19th FIEPS European Congress

"Inspiring Excellence:
Empowering the Future of Physical and Sport Education"

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19th FIEPS European Congress

FULL TEXT BOOK

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ASDER TİKA igenas

Message from the Congress President

It is with great pride and heartfelt gratitude that I address you through this abstract book, marking the successful completion of the 19th FIEPS European Congress, held under the inspiring theme: “Inspiring Excellence: Empowering the Future of Physical and Sport Education.”

Hosted in the vibrant and historically rich city of Antalya, Turkey, this congress brought together over 300 participants and featured nearly 250 scientific contributions, creating a dynamic and interdisciplinary platform for the exchange of knowledge, ideas, and practices. With delegates from 42 countries, the congress served as a true celebration of international collaboration and academic excellence in the fields of physical education, sport sciences, health, and movement culture.

As the Congress President, I am deeply honored to have witnessed the passion, innovation, and commitment reflected in every session, presentation, and discussion. This gathering was not only a testament to the strength of our academic community, but also a call to action for shaping the future through inclusive, quality, and forward-thinking physical and sport education.

I extend my sincere appreciation to all authors, speakers, moderators, participants, and institutional supporters who contributed to making this event a memorable success. I would also like to thank the organizing committee, volunteers, and technical teams whose tireless efforts were invaluable in every step of the process.

I hope this abstract book serves not only as a record of the valuable academic work shared during the congress but also as a source of inspiration for future research, policy development, and educational transformation.

With best wishes for continued success in your scholarly and professional endeavors,
Warm regards,

Prof. Dr. Neşe Şahin
President of the 19th FIEPS European Congress

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Date: April 24, 16:45-18:00

Symposium Topic: The FitBack Toolkit: Missing Piece between Fitness Monitoring and Physical Literacy

Symposium Presentations:

1. The Scientific Background of FitBack Platform

2. From Assessment to Empowerment: The FitBack Toolkit's Role in Enhancing Physical Literacy

3. Application of the FitBack Toolkit for Improving the Physical Literacy of Students in Physical Education Classes – Serbian Teachers' experiences

4. Monitoring physical fitness to enhance the development of physical literacy in children and adolescents - Estonian example

MAIN ORGANIZATIONS

TABLE OF CONTENTS
Full Text

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FULL TEXTS

Modern learning process: Teaching gymnastics with the application of kinematic modelling

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Abstract: The aim of this research was to promote a new method in teaching practice which allows a better understanding of movement in space. This method uses computer programs for the analysis of sports movements. There are few studies that examine the impact of video feedback on skill development. In this case, the analysis of a basic gymnastics exercise was carried out to facilitate the modern educational process in teaching practice. The exercise was performed at the 40th World Cup competition in Artistic gymnastics in Maribor (SLO). The kinematic parameters were determined by the Ariel Performance 3D Video System (APAS), using sixteen (16) anthropometric reference points and eight (8) body segments, of which one represents the body's center of gravity. Selected exercise was analyzed on Uneven Bars - Stalder circle to Handstand. Stalder circle to Handstand belongs to a group of basic movements and it is necessary to learn this technique on Uneven Bars, so that we can master more complex movements. The goal of this research was to explain a new way of adopting teaching practice in the students' educational process. This use of modern technologies in sports helps students to adopt the exercise much faster, by spotting their mistakes and correcting it. Research related of video techniques in sports practice requires students to think how to use this technology.

Keywords: Female gymnast, kinematics, Uneven bars, technique analysis.

Introduction

The influence of modern technology has contributed to including video analysis of sports movement in the learning of a new gymnastics exercise or in detecting errors when learning new exercises. This process of error detection reduces the stagnation process in the advancement of learning new exercises. In an effort to develop more efficient and practical interventions for college performance, some professors have incorporated a variety of technological innovations. In sports research, only a few studies have examined the effects

of video feedback on athletic skill development. The effects of combining expert video modelling with self video feedback as an adjunct to the standard can improve new practical skills in college. Jonassen and Grabowski (1993) found that individual learning styles develop as a result of heredity, past life experiences and demands linked to environmental circumstances, where both strong and weak points develop. Gardner (1985) and Dunn & Dunn (1992) developed assessment systems that addressed the differences in teaching and learning styles. Research suggests that students learn best when the teaching style and learning style match (Brandt, 1990; King et al., 2009).

Kinematics is a part of the dynamics defining sports movements – displacement of the direction of movement, speed, velocity, angular momentum. To define kinematic parameters, modern teaching practice is improved by software designed for this purpose. These computer programs use 2D or 3D methods to provide a biomechanical analysis of a certain sports technique. Video motion analysis systems have many diverse applications related to gait analysis, rehabilitation, sports performance, medical robotics, and biofeedback. Videos based on 2-dimensional motion analysis systems are recognized as a useful tool for gait analysis. Complex analyses require in-depth knowledge of 3D systems, and the equipment used is not commonly available and cheap. In the teaching practice of physical education of college students, the following 2D software is being used: Ka 2 Video, Kinovea, Skill Spectator and Human. The most frequently used modern 3D software is the Ariel Performance 3D Video System (APAS) program, used in Artistic gymnastics analyses of complex movement. For 3D analysis, the software is much more complex and expensive, but it displays many more kinematic parameters that allow a better analysis of motion in space. The software “KA 2 video” and “Human TM” have been made for two-dimensional kinematic movement analysis. They require software for a 2D kinematic method with one camera. “Kinovea” comes in two versions, the stable, official one and an experimental one. “Kinovea” measures distances and times semi-automated tracking to follow points and check live values or trajectories. It allows the observation of two videos side by side and synchronizes them on a common event. Data processing for 3D analyses was carried out according to the standards of the APAS system. An analysis of basic gymnastics movement was provided in this research.

In Artistic gymnastics, exercises represent the basic movement structures, interconnected with a competitive combination of compositions which gymnasts present to the judges during competitions. Judges define errors in movement and evaluate exercise based on subjective observations and prescribed rules (Petković, 2018). Model assessment, which is provided by the Code of Points (2005-2008) refers to an implementation model of performance in gymnastics (Kolar, 2006). Any deviation from this model means breaking a rule that is sanctioned with the loss of a certain number of points for a mistake that can be aesthetic or technical in nature (Kolar, 2006). Kinematic analysis of a certain kind of movement is becoming more and more frequent in artistic gymnastics; particularly since

the obtained information enables a more rational and economical instruction of the analyzed movement (Brueggemann, Cheetham, Alp, & Arampatzis, 1994; Takei, 1998; Kolar, Andlovic-Kolar, Štuhec, 2002; Pidcoe et al., 2010; Hamill et al., 2014; Farana et al., 2015; Petković et al. 2024). Systems for the kinematic analysis of human movement provide precise measurement of values and parameters of athletes' movements during the performance of any sports technique.

The aim of this research was to promote a new method in teaching practice which allows a better understanding of movement in space. This method uses computer programs for the analysis of sports movements. In this case, the analysis of a basic gymnastics exercise was carried out to facilitate the modern educational process in teaching practice.

Material And Method

The participant in this research was an active competitor with years of experience, the elite gymnast Kristina Palesova from the Czech Republic, whose anthropometric characteristics fit the championship model. The participant performed a basic movement, the Stalder Circle to Handstand on the Uneven Bars. The exercise was performed at the 40th World Cup in Artistic gymnastics in Maribor (SLO). The Ethics Committee of the Faculty of Sport, University of Ljubljana approved all experimental procedures according to the revised Declaration of Helsinki. Data processing was carried out according to the standards of the Ariel Performance 3D Video System (APAS), used for kinematic analysis, which included 16 reference points conducted through several phases: frame grabbing, digitalization of the recorded videos and the reference points of the body, transforming the three-dimensional space, data filtering, and calculation of kinematic quantities. An 8-segment anthropometric model was also used (foot, ankle, knee joint, hip joint, wrist, elbow joint, shoulder joint and head). The body's center of gravity (TT) was calculated based on Winer's (1991) model. The frequency of the camera was 50 Hz. All movements were performed in the same right direction. Before recording during the competition, in order to define the field of measurement and to take precise calibration of the space, three frames of reference (2x1m3) were leveled on the higher and lower bars. A visual representation of the 3D kinematic modeling of the Stalder Circle to Handstand on the Uneven bars can be seen in Fig.1. The images that are obtained are colored and very similar to the simulation of the human body and movement. Determing kinograms od kinematic modeling of the Stalder Circle to Handstand on the Ubars can be seen in Fig.2.

Fig 1. Visual representation of the 3D kinematic modeling of the Stalder Circle to Handstand on the Ubars

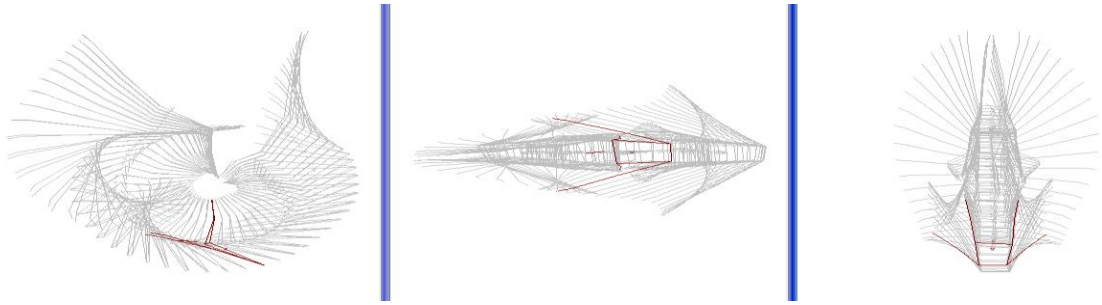
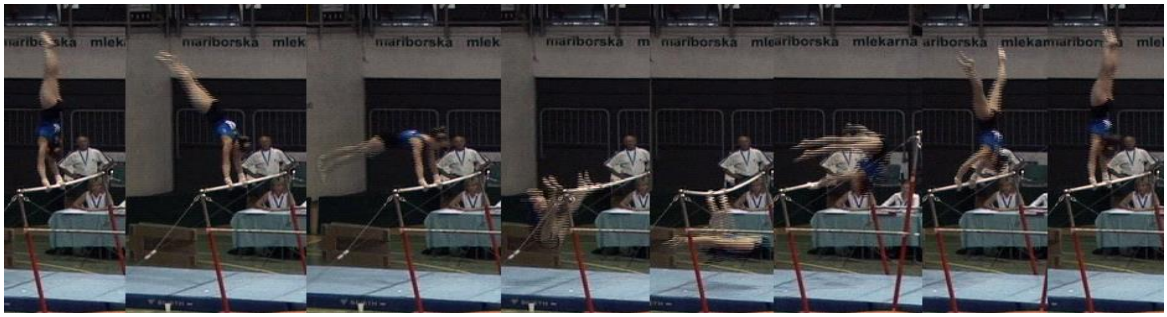


