits and active activity, reducing sedentary lifestyles.

If we talk about healthy habits, we are referring to those behaviors that we perform repetitively and sometimes even unconsciously, and that influence our physical, mental and social well-being. Thus, the set of our habits defines our style and quality of life. It will be necessary to have a good diet from the first years of life, since an unbalanced diet leads to a series of health problems, the most common being obesity and diabetes, among others (SAFSN, 2016). However, the acquisition of unhealthy habits at an early age such as a sedentary lifestyle, physical inactivity and excessive consumption of foods of low nutritional quality anticipate overweight and obesity problems.

To counteract this serious situation, numerous intervention programmes have been proposed to promote the inclusion of healthy habits in schools (NAOS strategy, 2005; PERSEO programme, 2006; THAO programme, 2007; Active Breaks, 2017; Growing in Health, 2018; ALADDIN study, 2019; PASOS program, 2022; SHE program, 2022) In particular, the Pilot School Reference Program for Health and Exercise against Obesity (PERSEO), carried out in 2006 and included in the Strategy

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for Nutrition, Physical Activity and Prevention of Obesity (NAOS), was one of the first proposals put forward to promote healthy lifestyle habits in primary school children. through an educational program in which the educational community and primary health centers participated. It was equipped with simple interventions that could be applied in real conditions, and was based on 5 fundamental habits: nutrition, postural, hygiene, rest and sleep, and physical activity. In addition to these, there could also be other requirements, such as the prevention of smoking and alcohol consumption (Spanish Government, 2015).

In children and adolescents, a more sedentary lifestyle is associated with the following poor health outcomes: increased adiposity, poorer cardiometabolic health, physical fitness and prosocial behaviour/behaviour, and shorter sleep duration (WHO, 2020). The Spanish Society for the Study of Obesity (SEEDO) confirms in its study carried out in March 2022 that 44.5% of Spanish children are overweight. In this sense, the WHO (2014) warns that childhood obesity is one of the most serious public health problems of the 21st century. The significant increase in childhood overweight and obesity in developed countries has been mainly due to lifestyle changes. To compensate for these data, between 5-17 years old, it is recommended to limit the time of sedentary activity, and at least three days a week, perform 60' of mainly aerobic daily physical activity, and moderate to vigorous intensity throughout the week (WHO, 2022). Similarly, the Spain Ministry of Health (2023), in terms of the population aged 5-17 years, recommends one hour of moderate- or high-intensity physical activity every day of the week, including both games and other high-intensity activities that have a high-effort character. On the other hand, you should try to reduce sedentary periods in front of the television or other screens.

However, even knowing the danger that this situation brings to our lives, changing habits is not an easy task. In the book "Atomic Habits", by James Clear (2019), he proposes several keys to go from a negative or harmful habit to a positive habit, going through making it evident, posing it in an attractive way, doing it in the simplest way, and receiving satisfaction for maintaining it. From the perspective of neuroeducation, "the greatest threat to success is not failure but boredom" (p.162); and playing becomes a very powerful concept, which goes beyond simple fun to become the

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main learning strategy. Therefore, with the intention of promoting the creation of healthy habits, the neurological activity involved in the creation of habits during play and fun is highlighted. Llorens et al. (2016) explained how individuals, when having fun during tasks, release enough dopamine to activate feelings such as: fun, motivation, and attention.

On this point, Teixes (2014), Fatima et al. (2023), Martín et al. (2022), recall that the gamification is used to modify the behaviors of students so that the result of the educational or training action is beneficial for them. In this sense, it coincides with what Clear (2019) and Rodríguez-Ferrer et al. (2024) said, regarding the creation of habits. Consequently, it involves applying game mechanics and dynamics, and turning something that at first might seem boring, into something fun and interesting (González-Tardón, 2014), capable of attracting and motivating the attention of students and initiating meaningful learning.

Gamification is the use of game design mechanics, elements, and techniques in non-game context to engage users and solve problems (Zichermann & Cunningham, 2011; Werbach & Hunter, 2012). It comes from the business world (Cortizo et al., 2011), and lies between marketing, games and psychology (Gallego & De Pablos, 2013). It seeks to increase motivation, through psychological strategies applied to games, to promote playfulness in learning situations (Reig & Vilchez, 2013). According to Gallego et al. (2014), it is a way of designing optimal ways of transmitting knowledge; and for Marín & Hierro (2013), it is a technique and at the same time a concept of tasks or duties by challenges and missions, that is, the negative and boring connotation of performing a task is eliminated, for something epic and fun such as overcoming a challenge with oneself.

Educational gamification currently has a wide variety of possible models and forms of application. The vast majority of gamified proposals in recent years (Pérez et al., 2017; Ramos, 2021; Chamorro, 2020; Pérez et al., 2020), use as mechanics a series of challenges to overcome to achieve a certain goal, thus following the dynamics of escape games. It is designed to modify students behavior patterns. By enjoying action, even if it involves effort, we are learning at the same time that time passes quickly, entering *flow* (Csikszentmihalyi, 2011), a state in which a person feels completely

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immersed in activities that provide pleasure and enjoyment. In this awakening of positive emotions, gamification is of fundamental importance due to the neurochemistry it generates (Marczewski, 2013).

In recent years, several gamified proposals have been applied in the field of education, which we can access thanks to the studies that reflect the results of the application of these proposals. The results obtained by various studies show the potential of gamification in different educational stages: in university classrooms (Pérez et al., 2017), in Secondary Education (Monguillot et al., 2015; Almirall et al., 2016; Pourabbasi et al., 2020; Ramos, 2021; Sotos-Martínez et al., 2024) and in Primary Education (De las Heras et al., 2017; Martín, 2017; Chamorro, 2020; Pérez et al., 2020; Morales et al., 2024). An interesting study in a university classroom is "The threat of sedentaries" (Pérez, 2016), whose objective was to improve healthy lifestyle habits in university students through an educational gamification intervention. The results were clearly favorable to the gamified group, standing out as a strategy of great value to increase motivation and learning. Another study designed in the form of a didactic unit, called Play The Game, showed the impact of the use of gamification through the Play the Game (PTG) experience in the subject of Physical Education in secondary education for the development of healthy behaviors (Monguillot et al., 2015).

There are more gamified proposals that have also been applied in Primary Education, such as the project "El Camino de PiEFecitos" (Chamorro, 2020), which combines physical activity, healthy eating, reading, ICTs and sustainable development, and uses the structure of the Camino de Santiago and the achievement of healthy kilometers. Coombes & Jones (2016) presented the gamified program Beat the Street in England, which aims to promote active trips to school, encouraging students to walk and cycle on their way to school, through a reward scheme.

The first escape games began in Japan in 2007, and arrived in 2012 in the USA (French, 2015). The transition to a pedagogical context has been recent. Gymkhanas, Escape Room or Educational Breakout are applied in the educational context. One of the disadvantages is the logistical aspect. Appreciating this, the organization Educational Breakout (Break Out Edu 2015), developed a model similar to escape rooms, but with the aim of overcoming challenges, and not escaping from a place

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(Duggins, 2019). BreakoutEdu promotes this tool as a way not only to teach content, but to actively engage students in effective communication and team problem-solving (Bellow, 2023), a game where the goal is to open a locked box with different types of keys or padlocks. The educational breakout has elements in common with the Escape Room but with an educational nature. This type of methodological strategy allows students to adapt to any curricular content, promote collaboration and teamwork, develop critical thinking and problem-solving skills, improve communication skills, build critical thinking, and promote motivation. The purpose of this study was to analyze the benefit of a gamification project on the behavior of healthy habits of primary school students.

Methodology

Sample

The sample consisted of 96 subjects, from three different primary schools of A Coruña and Pontevedra provinces, who participated along 2022 and 2023. The mean age was 8.68 years.