Fig 2. Determing kinograms od kinematic modeling of the Stalder Circle to Handstand on the Ubars



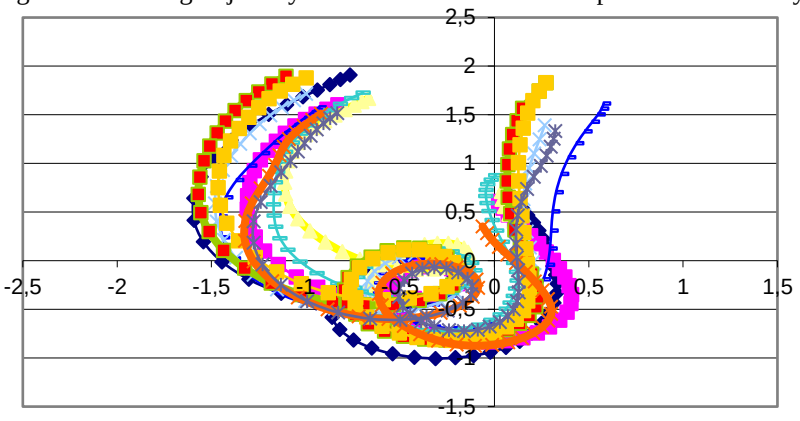
Results

After the recorded movement, significant positions should be determined based on a theoretical movement model. Various kinematic parameters can be determined by following the protocol of the APAS program, such as the trajectory of reference points along the y-axis:

1. The trajectory of the shoulder along the y-axis (TZRY);
2. The trajectory of the crown of the head along the y-axis (TTGY);
3. The trajectory of the foot peak along the y-axis (TVSY);
4. The trajectory of the wrist peak along the y-axis (TVSY);
5. The trajectory of the knee peak along the y-axis (TKSY).

The trajectory of movement of kinematic parameters on the y-axis can be seen in Diagram 1.

Diagr. 1. Determing trajectory of movement of kinematic parameters on the y-axis

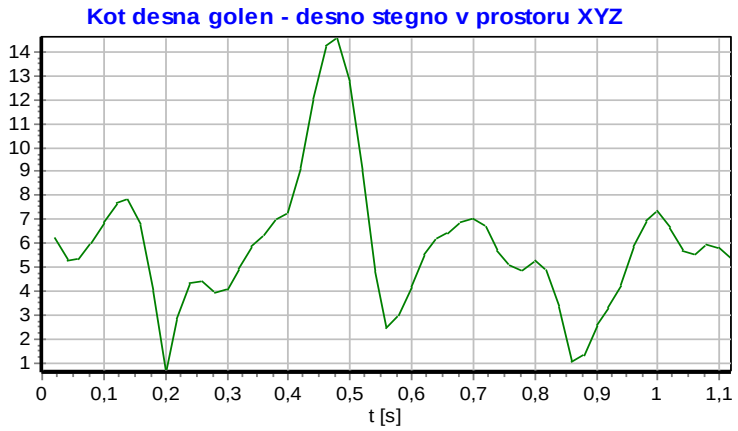


The trajectory of the body center of gravity along the y-axis (TTTY). All kinematic parameters must be presented as abbreviations (TZRY, TVSY, TTTY...). The goniometric sample of the kinematic parameters can be presented as:

1. The angle of the hip joint (GUZK);
2. The angle of the shoulder joint (GUZR);
3. The angle between the segments of the head (GUGT);
4. The angle between the segments of the shoulder joint center located on the x-axis (GURX).

Determining the angles and angular velocities of movement some of individual body parts can be some of the benefits using this APAS program, as in Diagram 2.

Diagr. 2. Determing angles and angular velocities of movement some of individual body parts



Conclusion

The goal of this research was to explain a new way of adopting teaching practice in the students' educational process. This use of modern technologies in sports helps students to adopt the exercise much faster, by spotting their mistakes and correcting it. It is necessary to introduce new technologies into physical education classes so that students, can also analyze sports movement for themselves. Using such programs in the analysis of sports movement techniques makes the teaching process more interesting and fun. This technique analysis in the APAS program is just one part of the modern programs used in technique analysis. There are other versions, which are free and in used as applications on mobile phones, tablets and computers. Research related to the introduction of video techniques in sports practice requires different data to be obtained in 2D and 3D systems.

Acknowledgements: The authors would like to thank the Slovenian Gymnastic Federation for their Project biomechanical analysis of basic elements on Uneven Bars at the 40th World Cup in Artistic gymnastics in Maribor (SLO).

Conflict of interest statement: the authors declare that they have no conflict of interest with reference to this paper.

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Beijing 2022 Winter Olympics: A multi-dimensional analysis of impact and legacy

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Abstract: The 24th Winter Olympic Games in Beijing 2022 were a significant event in the history of China, as Beijing became the first city to host both the Summer (2008) and Winter (2022) Olympic Games. This significant sporting event served to showcase China's organisational capabilities and technological advancements, whilst also providing a substantial economic boost to winter sports and the regional economy. The utilisation of a SWOT (used to identify strengths, weaknesses, opportunities, and threats) model offers a systematic framework for the effective analysis of such large-scale events. The PESTEL model (Political, Economic, Social, Technological, Environmental, Legal) is a marketing tool of significant value when analysing the Beijing 2022 Winter Olympic Games. It facilitates comprehension of the impact that external factors exert on the organisation, conduct, and outcomes of this significant international sporting event. It is evident that the Beijing 2022 Winter Olympics have exerted a profound influence on China's economy, social structure, and technological development. Beijing's distinction as the first city to host both the Summer and Winter Olympics has necessitated substantial investments aimed at showcasing its technological prowess, catalysing economic growth, and fostering social transformation. A comprehensive PESTEL and SWOT analysis underscores the role of both external and internal factors in shaping the Beijing 2022 Winter Olympics, thereby propelling economic growth, technological innovation, and the enhancement of international relations.

Keywords: Olympics, impact, SWOT, PESTEL, COVID-19.

Introduction

The Olympic Games, as a major sporting event, have invariably exerted a profound influence on the economy, social structure and technological development of the host countries. The Beijing 2022 Winter Olympics were no exception to this rule. The hosting of the Games necessitated considerable investment, yet they also provided an opportunity for the country to showcase its technological capabilities, stimulate economic growth and contribute to social change.

The 24th Winter Olympic Games in Beijing 2022 were a significant event in the history of China, as Beijing became the first city to host both the Summer (2008) and Winter (2022) Olympic Games. This significant sporting event served to showcase China's organisational

capabilities and technological advancements, whilst also providing a substantial economic boost to winter sports and the regional economy. The utilisation of a SWOT (used to identify strengths, weaknesses, opportunities, and threats) model offers a systematic framework for the effective analysis of such large-scale events.

The purpose of this research is evaluate the impact of the Beijing 2022 Winter Olympics using SWOT and PESTEL analysis.

Research methods and organization. To evaluate the impact of the Beijing 2022 Winter Olympic Games SWOT and PESTEL analysis were used.

The abstract of this research was presented at the 19th FIEPS European congress.
SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is a powerful planning tool that allows for the assessment of a company, event or individual's strengths and weaknesses, as well as the existing opportunities and threats, with a view to overcoming obstacles and achieving goals [11].

The elements of a SWOT analysis are:
1. Strengths and weaknesses, which are considered internal factors of the organization and are within the control of the organization.

2. Opportunities and threats, which relate to the company's business environment and are considered external factors beyond the company's control [11].

It is well known that one of the most effective methods of analyzing the market situation is the PESTEL analysis (Political, Economic, Sociological, Technological, Legal, Environmental), which is designed to predict, identify and evaluate factors [10].

When performing a PESTEL analysis, different evaluation factors can be used to assess the importance of each factor [15].

In general, the choice of evaluation factors in a PESTEL analysis depends on the specific task and objectives of the analysis, as well as the resources and data available. A combination of methods (e.g. PESTEL and SWOT) can provide a more accurate assessment of the importance of each factor and improve the quality of the decisions made based on the results of the analysis [10].

Research Results. Table 1 presents the SWOT analysis of the Beijing 2022 Winter Olympics.

The table makes it clear that Beijing 2022, in addition to opportunities for China, also posed certain threats, without the neutralization of which the Games would have failed.

Table 1. SWOT analysis of the Beijing 2022 Winter Olympics

Strengths	***Weaknesses***
1. Beijing became the first city to host both the Summer (2008) and Winter Olympics (2022) [3]. 2. Natural CO2 refrigeration systems, which were employed for the first time in China and at the Olympics, have been shown to reduce carbon emissions and energy consumption [1]. 3. Notably, the Olympic Games were streamed on the video streaming platform Twitch for the first time, garnering 720,000 views [1].	1. The severe challenges of the COVID-19 pandemic, including the closed-loop system, limited audience attendance, and reduced festive atmosphere. 2. The use of artificial snow in a region with water scarcity. 3. Several countries, including the USA and the UK, have initiated a boycott in response to human rights issues in China.
Opportunities	***Threats***
1. The 2022 Beijing Winter Olympics have attracted an audience of over 300 million, thereby stimulating the growth of China's winter sports industry and augmenting tourism [1]. 2. The Chinese government used the Games as a platform to showcase its advancements in the field of renewable energy and green technology, thereby positioning itself as a global leader in sustainability. 3. The 2022 Beijing Winter Olympics were met with a significant opportunity to maximise social and economic benefits for residents of the three competition zones: Beijing, Yangtze River Region and Zhangjiakou [3].	1. After the Games, many venues were at risk of becoming "white elephants", leading to long-term financial losses and maintenance problems [2]. 2. Allegations of human rights abuses in China, particularly against the Uyghur population, are leading to global criticism and negative media coverage [7]. 3. A number of countries, including the USA, UK, Canada and Australia, declared a diplomatic boycott in light of concerns regarding China's human rights record. This development had considerable ramifications for international relations, media coverage, and the global perception of the Games. The political controversies that dominated the sporting events precipitated diplomatic tensions [14].