Instruments

Healthy Habits Questionnaire: A questionnaire was intended to measure the construct "healthy life", and to consider the maximum number of dimensions objectively, taking into account the scarcity of those aimed at an adolescent audience. On the one hand, we looked at the PACE (Physician-based Assessment and Counseling for Exercise) physical activity questionnaire, developed by Patrick et al. (2001), to determine the level of physical activity in adolescents. This instrument assesses with two questions how many days in the last week and in a typical week the adolescent performs at least 60 minutes of physical activity. On the other hand, Ramírez & Agredo (2012) validated the "Fantastic" questionnaire to measure lifestyle, which was also adapted to children. Years later, content validation and adaptation were carried out using the Delphi technique (Betancurth, Álvarez, & Vargas, 2015), suggesting that the instrument has a good rating capacity. The Questionnaire on Healthy Lifestyle Habits of Eating and Physical Activity (CHVSAAF), which relates the practice of physical activity with eating habits (Guerrero et al., 2014), was also considered.

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From here, we proposed a Likert-type questionnaire due to its wide range as a data collection instrument in studies, either combined with other techniques and used in different stages (Guerrero et al., 2014). According to Namakforoosh (2000), it consists of a series of items related to the object of study to which subjects are asked to respond. Respondents must indicate their degree of agreement with each item or statement, with five being the most commonly used number of answer options. Each of them is assigned a numerical value that will direct the respondent to a total score resulting from the responses to the total of the items of the questionnaire, which indicates the subject's position within the scale (Maldonado, 2007).

The designed questionnaire consists of a total of 15 items, each with 5 response options (not at all agree, somewhat agree, somewhat agree, strongly agree, strongly agree). Of these 15 questions, 3 refer to physical health (items 7, 8 and 11), 3 to social health (items 6, 12 and 15) and 3 to mental health (items 9, 13 and 14), with the remaining 6 referring to a healthy life and habits in general (items 1, 2, 3, 4, 5 and 10). The socio-cultural and economic level of the respondents is taken into account, as well as taking into account their age and previous knowledge (specifically related to block 1 of contents in the Primary Education curriculum in Galicia). The questions were previously reviewed by two external experts (teachers), and ordered to go in increasing difficulty, based on criteria of greater reflection or personal involvement and always taking into account the comfort and veracity of the respondents' answers, as well as we intend to disaggregate those that revolve around the same category. The first two questions shown will be those related to the gender and age of the respondents. The questionnaire was anonymous, as it aims for total and unbiased transparency of the results, and applied online through the Google Forms platform. It was distributed on two occasions, before the intervention, in which we sought to perceive the opinions and previous knowledge of the students on the subject at hand; and then, to know the benefits or harms of a gamified proposal for the achievement of active and healthy habits.

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Self-Assesment Target: To evaluate the intervention program, we used a self-evaluation target. As Hattie (2012) suggests, it is designed to assess the learning outcomes after the project and not the tasks carried out during it. In this way, students focus on what they have learned rather than on what they have done, which allows them to identify strengths and weaknesses and work to improve the latter in future proposals. Since the subject is also a participant in his or her own evaluation, there is a formative function, because in addition to reflecting on his or her own learning, it is the practitioner who assesses the validity or otherwise of a certain method for the achievement of some content or competence (Blandford & Knowles, 2012). In this case, the target was composed of six items, which assessed aspects related to the methodology used, behavior, and attitude towards the proposal. It was distributed on paper only once as a final point of evaluation of the experience. This tool is a visual form of learning assessment in which a series of concentric circles of increasing size are presented. These are divided with straight lines, creating different portions that are each related to a specific item to be scored. Each of these portions is divided into four sectors that are identified with a certain score, from one to four, with the outer sector being given the highest score. Taking into account the item to which each sector refers, the sector corresponding to the score it considers is colored, and the final score of the target is as high as the colored surface there is.

Data processing

Descriptive statistics measures of natural mean (\bar{X}) and percentage (%) were used for data processing, as well as a parametric test, in this case Student's test (t) for paired samples with normal distribution, and comparison of means to test for significant differences ($p < 0.05$), using excel 18.0 software.