The PESTEL model is a marketing tool of significant value when analysing the Beijing 2022 Winter Olympic Games. It facilitates comprehension of the impact that external factors exert on the organisation, conduct, and outcomes of this significant international sporting event.

Political: Several countries, including the United States, Canada, the United Kingdom, and Australia, announced a diplomatic boycott of the 2022 Beijing Winter Olympics. These countries cited concerns about the human rights situation in China, particularly the treatment of Uyghurs in Xinjiang, and the political situation in Hong Kong [13].

The Games took place amid rising geopolitical tensions. Allegations emerged that China had advance knowledge of Russia's plans to invade Ukraine and requested a postponement until after the Olympics to avoid overshadowing the event. China denied these allegations, but the situation highlighted the complex international dynamics that would prevail during the Games [5].

Economic: The 2022 Beijing Winter Olympics were expected to accelerate the development of China's winter sports industry, with the total volume of the industry expected to exceed one trillion yuan by 2025. The annual output value of the ski industry was predicted to reach 27 billion yuan [12].

Social: The Games were intended to popularize winter sports in China. The initiative was part of a larger program to encourage a healthy lifestyle [6]. Beijing 2022 attracted more than 300 million people to winter sports, accelerating the growth of China's winter sports industry and boosting tourism [1].

Technological: Due to the aridity of Beijing's climate, the organisers of the Games were compelled to rely on artificial snow, a practice that gave rise to concerns regarding environmental sustainability. China employed state-of-the-art snowmaking technology to ensure optimal conditions [9]. During Beijing 2022, China implemented advanced technologies such as robotics, temperature checks, and advanced disinfection techniques to manage the risks of COVD-19 [2].

Environmental: The production of artificial snow required significant water resources, which raised concerns about water shortages.

Legal: The China National Intellectual Property Administration (CNIPA) has announced the registration of the mascots and logos for the Beijing 2022 Winter Olympics. This legal protection was intended to prevent unauthorised commercial use and ensure that the official symbols were used properly, with penalties for violations [8]. The hosting of the Olympic Games necessitated adherence to international regulations and standards, which resulted in the revision of local laws and policies to align with global expectations [4].

Conclusion

It is evident that the Beijing 2022 Winter Olympics have exerted a profound influence on China's economy, social structure, and technological development. The city of Beijing has been distinguished as the first city to host both the Summer and Winter Olympics. This has necessitated substantial investments with the aim of showcasing its technological prowess, catalysing economic growth, and fostering social transformation. A comprehensive PESTEL and SWOT analysis underscores the role of both external and internal factors in shaping the Beijing 2022 Winter Olympics, thereby propelling economic growth, technological innovation, and the enhancement of international relations.

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Differences in dimensions of competitive anxiety in football players of various biological acceleration

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Abstract: This study aimed to examine differences in competitive anxiety among youth football players in relation to their level of biological maturation and playing experience. The sample consisted of 104 male athletes in the older pioneers age category, recruited from six Croatian football clubs. Competitive anxiety was assessed using the short form of the Competitive State Anxiety Inventory-2 (CSAI-2). Descriptive statistics were used to summarize the data, while group differences were tested using the Kruskal-Wallis and Mann-Whitney U tests. The findings did not support the initial hypothesis that accelerated biological development is associated with greater psychological stability and enhanced athletic performance. Instead, results suggest that psychological readiness plays a more decisive role in competitive outcomes than somatic maturity. Athletes with greater mental resilience demonstrated more effective anxiety regulation, which may contribute positively to performance. Moreover, the study highlights that psychological development progresses at an individual pace and is not necessarily aligned with physical growth. Accelerated biological maturation does not equate to faster psychological development. Playing experience emerged as a more reliable predictor of psychological stability than biological age.

Keywords: Adolescents, development, psychology, team sport.

Introduction

Football is a globally popular, high-intensity team sport that requires the integration of complex motor skills, frequent changes in movement patterns, and rapid decision-making under pressure. Matches demand a combination of aerobic endurance, anaerobic power, agility, strength, and technical skills, all of which must be effectively regulated through both physiological and psychological mechanisms. Particularly in youth football, players are navigating the dual challenges of athletic development and adolescence, during which both physical and emotional systems are undergoing rapid change.

Youth athletes in competitive environments are often exposed to performance-related stressors, making psychological preparedness as important as physical conditioning. Among the most studied psychological variables in sports is competitive anxiety—defined

as a transient emotional state elicited before or during performance that is characterized by tension, apprehension, and heightened autonomic nervous system activity (Weinberg & Gould, 2015). Competitive anxiety is considered multidimensional, consisting of cognitive components (such as negative thoughts, worry, or fear of failure) and somatic components (such as increased heart rate, muscle tension, or gastrointestinal discomfort). According to Martens et al. (1990), these components interact with situational and individual factors to influence performance outcomes.

The two primary types of anxiety in sport contexts are state anxiety and trait anxiety. State anxiety refers to temporary, situational responses that fluctuate depending on the perceived threat of the competitive environment. Trait anxiety, on the other hand, is considered a stable personality characteristic that predisposes individuals to experience anxiety across various settings. These forms of anxiety do not operate independently but are moderated by psychological and developmental variables such as personality traits, emotional regulation capacity, and prior competitive experiences (Woodman & Hardy, 2003).

In adolescence, the influence of biological maturity on psychological functioning is particularly significant. Maturation, often assessed via age at peak height velocity (PHV), is known to affect not only anthropometric dimensions and physical performance but also psychological characteristics such as self-perception and emotional control (Malina et al., 2004; Philippaerts et al., 2006). While early maturing players may enjoy short-term advantages in physical competitiveness, they may not necessarily be better equipped to handle competitive pressure or psychological strain. In fact, the asynchronous development of physical and psychological systems can lead to mismatched expectations and vulnerabilities (Malina et al., 2007).

Recent research supports the notion that psychological development in young athletes does not always parallel physical growth. Domínguez-González et al. (2024) reported that older and more experienced adolescent footballers demonstrated higher levels of self-confidence and lower competitive anxiety, suggesting a cumulative benefit of sport exposure over time. Similarly, Lukova et al. (2023) found that dispositional optimism—a cognitive trait linked to resilience and adaptive coping—was inversely related to anxiety symptoms in adolescent athletes.

Given the pressure to succeed and the increasing competitiveness of youth sport, it is not uncommon for psychological stress to contribute to performance decrements, burnout, or even sport dropout. According to Smith and Smoll (as cited in Grasso, 1999), key reasons for youth sport withdrawal include excessive anxiety and a perceived lack of enjoyment. Therefore, understanding the psychological challenges facing young athletes, particularly in relation to maturity and experience, is essential for building supportive and developmentally appropriate training environments.

This study aims to investigate differences in competitive anxiety among youth football players categorized by biological maturity and playing experience. By identifying potential disparities in anxiety levels, the research provides insights for coaches, sports psychologists, and talent development professionals to better structure competitive exposure and psychological support during critical stages of adolescent development.

Methods

Participants

The sample consisted of 104 male youth football players in the U15 age category recruited from six football clubs located in the Dalmatian region of Croatia. All participants were active in organized training and competition within their respective clubs. The sample's demographic and anthropometric characteristics including age, body mass, body height, sitting height, and training experience are presented in Table 2.

The Ethics Committee of the Faculty of Kinesiology approved the study (approval number: 2181-205-02-05-25-019 Split, Croatia), in accordance with the ethical standards of the Helsinki Declaration of 1964. All players had a valid membership card from the Croatian Football Federation, were fully healthy, and were examined by a local sports medicine specialist. All participants consented to the examination, and their anonymity was guaranteed.

Procedures

The data collection took place on the day of scheduled football matches. Each participant completed the Competitive State Anxiety Inventory-2 (CSAI-2) short-form questionnaire before the start of their respective matches. (CSAI-2), which evaluates three dimensions of competitive anxiety: self-confidence, cognitive anxiety, and somatic anxiety. This instrument is widely used in sport psychology research due to its established reliability and construct validity (Cox, Martens, & Russell, 2003). The internal consistency of each subscale in the present study was evaluated using Cronbach's alpha coefficients and average inter-item correlations (Table 1). Additional information regarding chronological age and years of training experience was collected alongside the questionnaire. Following the self-report, anthropometric measures were conducted using standard protocols, including height, weight, and sitting height.

To assess biological maturity, age at peak height velocity (APHV) was estimated for each player using the Mirwald et al. (2002) equation. Individual deviations from the average APHV were then calculated using the method outlined by Milić et al. (2014). This allowed for classification into three biological maturity clusters: Cluster 1 (late matures, APHV deviation ≤ -0.51 years), Cluster 2 (average matures, APHV deviation between-0.5 and 0.5

years) and Cluster 3 (early matures, APHV deviation ≥ 0.51 years).

Data Analysis

Descriptive statistics (mean and standard deviation) were computed for all variables. The reliability of the CSAI-2 subscales was assessed using Cronbach's alpha and average inter-item correlations. To analyze group differences in competitive anxiety dimensions, non-parametric tests were employed due to the nature of the data distribution: Kruskal-Walli's test was used to evaluate differences across the three biological maturity clusters and Mann-Whitney U test was applied to assess differences based on training experience (i.e., more experienced vs. less experienced players). All analyses were performed using SPSS Statistics (Version 25.0), and the level of significance was set at $p < .05$.

Results

Table 1. Cronbach's alpha and average inter-item correlations for each dimension

Variables	**Cronbach's alpha**	**Average Inter-Item Correlation**
Confidence	0.72	0.30
Somatic Anxiety	0.80	0.46
Cognitive Anxiety	0.83	0.50

Table 1 presents the reliability parameters, including Cronbach's alpha coefficients and average inter-item correlations for each dimension of the questionnaire. The results indicate that all dimensions meet the established criteria for internal consistency.

Table 2. Descriptive statistics by maturity and experience groups and inter-group differences

	Early matures (N=56)	**Average matures** (N=35)	**Late matures** (N=13)	More Experienced (N=43)	Less Experienced (N=61)
Variables	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Training Experience (yrs)	6.63±2.45	5.46±1.79	7.23±1.42	**8.53±0.67†**	**6.71±1.66†**
Age (yrs)	**14.71±0.52***	**14.23±0.60***	**13.75±0.27***	**14.53±0.59†**	**14.02±0.45†**
Weight (kg)	**64.24±8.64***	**58.45±11.02***	**45.21±4.82***	58.24±8.56	53.85±5.64
Height (cm)	**176.94±7.09***	**171.32±10.16***	**157.31±6.89***	172.27±8.14	168.71±5.74
Sitting Height (cm)	**90.79±3.59***	**87.29±5.66***	**78.21±3.38***	87.39±5.12	85.18±2.78

* Statistically significant difference between groups divided by biological maturity acceleration in age (Kruskal-Wallis, H=42.00, p<0.001), body mass (Kruskal-Wallis, H=52.20, p<0.001), body height (Kruskal-Wallis, H=49.55, p<0.001), and sitting height (Kruskal-Wallis, H=62.19, p<0.001);
† Statistically significant difference between groups divided by experience in training age (MWU, U=12.00, p<0.001) and chronological age (MWU, U=922.50, p=0.01).

Table 2 presents descriptive statistical parameters (arithmetic mean and standard deviation; M±SD) for the variables used to describe the sample, categorized according to biological maturation status (**early matures, average matures** and late matures) and playing

experience (more experienced vs. less experienced players). Group differences were assessed using the Kruskal-Wallis test and the Mann-Whitney U test.

Table 3. Psychological Dimensions by maturity and experience groups and inter-group differences

	Early matures (N=56)	**Average matures** (N=35)	**Late matures** (N=13)	More Experienced (N=43)	Less Experienced (N=61)
Variables	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Confidence	15.41±9.92	15.31±3.03	15.54±2.73	**16.30±3.02***	**14.91±3.28***
Somatic Anxiety	12.73±3.12	12.54±3.36	12.69±3.04	12.84±3.43	12.54±3.93
Cognitive Anxiety	12.16±2.04	10.70±3.24	12.31±1.93	**8.77±3.12***	**12.77±1.78***

***** Statistically significant difference between experienced and less experienced players in self-confidence (Mann-Whitney, U=970.50, $p<0.05$) and cognitive anxiety (Mann-Whitney, U=854.50, $p<0.01$).

Table 3 presents the descriptive statistical parameters (mean and standard deviation; M±SD) for the variables used to describe the sample, categorized according to biological maturation status (**early matures, average matures** and late matures) and level of playing experience (more experienced vs. less experienced players). Group differences were assessed using the Kruskal-Wallis test and the Mann-Whitney U test. The results indicate that no statistically significant differences were observed between groups defined by biological maturation. However, significant differences emerged between experience-based groups in self-confidence and cognitive anxiety.

Discussions

This study investigated the relationship between competitive anxiety and two key developmental factors in youth football players: biological maturity and sport-specific experience. While the biological maturity of participants varied ranging from late to early matures no statistically significant differences were found in self-confidence, cognitive anxiety, or somatic anxiety across maturity groups. These results challenge common assumptions in youth sport that early matures (often referred to as "accelerants") enjoy not only physical advantages but also enhanced psychological resilience due to their athletic success in earlier developmental stages.

The absence of significant psychological differences between maturity clusters aligns with existing literature suggesting that psychological growth does not necessarily mirror physical development. Although early matures may initially dominate due to physical superiority (Malina, 1991; Malina et al., 2004), psychological competencies such as emotional regulation, coping strategies, and stress tolerance develop on separate timelines influenced more by environmental and experiential factors than by biology alone (Ollendick, 1995; Boričević-Maršanić, 2013).

Moreover, previous studies have shown that psychological adaptation to sport-related stressors depends on the accumulation of competition experience rather than biological age or maturity status. For example, in a study by Kristjánsdóttir et al. (2019), athletes with higher levels of psychological skill development and mental toughness demonstrated lower levels of performance-related anxiety. Similarly, Gustafsson et al. (2017) found that athletes with prolonged exposure to competition were better able to manage fear of failure, a major component of competitive anxiety.

The most meaningful findings of the present study relate to the role of experience. Players with greater exposure to competitive environments reported significantly higher self-confidence and significantly lower cognitive anxiety than less experienced players. This supports the growing body of evidence suggesting that experience serves as a buffer against performance anxiety by fostering familiarity with competitive pressure, enhancing emotional control, and allowing athletes to build realistic expectations of success and failure (Woodman & Hardy, 2003; Nicholls et al., 2005).

Recent research has also emphasized the role of psychological resilience and coping strategies in mitigating anxiety among youth athletes. For example, Domínguez-González et al. (2024) highlighted how self-confidence and flow state are more prevalent in adolescent footballers with extensive competition histories, contributing to both reduced anxiety and improved performance. Additionally, Lukova et al. (2023) noted that dispositional optimism a trait linked with resilience significantly reduces the likelihood of both state and trait anxiety manifestations in adolescent athletes. These findings reinforce the current study's observation that training experience plays a critical role in shaping emotional stability.

It is also important to consider how talent development systems might inadvertently marginalize late-maturing athletes. Research has shown that players born earlier in the selection year or maturing earlier biologically are disproportionately favored in selection processes (Delorme et al., 2010; Cumming et al., 2017). However, our findings suggest that maturity-based selection may overlook critical psychological factors that influence long-term success and well-being. Coaches and development programs should therefore adopt a holistic approach, valuing not only physical readiness but also the psychological adaptability and experience of young athletes. From an applied perspective, these insights call for deliberate efforts in coaching practice to reduce performance pressure and promote psychological skill development. Psychological training programs aimed at enhancing self-confidence, cognitive restructuring, and arousal regulation should be integrated into youth sport environments. Structured exposure to challenging but supportive competition may accelerate the development of psychological readiness and reduce anxiety-related dropout in youth football.

In sum, this study contributes to the growing evidence that while biological maturity alone does not significantly impact dimensions of competitive anxiety, experience in sport through exposure to competition, learning opportunities, and gradual adaptation to stressors plays a substantial role in promoting emotional resilience. Future research should examine longitudinal effects of experience and explore how targeted psychological interventions can support youth athletes across varying maturity levels.

Limitations

While the findings of this study provide valuable insights, several limitations must be acknowledged. First, the cross-sectional design prevents the establishment of causal relationships between maturity, experience, and anxiety dimensions. A longitudinal approach would be more appropriate to understand the developmental trajectory of psychological characteristics over time. Second, although the sample size was adequate, it was limited to a specific regional population (six clubs in Dalmatia), which may restrict the generalizability of results to broader or more diverse athletic populations.

Additionally, the measurement of anxiety was based solely on self-reported data collected on match day, which may have been influenced by situational factors such as match importance, opponent strength, or individual expectations. Including physiological markers or coach/parent ratings could offer a more multidimensional perspective. Finally, the study did not account for contextual variables such as coaching style, team climate, or parental influence, which may also affect anxiety and self-confidence in young athletes. Future studies should consider integrating these factors to develop a more comprehensive understanding of psychological dynamics in youth sport.

Conclusions

This study explored how biological maturity and experience influence competitive anxiety dimensions in youth football players. The results demonstrated that biological maturity alone does not significantly impact self-confidence, cognitive anxiety, or somatic anxiety. In contrast, playing experience was a decisive factor, as more experienced players exhibited higher self-confidence and reduced cognitive anxiety. These findings suggest that psychological development in sport is more closely tied to accumulated experiences and emotional learning than to physical maturation alone.

This conclusion supports a developmental framework in youth sports that values gradual and structured competitive exposure. Psychological skills, like physical capabilities, evolve with practice, reflection, and adaptation. Therefore, fostering environments that emphasize learning over early success may better serve the long-term development and mental well-being of young athletes.

Practical Implications

The findings have several implications for coaches, sport psychologists, and talent development programs. First, selection and development strategies should move beyond biological indicators and integrate psychological criteria, including resilience, emotional control, and readiness to cope with stress. Second, implementing mental skills training (e.g., relaxation techniques, goal setting, cognitive restructuring) should be a standard part of youth training curricula. Third, creating psychologically safe environments where mistakes are treated as learning opportunities can help athletes build confidence and reduce anxiety. Coaches should be trained not only in technical and tactical development but also in recognizing signs of anxiety and supporting athletes' emotional regulation. Lastly, competition formats should be designed to provide diverse and repeated exposure to challenging situations, enabling athletes to develop the coping mechanisms necessary for elite performance.

Adopting these strategies can contribute to healthier sport experiences and help retain late developers who may otherwise be overlooked due to temporary physical disadvantages.

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Factors influencing the development of PETE students self-efficacy during practicum

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Abstract: Teachers' Self-Efficacy (TSE) is a crucial factor in shaping instructional effectiveness, particularly in engaging students and fostering skill development. Grounded in Bandura's (1977) framework, SE is influenced by four key sources: mastery experience, vicarious experience, social persuasion, and physiological-affective states. This study examined factors affecting TSE in twenty-three (n=23) third-year Physical Education Teacher Education (PETE) students (11 males, 12 females). Participants completed a Teacher Reflection List of TSE sources, three times during their practicum. This list was developed following a literature review on potential sources influencing TSE. A quantitative analysis was performed by calculating the percentage of total responses to each SE source across four possible answers: positive, negative, no impact, or something else. Results revealed that personal characteristics—such as personality traits, motivation for self-improvement, and motivation for teaching—positively influenced TSE. Additionally, teaching skills, including communication, perception, organization, classroom management, adaptability, and creativity, played a significant role. Further analysis highlighted that factors like athletic and academic background, relationship-building skills, and a sustained interest in professional development also contributed to TSE formation. These findings emphasize the multifaceted nature of TSE development in preservice teachers, particularly in PETE students, and underscore the importance of fostering both personal and professional competencies during practicum experiences.

Keywords: Physical education teacher education (pete), self-efficacy, practicum.

Introduction

Teachers' Self-efficacy in education, particularly in the field of Physical Education, plays a crucial role in determining not only the quality of teaching but also how future teachers engage with their students and environments. Rooted in Bandura's social cognitive theory,

teachers' self-efficacy is defined as the belief in one's ability to effectively foster student learning and manage classroom dynamics (Tschannen-Moran & Woolfolk Hoy, 2001; Morris et al., 2017). It is attributed to four primary sources, each of which is equally applicable within the context of teaching. Mastery experiences constitute the most influential source of self-efficacy. When a teaching attempt is successful, it reinforces a preservice teacher's belief in their capabilities. Conversely, setbacks may lead to doubt, particularly in areas where self-efficacy is still forming. Second, vicarious experiences influence self-efficacy through the observation of others' performance. When preservice teachers witness peers successfully managing similar tasks, it can reinforce their own belief in the possibility of success—particularly when they identify with those peers. Third, social persuasion such as constructive feedback and encouragement from instructors, mentors, or peers can strengthen a preservice teacher's self-efficacy. Although less influential than personal experience, verbal persuasion remains a valuable tool in supporting professional growth. Fourth, emotional and physiological responses—such as stress or enthusiasm—can inform how capable individuals perceive themselves to be. Awareness and regulation of these states are essential, as they may either hinder or enhance one's sense of self-efficacy.