Procedure

For participation in the study, the center was informed and the written informed consent of the parents or legal guardians of the participants was requested, with the possibility of leaving the study at any time. The instruments were distributed diachronically. The procedure was simple, the contents were presented, and interactive

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tasks were carried out during the school sessions (approximately half an hour), using the means of the computer classroom, similar to other experiences that also incorporate digital technologies and computer applications (Fatima et al., 2023; Pérez-Jorge et al., 2024).

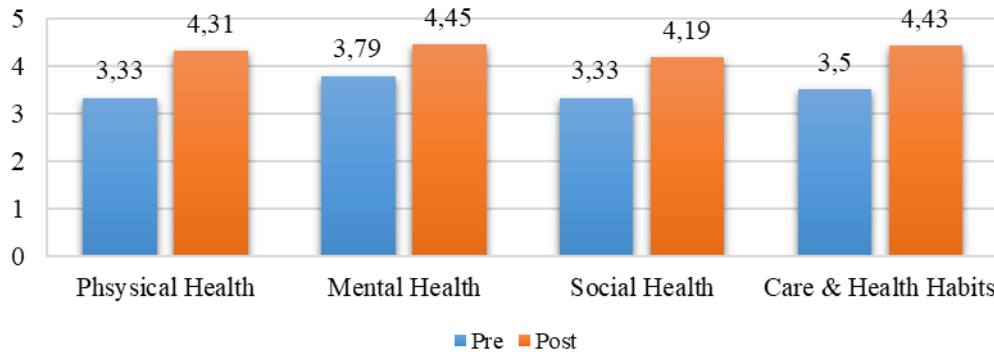
The intervention was a hybrid model of Breakout type indoor-outdoor escape games based on different studies (Almirall et al., 2015; De las Heras et al., 2017; González et al., 2016; Marín & Hierro, 2013; Muñoz et al., 2015; Pérez et al., 2017; Sánchez et al., 2017). What differentiates a Breakout from a Gymkhana is that it can be used in outdoor and open spaces and have a longer duration, eliminating unnecessary moments of tension. The proposed educational breakout has a duration of nine sessions of 90 minutes each along four weeks. In each of these sessions, the different dimensions of the term health in the current curriculum are discussed. Each day we will work on a different dimension necessary for good health in childhood. The narrative of the Educational Breakout is based on the idea that an ultra-processed food company intends to build a business on the football field of our football team. But not at ease with this, what this company intends to do is to change physical activity (football field) for the intake of unhealthy foods and the elimination of sport. In short, we become unhealthy people. In each of the nine sessions, students will have to complete a specific mission, which will be indicated inside their team toolboxes. These boxes are of manufactured origin from old shoe boxes that have been turned upside down and have been personalized with the classroom equipment logo.

In addition to changing the routes and locations, so that they could actually engage in moderate physical activity for 60 minutes a day and complete the international physical activity recommendations (WHO, 2021), each day there were the same number of boxes as the number of participating groups, plus a 'mystery chest' that could only be opened once all the missions had been successfully completed. This box would be differentiated from the rest by its decoration, phrases alluding to the promotion of healthy habits, and locked with several padlocks.

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Results

Figure 1: Average levels achieved according to health categories (pre-post)

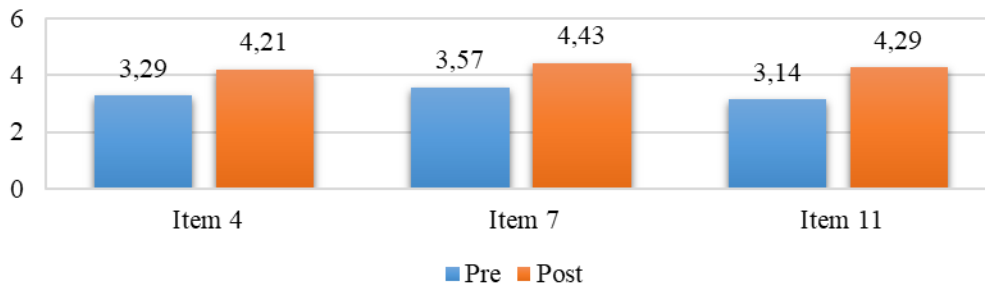


We observe the results in figure 1, and in all categories very similar and stable data are obtained in the pre-intervention phase, close to 3.5 points (out of 5). The lowest scores were obtained by the social health categories, with a score of 3.33 points out of 5, and the physical health category. The category that achieved the highest score was mental health, with a score of 3.79. On the other hand, care and healthy habits achieved a lower score, of 3.5 out of 5.