Although current models account for only a limited portion of the variance in teacher self-efficacy—approximately 18% according to Clark and Newberry (2019)—a broader range of contributing factors has been identified in the literature. These include intrinsic characteristics such as personal traits and teaching competencies (Poulou, 2007), as well as domain-specific expertise gained through content knowledge enhancement (Palmer, 2006; Seung et al., 2019). Moreover, the overall academic quality of teacher education programs plays a pivotal role in shaping self-efficacy beliefs (Ahsan et al., 2012; Gleeson et al., 2015). Contextual and institutional factors, such as the level of support provided by school leadership, also significantly influence self-perceptions of teaching competence (Gonzalez et al., 2017; Min, 2019). Additionally, challenges such as negative student attitudes, precarious job conditions (Ma et al., 2021), and the level of emotional intelligence possessed by educators (Moafian & Ghanizadeh, 2009; Sarkhosh & Rezaee, 2014) further mediate the development of self-efficacy among preservice and practicing teachers.

Practicum is a mandatory part of undergraduate and postgraduate education for physical education teachers worldwide (Cohen et al., 2013; Lawson et al., 2015) and constitutes a period during which trainees teach, observe, plan, and modify lessons under the supervision of an experienced mentor. During this period, student teachers acquire pedagogical content knowledge, learn to connect theory with practice in lesson planning, face real and authentic teaching conditions in schools, and based on these experiences, develop personal skills and competencies related to teaching (Morris et al., 2017). Supervised practicum plays a crucial role in strengthening future educators and easing their integration into the profession. Research confirms this claim and highlights the multiple benefits of practical training. Specifically, it contributes to the development of students' ability to reflect on their teaching, set learning goals, and achieve expected learning outcomes. Furthermore, it

enhances their ability to collaborate and find solutions during the teaching process (Iaochite & Costa Filho, 2016; Feiman-Nemser, 2001; Martins et al., 2015).

Studies on the development of TSE in physical education student teachers have focused on exploring personal experience as a primary source of information about TSE (Morris et al., 2017). In this context, supervised practicum has been shown to be pivotal in strengthening TSE, particularly due to the real conditions faced by future educators in the school environment (Gurvitch & Metzler, 2009; Martins et al., 2015). Research shows that practicum and educational programs often fail to change the views and beliefs of future physical education teachers (Adamakis & Zounhia, 2016; Mordal-Moen & Green, 2014). However, some researchers emphasize that a well-structured practicum program can positively influence the views and beliefs of future physical education teachers (Richards et al., 2014). To achieve this, it is essential for the practicum program to consider the background and abilities of students – for example, the teaching methods with which they were trained as athletes or students, their already formed beliefs, and their needs during the program's implementation (McCullick et al., 2012). However, research examining the role of physical education students' experiences during their practicum remains limited compared to studies on other school subjects (Cohen et al., 2013). Researchers highlight the need to understand the processes by which these experiences are recognized as significant sources of knowledge for building TSE in teachers, particularly during the early stages of their teaching careers (Iaochite & Costa Filho, 2016; Kuhn et al., 2019).

Methods

Participants and Context

The study involved 24 third-year Physical Education Teacher Education (PETE) students (11 males, 13 females) from the National and Kapodistrian University of Athens responded to an open invitation addressed to all third-year students enrolled in the teaching practicum component of the university curriculum. All participants had prior practicum experience in primary schools. This process enhanced their reflective capacity and enabled them to more effectively assess their TSE during the more demanding context of the secondary school practicum. The practicum comprised 20 hours of teaching using student-centered pedagogical models and they were supervised by cooperating teacher with professional experience and qualifications in counselling, providing structured feedback and mentorship. In parallel with their practicum, students were also enrolled in related coursework at university, including sport pedagogy, instructional models, and microteaching, ensuring a strong connection between theory and practice.

Data Collection and Analysis

Data were collected through a structured self-reflection instrument, The Reflection List,

based on previous research to make sure it covered relevant sources and influencing factors (Gonzalez et al., 2017; Pfitzner-Eden, 2016). It was completed within one week following the completion of the students' teaching practicum. It included 19 factors, and it was started with the expression "factors that affected my teaching today…". For data analysis, descriptive statistics was used. No advanced statistical analyses were employed, as the primary objective of the study was exploratory in nature, focusing on the identification of patterns rather than hypothesis testing. Instead, a descriptive approach was used by calculating the percentage of participants who identified each factor as having a positive, negative, or neutral impact on their TSE. This method provided valuable insight into the elements that either facilitated or hindered the development of teaching confidence. Similarly, the sources of TSE were evaluated in other studies involving 250 preservice teachers from various disciplines (Pfitzner-Eden, 2016) and 18 preservice physical education teachers (Iaochite & Costa Filho, 2016). In relation to emotional influences, participants reported experiencing both positive emotions—such as confidence and enthusiasm—and negative emotions, including anxiety and frustration, which played a significant role in shaping their perceived efficacy.

Results

The majority of participants reported that several personal and instructional factors had a positive impact on their teaching practice. Among the most positively perceived were personality, creativity, effort, and improvement of teaching. Similarly high percentages were noted for communication with students, understanding of students' needs, organization of daily lesson activities, and feedback from students. Factors such as prior experience as a student or athlete and classroom management were also perceived positively, although classroom management was associated with a relatively higher negative perception. Moderately high positive influences were reported for flexibility in lesson flow, feedback from the supervising professor, and theoretical knowledge from university courses. Personal motivation and peer feedback were also viewed positively, though the latter was reported to have no influence by 25%. The comparison of one's lesson with that of the supervising professor and particularly with a classmate's lesson were the least positively rated factors, with the latter most frequently reported as having no influence (table 1). The most frequently reported positive emotions were satisfaction, enjoyment and confidence. On the other hand, the most common negative emotions included anxiety and frustration.

Table 1. Perceived Influence of Various Factors on Teaching Practice

Factor	Positive (%)	Negative (%)	No Influence (%)
Personality	95.8	4.2	0.0
Creativity	95.8	0.0	4.2
Effort	95.8	4.2	0.0
Improvement of teaching	95.8	0.0	4.2
Communication with students	91.7	4.2	4.1
Understanding of students' needs	91.7	4.2	4.1
Organization of daily lesson activities	91.7	4.2	4.1
Feedback from student	91.7	4.1	4.2
Experience as a student or athlete	87.5	0.0	12.5
Classroom management	87.5	8.3	4.2
Flexibility in lesson flow	83.3	0.0	16.7
Feedback from supervising professor	83.3	0.0	16.7
Theoretical knowledge from University	83.3	0.0	16.7
Personal motivation	75.0	4.2	20.8
Feedback from classmate	75.0	0.0	25.0
Comparison of lesson with supervising professor's lesson	58.3	4.2	37.5
Comparison of lesson with classmate's lesson	33.3	4.2	62.5

The development of TSE is influenced by a variety of interconnected factors, which can be categorized into three primary groups. The first group draws on Bandura's four sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and physiological states, which form the foundation for teachers' beliefs in their own capabilities. The second group emphasizes personal characteristics, such as motivation, resilience, and self-reflection, which shape a teacher's ability to adapt and grow in the profession. The third group focuses on teaching skills, including classroom management, instructional strategies, and assessment techniques, all of which are essential for effective teaching. While Bandura's self-efficacy theory provides a valuable framework for understanding teacher development, it becomes evident that a more holistic approach is necessary.

Discussion

The findings of this study align with Bandura's (1977) self-efficacy framework, affirming the centrality of mastery experiences, verbal persuasion, and affective states in shaping preservice teachers' beliefs about their instructional competence. However, the results also point to the relevance of additional, often underexplored, factors rooted in emotional intelligence and the evolving professional identity of novice teachers. Notably, participants identified creativity, personality traits (e.g., confidence, humour), and effective communication with students as highly influential on their TSE. These elements reflect a broader construct of interpersonal competence, suggesting that the capacity to engage students meaningfully and authentically is a key driver of confidence in the classroom.

The importance of constructive mentorship also emerged clearly, as feedback from supervising teachers was among the most positively rated influences. This underscores the formative role of mentorship when it is supportive, dialogical, and contextually responsive. In addition, high ratings for understanding students' needs, consistent effort, and lesson organization highlight the value preservice teachers place on preparation, adaptability, and responsiveness—skills that contribute directly to instructional effectiveness and learner engagement.

In contrast, theoretical knowledge acquired through university coursework, though acknowledged as beneficial, was considered less influential compared to more experiential or relational factors. This finding suggests that the translation of theory into practice—rather than theoretical knowledge alone—is what ultimately strengthens TSE during practicum experiences. Such insights point to the importance of practice-oriented pedagogies in teacher education programs that bridge academic content with real-world teaching challenges.

Notably, comparative assessments—such as evaluating one's performance against peers or supervisors—were among the least impactful and, in some cases, perceived as demotivating. These findings raise concerns about the potentially counterproductive effects of comparison-based evaluation, which may induce self-doubt rather than encouraging reflective growth.

Negative influences on TSE were also observed, particularly related to classroom management and the lack of flexibility during lessons. These challenges likely reflect the demands of real-time decision-making and behavioural regulation, which are especially taxing for novice teachers still developing classroom authority and instructional fluency.
Finally, the emotional dimension of the practicum experience was prominent. Positive emotions such as satisfaction, enjoyment, and confidence were frequently cited as reinforcing TSE, while anxiety and frustration emerged as common detractors. These emotional fluctuations were not merely peripheral experiences but played a central role in shaping participants' daily teaching perceptions and long-term professional self-concept.

Verbal persuasion, such as feedback from students, peers, and mentors, is a crucial factor in shaping TSE, as noted by Iaochite and Costa Filho (2016) and Martins et al. (2015). In line with previous research, the feedback from these groups was identified as a key influence on participants' TSE development. Also, a strong academic foundation in pedagogy and instructional strategies provided participants with essential competencies for effective lesson planning and classroom management (Palmer, 2006; Poulou, 2007). In contrast, vicarious experiences, particularly those involving comparison with others, appeared to have a limited impact on TSE. Although Bandura (1997) emphasizes the potential influence of such experiences, their effectiveness is significantly enhanced when individuals identify closely with the model (Usher & Pajares, 2008). Furthermore,

consistent with existing literature, verbal persuasion such as feedback from students, peers, and mentors played a crucial role in shaping TSEserving as a key factor in building participants' TSE (Iaochite & Costa Filho, 2016; Martins et al., 2015).