The stability discussed in the pre-intervention phase continues to be observed in the second phase, in this case with average scores above 4 points in all categories. In the categories of physical health and social health, which in a first distribution of the questionnaires showed lower results, they continue to be so compared to the rest of the results extracted in this second phase. On the other hand, social health had a score of 4.19; and physical health, 4.31. The mental health category, with a 4.45, took the top score; and the category of care and healthy habits, was very close, with a 4.43.

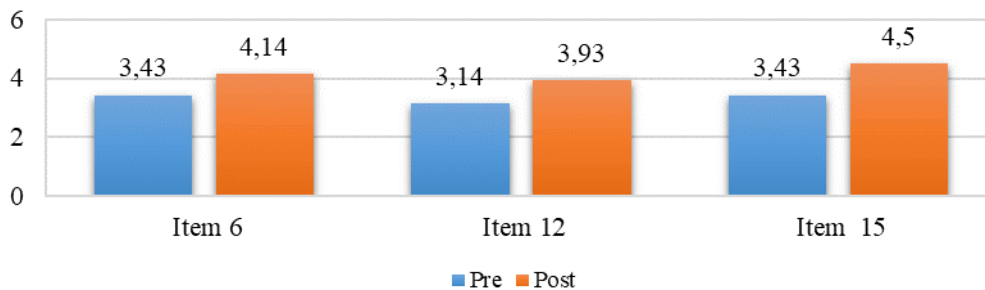
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Figure 2: Physical health outcomes



As we can see in figure 2, on physical health, it is worth noting that the results of article 7 (referring to the positive effects of an active and healthy lifestyle) went from a score of 3.29 to 4.21 points (+0.92); in 8 (referring to healthy food and hydration) from 3.57 to 4.43 points (+ 0.86); and in 11 (referring to the characteristics of natural, processed and ultra-processed foods), from 3.14 to 4.29 points (+1.15).

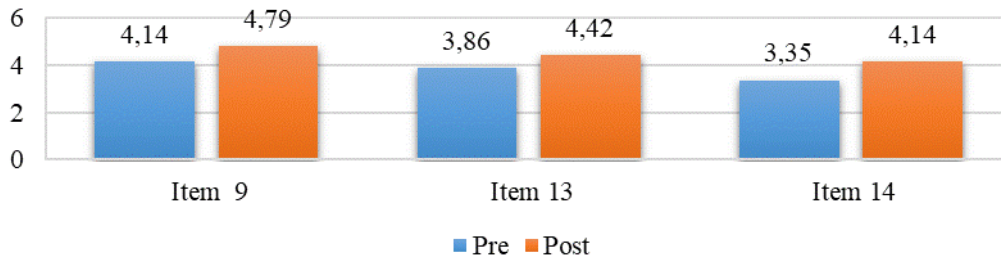
Figure 3: Social health outcomes



On the other hand, (Fig. 3), the data collected in terms of social health were also satisfactory. Item 6 (physical activity relation) and item 15 (various body acceptance relation) obtained an average score of 3.43 in the pre-test, rising to 4.14 points (+0.71) and 4.50 (+1.07) respectively, after implementation. On the other hand, for item 12 (physical activity as a form of leisure), 3.14 points were collected in the pre-test, moving to a final score of 3.93 (+ 0.79).

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Figure 4: Mental health outcomes



Regarding mental health (Fig. 4), item 9 (referring to acceptance of one's own body) obtained 4.14 points in the pre-test, going to 4.79 (+0.65), and item 13 (referring to the assessment of mental health) from 3.86 to 4.42 points (+ 0.56). Finally, item 14 (related to the identification of weaknesses and strengths) with results of 3.36 in the pre-intervention, and 4.14 in the post-intervention (+0.78).

Figure 5: Care and healthy habits

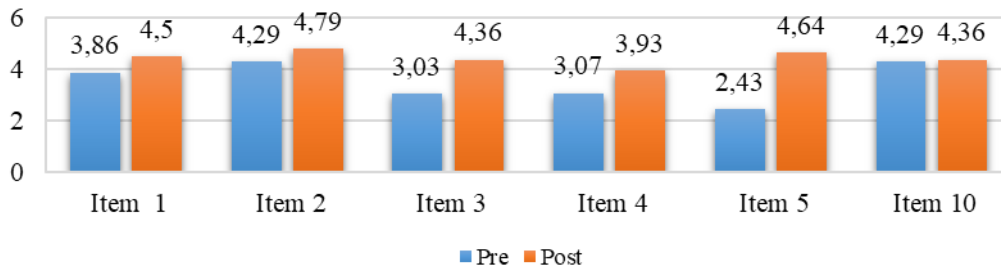
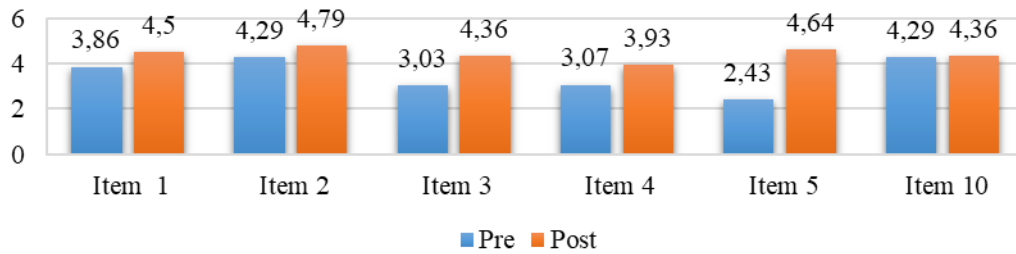


Figure 5 shows the results on care and healthy habits. Item 1 (related to the word health) went from 3.86 to 4.5 points on average (+0.64); item 2 (health assessment) obtained results of 4.29 in the first phase and 4.79 in the second (+0.5); Items 3 (relating to healthy habits) and 4 (relating to positive and negative health habits) went from a score of 3.07 to 4.36 (+1.29) and 3.93 (+0.86) respectively. Item 5 (related to the description of healthy habits) achieved a mean response score of 2.43 in the pre-test and 4.64 in the post-test (+2.21). Finally, item 10 (relating to the development of healthy habits) had mean results of 4.29 in the pre-intervention and 4.36 in the post-intervention (+0.07).

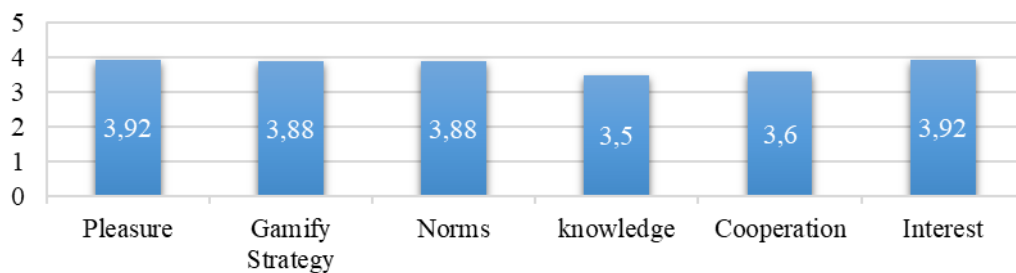
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Figure 6: Average levels achieved by health category



In the representation of all categories (Figure 6), we observed that the results a posteriori were better than those collected during the pre-test. Thus, physical health grew by 22.74%; social by 25.83%; mental health by 14.83%; while care and healthy habits accounted for 26.57%. Despite the fact that mental health was the category that grew the least, we can see that it is ranked as an outstanding category, having the highest average scores both before and after the intervention.