Emotional experiences also played a significant role in shaping TSE beliefs. Positive emotions, such as confidence and joy, were associated with enhanced performance and engagement (Cohen & Zach, 2013; Iaochite & Costa Filho, 2016). However, negative emotions—particularly anxiety and frustration—were commonly reported, often posing challenges to effective teaching (Sutton et al., 2009). The ability to recognize and understand these emotional states contributed to the development of adaptive coping strategies (Di Fabio & Palazzeschi, 2008). Furthermore, personal traits such as emotional intelligence supported the regulation of emotional responses, thereby fostering greater emotional resilience and stability in teaching contexts (Kim et al., 2018).

Personal traits and motivational factors were consistently identified by participants as key contributors to their TSE. Attributes such as effective communication, a sense of humor, and flexibility in lesson delivery were commonly cited as enhancing confidence and classroom engagement. These findings align with Poulou's (2007) study involving 198 preservice teachers, which highlighted similar characteristics as influential in developing TSE. Furthermore, Jamil et al. (2012) demonstrated that individuals with higher levels of extroversion experienced lower anxiety and reported stronger TSE beliefs, underscoring the role of personality in mediating emotional and motivational aspects of teaching.

Overall, personal characteristics such as extroversion and self-confidence emerged as significant sources of TSE among preservice teachers. Skills in building positive relationships with students were also found to enhance both classroom management and instructional effectiveness. Moreover, a strong motivation for growth and ongoing professional development contributed to the reduction of negative emotional responses, such as anxiety and frustration. Overall, these personal factors not only supported preservice teachers in adapting to classroom challenges but also played a key role in sustaining student motivation and engagement.

This study focused only on PETE students, teaching in secondary schools. So, the findings can't be applied to other age groups or settings like primary school or extracurricular sports programs. Also, because the results were based on the participants' reflections, we don't have observational data to confirm their reported experiences.

Incorporating strategies for personality development and motivation into teacher professional development programs is essential for fostering both personal growth and professional effectiveness. Activities that promote self-awareness, emotional intelligence, and resilience are crucial in helping educators develop the emotional and psychological skills necessary for successful teaching. For instance, self-reflection exercises and

role-playing scenarios can enhance communication skills and prepare teachers for challenging classroom interactions. Additionally, focusing on goal setting and positive reinforcement can motivate teachers to continue advancing their skills, while mindfulness practices can help manage stress and prevent burnout. Furthermore, creating a supportive peer network and mentorship programs can foster emotional resilience by offering teachers a space to share experiences and receive guidance. Ultimately, by integrating these strategies, professional development programs can better equip educators to navigate the complexities of their roles and create a more supportive and effective learning environment.

Future research should focus on exploring more effective methods for integrating social-emotional development into teacher training programs. Specifically, studies could examine the impact of daily reflection tools on teachers' ability to track and improve their emotional resilience and classroom management strategies over time. Additionally, research could investigate the long-term effects of observing and recording classroom behaviour at multiple time points, particularly in relation to how teachers adapt their pedagogical approaches to meet the evolving needs of their students. Further studies could also explore innovative ways to teach pedagogical strategies more effectively, such as through the use of technology, peer collaborations, or experiential learning techniques. By expanding our understanding of these areas, future research can provide valuable insights into improving teacher professional development and enhancing the overall quality of education.

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Gender and age-related differences in flexibility among Albanian first and fourth graders (2013–2024)

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Abstract: This study investigates variations in flexibility levels across first and fourth-grade Albanian elementary school children from 2013 to 2024. A total of 240 children participated in the study, comprising 121 children in 2013 (89 first-graders and 32 fourth-graders) and 61 children in 2024 (32 first-graders and 29 fourth-graders). Flexibility was evaluated by the Sit and Reach test, and independent samples t-tests were performed to compare mean results throughout the two years. The results demonstrated a notable reduction in first-grade flexibility from 27.1 cm in 2013 to 23.2 cm in 2024 ($p = 0.005$), although fourth-grade flexibility exhibited no statistically significant variation ($p = 0.639$). Gender-based analysis indicated no notable changes in flexibility among first-grade males, whereas first-grade girls had a considerable enhancement ($p = 0.001$). Fourth-grade boys had a notable reduction in flexibility ($p = 0.036$), whereas fourth-grade girls displayed a considerable enhancement ($p = 0.042$). The data indicate a decrease in flexibility in younger children, maybe associated with diminished physical activity or lifestyle alterations. The observed gender disparities suggest that females exhibit higher involvement in activities that enhance flexibility, while boys' engagement in flexibility-related exercises may have diminished. Additional research is required to investigate the influence of physical education programs, extracurricular activities, and lifestyle choices on these trends.

Keywords: Flexibility, sit and reach, physical activity, gender differences, child health, Albania.

Introduction

Flexibility is an essential element of physical fitness, intricately linked to musculoskeletal health, postural alignment, and overall physical performance in children. During primary school, children experience significant growth and development, rendering this a critical period for evaluating and enhancing physical fitness, particularly flexibility (Malina, Bouchard, & Bar-Or, 2004; Jarani et al., 2020).

The Sit and Reach test is a widely utilized field examination for evaluating flexibility in children and adolescents. It assesses the flexibility of the hamstrings and lower back and has been confirmed as both reliable and simple to administer (Jackson & Baker, 1986). Due to its efficacy and uniform methodology, it is extensively utilized in global school-based

fitness evaluations. Studies indicate that flexibility can differ markedly based on age, gender, and levels of physical exercise. Younger children are often more flexible than older individuals, although this tendency may be affected by consistent physical activity and stretching regimens (Bandy, Irion, & Briggler, 1997). Moreover, girls frequently surpass boys in flexibility assessments owing to physiological and anatomical distinctions (Ayala et al., 2012). Recent studies indicate a decline in children's physical fitness over the past decade, possibly associated with diminished physical activity, heightened screen time, and alterations in school curricula that deprioritize physical education (Trudeau & Shephard, 2008; Tomkinson et al., 2012). It is posited that these lifestyle and educational modifications adversely affect various fitness components, including flexibility (Strong et al., 2005).

In Albania, empirical research especially examining trends in children's physical development and flexibility is scarce. Nonetheless, extensive social and educational transformations from 2013 to 2024, encompassing technological innovations and evolving school frameworks, may have impacted children's health (Tarp et al., 2018; Jarani et al.,2016) and physical activity levels. This study seeks to fill the research vacuum by comparing flexibility levels between first- and fourth-grade pupils in Albania at two time intervals—2013 and 2024. The findings are anticipated to enhance the comprehension of physical fitness trends and guide strategies designed to improve youth health outcomes.
This study investigates variations in flexibility levels across first and fourth-grade Albanian elementary school children from 2013 to 2024.

Methods

This study involved 240 Albanian primary school children (living in Tirana). In 2013, a total of 121 children were evaluated, consisting of 89 first-grade students (ages 6–7) and 32 fourth-grade students (ages 9–10). In 2024, 61 children were assessed, comprising 32 first-grade kids and 29 fourth-grade pupils within identical age brackets. All participants were in good health, devoid of any known musculoskeletal or neurological abnormalities, and had obtained parental approval to partake in the study. The children were selected from public elementary schools in Albania, which had similar curricula and physical education programs.

Protocols of the measurement

The Sit and Reach test, a recognized and established field assessment, was employed to evaluate flexibility, specifically targeting lower back and hamstring flexibility. The examination was executed in accordance with established protocols. Participants were directed to sit on the floor with their legs completely extended and feet positioned against a testing box. With hands interlaced and arms stretched anteriorly, they were instructed to reach as far forward as possible without flexing their knees. Each participant executed two

tries, and the optimal score (quantified in cm) was documented for analysis.

All measurements were performed in a regulated indoor setting during standard school hours, overseen by qualified physical education instructors and researchers to guarantee consistency and precision in data collecting.

Statistical Analysis

Descriptive statistics, encompassing means and standard deviations, were computed for the Sit and Reach test scores within each group. An independent samples t-test was conducted to compare the mean flexibility scores of the 2013 and 2024 cohorts for first-grade and fourth-grade children. The threshold for statistical significance was established at $p < 0.05$. Data analysis was performed utilizing IBM SPSS Statistics (Version 22.0).

Results

Table 1. Descriptive statistics for first and fourth grade children on sit and reach test by year of measurement

Class	Year	N	M	SD
First Grade	2013	89	27.1	7.0
	2024	32	23.2	5.7
Fourth Grade	2013	90	23.3	6.4
	2024	29	24.1	11.3

Note. Table 1 presents the descriptive statistics for first and fourth grade children on the sit-and-reach test across two measurement years, 2013 and 2024. For first graders, the mean flexibility score decreased from 27.1 cm (SD = 7.0) in 2013 to 23.2 cm (SD = 5.7) in 2024, indicating a decline in flexibility over time. In contrast, fourth graders showed a slight increase in average flexibility, from 23.3 cm (SD = 6.4) in 2013 to 24.1 cm (SD = 11.3) in 2024.

Table 2. Independent sample Tests comparison (year 2013 to 2024) for first and fourth grade children for sit and reach test

Class	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
First Grade	1.495	0.224	2.839	119	**0.005**	3.9060
Fourth Grade	1.136	0.289	-0.470	117	0.639	-0.7901

Note. Table 2 displays the results of independent samples t-tests comparing sit-and-reach scores between the years 2013 and 2024 for both first and fourth grade students. For first grade children, the Levene's test indicated equal variances ($F = 1.495$, $p = 0.224$), and the t-test revealed a statistically significant difference in mean scores ($t = 2.839$, $df = 119$, $p = 0.005$), with children in 2013 performing significantly better than those in 2024 (mean difference = 3.91 cm). In contrast, the comparison for fourth grade students showed no significant difference between years ($t = -0.470$, $df = 117$, $p = 0.639$), and the mean difference was minimal (-0.79 cm).

Table 3. Descriptive statistics for first and fourth grade on sit and reach test by year of measurement and gender

Gender			n	M	SD
Boys	First Grade	2013	40	25.4	7.1
		2024	15	23.9	7.2
	Fourth Grade	2013	42	21.7	5.7
		2024	15	27.3	14.2
Girls	First Grade	2013	49	28.5	6.6
		2024	17	22.6	4.0
	Fourth Grade	2013	48	24.7	6.7
		2024	14	20.6	5.8

Note. Table 3 presents descriptive statistics for the sit-and-reach test by year of measurement and gender for both first and fourth grade children. Among first graders, boys in 2013 had a higher mean score (M = 25.4 cm, SD = 7.1) than those in 2024 (M = 23.9 cm, SD = 7.2), while girls showed a more noticeable decline from 28.5 cm (SD = 6.6) in 2013 to 22.6 cm (SD = 4.0) in 2024. In fourth grade, boys showed an unexpected increase in flexibility, from 21.7 cm (SD = 5.7) in 2013 to 27.3 cm (SD = 14.2) in 2024. Conversely, girls' scores decreased from 24.7 cm (SD = 6.7) to 20.6 cm (SD = 5.8) over the same period.

Table 4. Independent sample Tests comparison (year 2013 to 2024) for first and fourth grade children for sit and reach test by gender

Gender		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Boys	First Grade	0.008	0.927	0.69	53	0.49	1.49
	Fourth Grade	2.219	0.142	-2.15	55	**0.04**	-5.64
Girls	First Grade	3.247	0.076	3.46	64	**0.00**	5.91
	Fourth Grade	0.763	0.386	2.08	60	**0.04**	4.09

Note. Table 4 shows the results of independent samples t-tests comparing sit-and-reach performance between 2013 and 2024 for first and fourth grade children, analyzed by gender. For first grade boys, no significant difference was found between years ($t = 0.69$, $df = 53$, $p = 0.49$), suggesting stable flexibility levels over time. However, fourth grade boys showed a significant improvement in 2024 compared to 2013 ($t = -2.15$, $df = 55$, $p = 0.04$), with a mean increase of 5.64 cm. Among girls, first graders in 2013 significantly outperformed those in 2024 ($t = 3.46$, $df = 64$, $p < 0.001$), with a mean difference of 5.91 cm, indicating a notable decline in flexibility. Fourth grade girls also showed a significant decrease ($t = 2.08$, $df = 60$, $p = 0.04$), with a mean difference of 4.09 cm.

Discussion

The research findings disclose significant changes in the evolution of flexibility in school-aged youngsters over an 11-year span. Results indicates that first grade kids in 2024 exhibited markedly reduced flexibility levels relative to their counterparts in 2013 ($p = 0.005$), with a mean difference of 3.91 cm. This indicates a reduction in flexibility among younger youngsters with time. Studies emphasize that reduced opportunities for physical engagement, possibly exacerbated by the COVID-19 pandemic, have diminished children's overall physical fitness, including flexibility (Tulchin-Francis et al., 2021; Ateljevic & Nanda, 2023). The pandemic-induced limitations on structured physical activities have particularly impacted childhood flexibility, as observed in various studies that examined children's activity levels during this period (PK & Shaikh, 2022; González-Gálvez et al., 2015).

Conversely, fourth grade kids exhibited no statistically significant difference between the two years ($p = 0.639$), suggesting a rather steady performance at this age level. This results offers further insights by delineating these comparisons according to gender. In boys,

flexibility levels in first grade remained statistically constant from 2013 to 2024. Notably, fourth grade boys exhibited a substantial enhancement in flexibility ($p = 0.04$), with an average increase of 5.64 cm. This favorable trend may indicate increased participation in physical activities or sports programs throughout the later years of elementary education. Conversely, girls exhibited a troubling decrease in flexibility across both age categories. In 2024, first grade girls exhibited a substantial decline in scores compared to their 2013 counterparts ($p < 0.001$), with a mean difference of 5.91 cm. Likewise, fourth grade girls exhibited a statistically significant reduction ($p = 0.04$), with an average decrease of 4.09 cm. This enhancement could correlate with increased participation in sports activities or physical education, both of which are integral to maintaining and improving physical fitness in children (Moledo et al., 2020; Marques et al., 2017).

The findings indicate a gender-specific evolution in flexibility patterns across time. Although boys, especially in the older demographic, exhibited evidence of enhancement, girls saw a significant deterioration. This pattern of decline among girls may be influenced by various factors, including less engagement in physical activities, reduced emphasis on physical education for girls, and possibly higher levels of sedentary behavior compared to boys (Silventoinen et al., 2020; Brooke et al., 2014). The findings call for targeted interventions aimed specifically at young girls to counteract this downward trend in flexibility and overall physical fitness.

This tendency may be affected by various variables, such as diminished physical activity, heightened sedentary behavior, or disparities in physical education participation. These findings underscore the necessity for focused interventions—particularly for younger children and girls—to enhance flexibility and total physical fitness during early schooling years. This study possesses certain limitations that must be acknowledged when analyzing the results. The sample size in 2024 was comparatively less than in 2013, perhaps constraining the generalizability of the findings. Furthermore, variables such the specifics of the physical education curriculum, levels of extracurricular engagement, socioeconomic status, and screen time were not specifically assessed, thereby limiting the understanding of the mechanisms contributing to variations in flexibility. Notwithstanding these constraints, the results underscore the significance of tracking physical fitness patterns longitudinally, particularly for gender and age. Future study ought to employ a longitudinal design and include a wider array of variables—such as lifestyle habits and school-based exercise programs—to enhance comprehension of the fundamental elements affecting children's physical development and to facilitate the creation of tailored treatments inside educational institutions. Monitoring the strength and flexibility of children over the years is crucial for understanding their physical development and overall health.

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Gross motor coordination in elementary school children: A gender comparison across key movement tasks

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Abstract: This study examines gender differences in gross motor coordination performance among elementary school children using a comparative analysis of key movement tasks (four sub tests). A total of 510 children (boys: n=253, girls: n=257) participated in the study, with gross motor coordination assessed utilizing Körperkoordinationstest für Kinder test battery (KTK). Data were analyzed using Levene's Test for Equality of Variances and an independent samples t-test to assess differences between boys and girls in four movement tasks: Jumping Sideways, Walking Backwards, Hooping Height, and Moving Sideways. Results indicate no significant gender differences in Jumping Sideways Total ($t(508) = 1.168$, $p = 0.243$) and Walking Backwards Total ($t(508) = -1.042$, $p = 0.298$), suggesting similar performances across genders for these skills. However, a statistically significant difference was observed in Hooping Height Total ($t(508) = 2.745$, $p = 0.006$), where boys outperformed girls. No significant gender-based difference was found in Moving Sideways Total ($t(508) = 0.799$, $p = 0.424$). These findings suggest that while most fundamental motor skills show no significant gender differences, certain tasks such as hooping height may be influenced by physiological or training-related factors. Further research is needed to explore underlying causes and implications for physical education curriculum development.

Keywords: Gender differences, motor skills, elementary school children, physical performance, movement tasks.

Introduction

Motor coordination is an essential component of children's physical development and is fundamental to their capacity to participate in physical activities, sports, and everyday tasks. Evaluating coordination in childhood offers insights into neuromotor development and predicts future physical competence and health outcomes (Piek et al., 2008; Jarani et al., 2020). The Körperkoordinationstest für Kinder (KTK), or Body Coordination Test for Children, is a recognized instrument intended to evaluate gross motor coordination via four subtests: Jumping Sideways, Walking Backwards, Moving Sideways, and Hopping for Height (Kiphard & Schilling, 2007). It has been extensively utilized in clinical and educational contexts owing to its validity and relevance across diverse demographics. Gender disparities in motor coordination have been extensively studied; nonetheless, the

results are typically inconsistent and frequently dependent on the specific activity. Research indicates that boys typically excel in tasks necessitating explosive force or object manipulation, whereas girls may demonstrate superior performance in balance and flexibility tasks (Barnett et al., 2010; Butterfield et al., 2004). These tendencies are frequently ascribed to biological, social, and environmental reasons, encompassing variations in maturation rates, muscle growth, and participation in physical activities.

Research employing the KTK test battery often reveals negligible or no substantial gender disparities in the majority of coordination tasks across early to middle childhood. Vandorpe et al. (2011) observed little gender-related performance differences in KTK scores among children aged 6 to 12, with boys exhibiting marginally superior performance in strength-oriented tasks and girls showing enhanced balancing capabilities. Rivilis et al. (2011) discovered that whereas boys may outperform in tasks requiring speed and power, overall coordination levels between genders are predominantly similar during the early school years.

Environmental factors, including the quality of physical education, availability of extracurricular activities, and cultural norms, can significantly influence children's motor skill development. An encouraging atmosphere that promotes active play and movement exploration may diminish gender inequalities in coordination by offering equal opportunities for skill development (Hardy et al., 2012).

Considering the heightened emphasis on gender equity in education and athletics, it is imperative to comprehend the development of coordination abilities in both boys and girls to create inclusive programs that cater to all learners. This study extends prior research by examining gender disparities in the KTK test battery among Albanian youngsters. This study analyzes performance across four fundamental motor tasks, contributing to the findings that, although specific activities may advantage one gender, overall coordination abilities are predominantly equitable. This study examines gender differences in gross motor coordination performance among elementary school children using a comparative analysis of key movement tasks (four sub tests).

Methods

This study comprised 510 elementary school children (boys: n = 253; girls: n = 257), aged around 6 to 11 years. Participants were sourced from public elementary schools and reflected the broader school-age demographic in Tirana (capital city of Albania). All children exhibited good health and were devoid of any physical or cognitive problems that could affect motor ability. Parental or guardian consent was acquired, and ethical approval was granted by the appropriate institutional authorities.

Test protocols

Gross motor coordination was evaluated using the Körperkoordinationstest für Kinder (KTK), a validated assessment tool intended for children aged 5 to 14 years. The KTK comprises four subtests:

1. Jumping Sideways— assessing agility and rhythm in a sideways motion.
2. Walking Backwards-- evaluating equilibrium and corporeal regulation.
3. Hopping for Height - assessing leg strength and coordination.
4. Walking Backwards- assessing coordination, velocity, and spatial perception.

Each assessment was conducted in accordance with standardized standards under the oversight of qualified physical education instructors. Children executed all four subtests in a single assessment session, and raw scores were documented for each activity. Testing was performed in a regulated indoor environment to maintain uniformity and reduce extraneous disturbances.