Figure 7: Self-assessment target results



With regard to the self-assessment target (Figure 7), the results are very similar in all items, exceeding 3.5 points. The most valued item was interest in the proposal made, which reached 3.96 points. Enjoyment and cooperation during the experience reported a score of 3.92. The validity of the use of this methodological strategy in the classroom obtained a score of 3.88, as did the adherence to its norms (3.88). Of the 96 participants in the study, nine of them rated the experience of the educational breakout with a 4 out of 4 in all the variables studied, which means that 64.3% of the students

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gave the maximum score to the intervention proposal. Of the remaining five, the item "cooperation" obtained an average of 3.6; the item "norms" an average of 3.4; the item "validity" a mean of 3.4; the item "knowledge" an average of 3; the item "enjoyment" an average of 3.6 and finally, the item "interest" a 3.8.

Data table 1: T-Student test (Health categories)

	P. HEALTH	M. HEALTH	S. HEALTH	C.HABITS
\bar{x}	3,33	3,79	3,33	3,50
<i>ST</i>	0,71	0,78	1,07	0,99
<i>DF</i>	95			
<i>t</i>	-10,82	-7,60	-7,12	-7,37
<i>CVt</i>	1,99			
<i>p</i>	<0,05			

As can be seen in Table 1, the data obtained from the t-test of comparison of means, with a confidence interval of 95%, indicate in all studied factors (physical health, mental health, social health, and healthy care and habits) that the critical value of $t > t^{st}$, so it is considered that the gamified school proposal obtained significant changes among the participating students between its beginning and final.

Discussion

Despite the fact that gamified proposals for the promotion of healthy habits in primary education are still scarce, one of the major drawbacks to being able to make a comparison is its great methodological variability (Arufe-Giráldez et al., 2023), and especially the analysis of its impact on motivational and psychological factors, moving away from a more holistic vision, that integrates a physical, social and personal care perspective too.

Healthy habits are a topic that has been studied repeatedly, often also from the perspective of gamification, like the proposal of Rodríguez-Ferrer et al. (2024). Specifically, Romero & López (2021) does this through a series of sessions in the form of a game in which multiple aspects aimed at healthy living are worked on, in which each session works on an individual aspect to which a certain score is assigned. which

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will serve to advance in a gamified race in which the person who accumulates the most points and therefore is healthier will win.

Other studies highlight the importance of blended learning, combining face-to-face teaching with non-face-to-face technology and using challenges and rewards as a gamifying element. The Play the Game study (Monguillot et al., 2015) has concluded that this methodology favors motivation and the promotion of healthy habits. In addition, Play the Game has introduced innovative elements such as personalization, cooperation, emotions, technology, and the combination of formal and informal contexts in order to respond to current educational demands and new learning ecologies. This is where the idea of uniting gamification in the classroom with a connection outside of it comes from, as well as the creation of a much broader context beyond what a simple classroom game would allow. What is proposed in this educational Breakout experience is that, in addition to leaving the classroom itself, it includes elements such as a web page from which students can feel inside the game from anywhere else, as well as personalized elements that make the experience live in a different way. In other experience, linked to the promotion of physical activity in which used a specific gamify app (Active Travel), achieved a behavioral change in the students towards a healthier lifestyle (Fatima et al., 2023), despite the fact that there are researchers who propose improving applications for young people to promote healthy habits (Pérez-Jorge, 2024).

In line with the present, a recent study carried out in Primary Education proposes the methodological strategy of the escape room for the Physical Education classroom (Segura & Parra, 2019), who showed that this type of methodology develops motivation, teamwork and collaboration and cooperation among students, although other previous studies that have used the escape room have pointed out the need to previously study the subject matter covered in these games in order to solve the challenges successfully (Jiménez et al., 2017).

For their part, the students say that the use of the escape room in the classroom is motivating and a good way to encourage study without the need for an exam. Students also concluded that the use of this methodological strategy is an experience that promotes teamwork and cooperation. As for the methodological strategy used in this study, the educational breakout, perhaps because it is something relatively recent

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and complex to apply, there are very few studies that have worked with it. A recent study analyzes it from the field of Early Childhood Education (Arimon et al., 2022) states that the educational breakout requires thinking, linking and memorizing various parameters, although it indicates the need to find a balance between the difficulty of the tests and the previous knowledge of the students so as not to demotivate in the game.

As in our study, Fatima et al. (2023) found that their gamified school program towards a healthy lifestyle improved engagement and mental health among participating students. Likewise, Sotos-Martínez et al. (2024), found significant differences after a gamified intervention, confirming that the satisfaction of basic psychological needs, intrinsic motivation, and social relationships was enhanced, while demotivation among students decreased. If we talk about the promotion of care and healthy habits, and although it refers to the secondary education stage, the study by Rodríguez-Ferrer et al., (2024) supports our findings. Significant differences were found in favor of the experimental group of a fifteen-week gamified program to promote healthy habits, both in physical health and in care and healthy habits. In a similar vein, positive results were also found in the study by Pourabbasi et al. (2020), in relation to the increase in physical activity; and in that of Morales et al. (2024), in physical-motor skills, after 12 weeks of a gamified physical-educational intervention. Analogous to us, the work of Martín et al. (2022) found benefits in terms of anxiety reduction, problem solving, and improvement of group cooperation; with that said, other problems that the gamified methodology entails in relation to its organization and control were also recognized.

In short, it has been studied in the literature on the subject that the implementation of methodologies such as gamification, and playful strategies such as educational breakout favor the promotion of healthy habits and foster motivation, attitudes and positive emotions in Primary Education students. As we have seen, the results have been clearly positive, which makes us proclaim that in addition to mere enjoyment, these games bring multiple benefits to our students. In this case, with the possibility of applying the proposal in a Primary Education classroom it has been possible to verify that these innovative methodologies that are increasingly common in our classrooms, are in fact, a spectacular way to dynamize classes, promote active learning, the development of cognitive skills, logical thinking, etc. Teamwork,

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motivation, application of knowledge, development of social and emotional skills, as well as providing a fun and entertaining experience for students.

It is true that these types of proposals involve large amounts of time and work and on many occasions, it is impossible to complement them with day-to-day teaching work. We must interpret our results with caution, since we understand that as it is a novel methodology for most of the participating students, as we recalled in the previous lines, it requires intense preparation by the teacher of the materials, spaces and activities, it could lose its effectiveness in longer periods of intervention, because the final week we appreciated a general loss of energy. In view of all this, several studies suggested continuing to evaluate the effects of the application of gamification in the Physical Education classroom to promote improvements and healthy habits (Arufe-Giráldez, 2022; Pérez-Jorge et al., 2024).

Conclusions

Based on the main problem of the work, the research managed to determine that gamification is a motivating methodology for students and appropriate to comply with international recommendations for physical activity and achieve healthy habits during the school day. With the gamified intervention, it was possible to improve all the health areas studied: physical, mental, social and care.

Although this project has reported positive and significant results and impressions, it is crucial to be caution and pay attention to its complex and negative aspects, such as the difficulty in adapting the proposals to the different realities and group levels, or the high teaching load they require, which implies the need for continue studying this type of gamified proposals related to the promotion of healthy habits from school, both in an indoor and outdoor context, and to better specify its applicability, propose it from an earlier age.

Limits and new lines of study

We recognize that without the experience, dedication and coordination of the group of teachers responsible, the same results would not have been obtained, which

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could be a conditioning factor for teachers and more novice groups, who in addition to inexperience do not have as much time to dedicate to it.

In particular, it would be interesting to implement it in children, where, according to the researchers, there are far fewer examples than in secondary and higher education, and where it is important to analyse the differences between gamified education in enclosed spaces or in contact with nature in the promotion of healthy habits.

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