Statistical Analysis

Descriptive statistics, including the mean and standard deviation, were computed for both boys and girls across each of the four KTK subtests. Independent samples t-tests were used for each subtest to ascertain statistically significant differences in gross motor coordination across genders. Before conducting the t-tests, Levene's test for equality of variances was employed to evaluate the assumption of homogeneity of variance. A significance level of $p < 0.05$ was employed to ascertain statistical significance. All analyses were conducted with IBM SPSS Statistics (Version 22.0).

Results

Table 1. Descriptive statistics for children in four movement tasks (KTK test battery)

	n	M	SD
Jumping Sideways- Total	510	49.8	14.7
Walking Backwards- Total	510	33.1	14.4
Hooping Height- Total	510	12.5	3.8
Moving Sideways- Total	510	14.9	3.6
Valid N (listwise)	510		

Note. Table 1 displays the descriptive statistics for the four movement tasks evaluated using the KTK test battery. The Jumping Sideways task exhibited the highest mean performance (M = 49.8, SD = 14.7), signifying robust coordination in this dynamic activity. In contrast, the lowest mean was observed in the Hooping Height challenge (M = 12.5, SD = 3.8), indicating it may pose greater difficulty for participants. The uniform sample size (N = 510) across all tasks guarantees comparability, whereas standard deviations reflect moderate variability in group performance.

Table 2. Descriptive statistics for boys and girls in four movement tasks (KTK test battery)

KTK tests	Gender	n	M	SD
Jumping Sideways- Total	Boys	253	50.5	14.7
	Girls	257	49.0	14.7
Walking Backwards- Total	Boys	253	32.4	14.4
	Girls	257	33.7	14.3
Hooping Height- Total	Boys	253	13.0	3.9
	Girls	257	12.1	3.7
Moving Sideways- Total	Boys	253	15.0	3.6
	Girls	257	14.8	3.6

Note. Table 2 provides descriptive statistics for boys and girls across the four KTK movement tasks. Overall, performance differences between genders are relatively small. Boys showed slightly higher mean scores in *Jumping Sideways* (M = 50.5) and *Hooping Height* (M = 13.0), while girls outperformed boys in *Walking Backwards* (M = 33.7) and showed similar performance in *Moving Sideways* (M = 14.8 vs. 15.0). These findings suggest subtle gender-based tendencies in coordination tasks, with boys slightly favoring power-based or dynamic tasks, and girls performing marginally better in balance-related tasks. However, the standard deviations across tasks indicate similar levels of variability in both groups.

Table 3. Independed sample T test for differences between boys and girls in four movement tasks (KTK test battery)

	Levene's Test for Equality of Variances		t-test for Equality of Means			
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Jumping Sideways- Total	0.135	0.714	1.17	508.0	0.24	1.52
Walking Backwards- Total	0.002	0.968	-1.04	508.0	0.30	-1.33
Hooping Height- Total	2.854	0.092	2.75	508.0	0.01	0.92
Moving Sideways- Total	0.289	0.591	0.80	508.0	0.42	0.26

Note. Table 3 presents the outcomes of independent samples t-tests comparing male and female participants on the four KTK movement tasks. A statistically significant difference was seen alone in the Hooping Height task ($t = 2.75$, $p = 0.01$), with boys exhibiting superior performance on average (Mean Difference = 0.92). No substantial gender differences were noted in Jumping Sideways ($p = 0.24$), Walking Backwards ($p = 0.30$), or Moving Sideways ($p = 0.42$), suggesting that boys and girls exhibited comparable performance in the majority of coordination activities.

Discussion

The analysis of gender disparities in motor coordination among elementary school students, particularly through the lens of the Körperkoordinationstest für Kinder (KTK), reveals critical insights into the developmental trajectories of boys and girls. The study's results indicate that statistically significant differences between boys and girls were only observed in the Hooping Height task ($p = 0.01$), where boys displayed superior performance. This outcome aligns with existing literature that recognizes boys often obtain early developmental advantages in explosive strength and coordination skills, likely owing to physiological factors such as muscle growth and power during early childhood (Mitsiou et al., 2016; Lust et al., 2022; Tarp et al., 2018l; Jarani et al.,2016). The specificity of the Hooping Height task in favoring boys may necessitate targeted interventions or adaptations in physical education curricula to foster strength-based coordination abilities in girls, thereby promoting equity in skill development.

In contrast, the absence of significant gender differences in the other three KTK tasks—Jumping Sideways, Walking Backwards, and Moving Sideways—suggests that overall coordination abilities among boys and girls are comparatively equal in these dimensions. This finding is consistent with previous research that emphasizes the minimal impact of gender on motor coordination in early childhood when contextual factors are controlled

(Roth et al., 2010; Izadi-Najafabadi et al., 2022). Studies show that motor skill development is often task-dependent and can be further influenced by environmental and societal factors, such as access to physical activities and quality of physical education programs (Zwicker et al., 2017; Blank et al., 2019). As such, the results of the current study underscore the need for inclusive physical education initiatives that cater to a diverse array of motor skills applicable to all children, regardless of gender.

Moreover, the study posits that the significant disparity in the Hooping Height task highlights a potential need for enriching programs that accommodate and empower girls in developing physical competencies traditionally dominated by boys. As identified in the literature, inequalities in motor skill acquisition may have broader implications on children's self-esteem, social dynamics, and long-term physical activity levels (Zwicker et al., 2017; Blank et al., 2019). Addressing these gaps may facilitate a more equitable and supportive environment for all students, enhancing their engagement with physical activities and skill mastery.

In conclusion, the current findings corroborate the notion of minimal gender differences in motor coordination capabilities among Albanian elementary school children, with only the Hooping Height task showcasing a notable advantage for boys. As the research points to an overall similarity in coordination skills across tasks, it reinforces the necessity for comprehensive physical education frameworks that promote participation and development irrespective of gender. Future inquiries should consider a broader spectrum of factors influencing the evolution of these capabilities, including developmental, environmental, and behavioral elements, as well as their potential contributions to gender-specific physical performance trends (Kasuyama et al., 2016).

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Accelerometer-Measured physical activity among Bulgarian students

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Abstract: Physical activity is a key component of a healthy lifestyle. According to the World Health Organization (2020), adults should engage in at least 150-300 minutes of moderate-intensity physical activity or 75-100 minutes of vigorous-intensity aerobic physical activity per week. This study aimed to measure the volume and intensity of physical activity among Bulgarian students. The measurement was conducted over one week in October, involving fifteen 1st-year students and fifteen 3rd-year students from the National Sports Academy "Vassil Levski". Three-axis logging accelerometers, Axivity AX3, were used. The obtained data were analyzed using descriptive statistics in SPSS Statistics 27.0. The results showed that each student covers the recommendations of the World Health Organization for daily physical activity. The 3rd-year students engage in more voluminous physical activity, with moderate (1st-year – 94.6 min.; 3rd-year – 147 min.) and vigorous (1st-year - 7.8 min.; 3rd-year – 7.3 min.) intensity levels in a week, compared to 1st-year students. An inconsistency was observed between the data in the questionnaire and the Axivity AX3 bands. Questionnaires from 1st-year students indicated that they engaged in more voluminous physical activity than 3rd-year students. Data from Axivity AX3 bands showed the opposite. In conclusion, it is a positive trend that each student has met the recommendations from the World Health Organization for daily physical activity.

Keywords: Moderate to vigorous physical activity, students' physical activity, the World Health Organization.

Introduction

Physical activity is a vital component of a healthy lifestyle and plays a significant role in maintaining both physical and mental well-being. The World Health Organization recommends that adults (aged 18–64 years) engage in 150-300 minutes of moderate to vigorous physical activity each week, along with muscle-strengthening exercises at least twice a week (WHO, 2020). Despite the widespread recognition of the benefits of regular physical activity, numerous studies show that activity levels among students often fall below the recommended standards, particularly outside of organized academic and sports

activities.

According to the National Strategy for the Development of Physical Activity, Physical Education, Sports, and Sport-Tourism Activities 2023–2034, only 4% of Bulgarians participate in regular sports. However, this figure has increased by two percentage points compared to the previous study conducted in 2017 (ibid.).

There is a clear need to improve the conditions for engaging in sports activities to increase the population's physical activity levels.

On the other hand, the transition from adolescence to adulthood is associated with a decline in physical activity due to a lack of time, increased professional responsibilities, and various other factors.

Modern technologies, such as accelerometers, provide reliable data for the objective measurement of physical activity, allowing for a more precise evaluation of students' actual movement in daily life. Nevertheless, many studies have shown discrepancies between data obtained from self-assessment questionnaires and data from objective measurement devices.

This study aims to evaluate the volume and intensity of physical activity among first- and third-year female students at the National Sports Academy "Vassil Levski", using three-axis logging accelerometers, Axivity AX3, and self-assessment questionnaires. This comparative approach allows for the identification of potential differences in physical activity depending on the year of study, as well as the level of agreement between subjective and objective assessments of physical activity. The study is important not only from a scientific perspective but also for optimizing the educational process and promoting physical activity among students.

Methods

Participants

For this research, 30 students from the National Sports Academy in Bulgaria were examined to study the amount of moderate to vigorous intensity physical activity. All students provided written consent in accordance with the Declaration of Helsinki. Ethical approval was obtained at National Sports Academy "Vassil Levski". To identify the differences, 15 first-year students and 15 third-year students were selected for the study. They were 20 years old (first year) and 22 years old (third year) respectively. All of them were women. All the students were asked and confirmed to be part of this study.

Procedures

To examine the amount of moderate to vigorous intensity physical activity in this cross-sectional study, 3-axis logging accelerometers Axivity AX3 were used. The students were acquainted with the accelerometers and the purpose of this study. They wore the bands for 7 days from Monday to Sunday. The accelerometer was taken off only when bathing. In this experimental study, a questionnaire was used to determine if there is a difference between the data from the Axivity AX3 bands and students' perceptions about their level of physical activity.

Data analysis

For processing data from accelerometers and questionnaires, SPSS Statistics 27.0. was used (descriptive statistics and independent sample t-test).

Results

The average amount of moderate to vigorous intensity physical activity from Monday to Sunday is depicted in Table 1.

Table 1. Average amount of MVPA daily

Day	Year	Average Minutes	Difference
Monday	1st	76,3	P=87,7
	3rd	134,9	
Tuesday	1st	177,2	P=92,3
	3rd	122,7	
Wednesday	1st	142,8	P=93,7
	3rd	208	
Thursday	1st	71,1	**P=99,3***
	3rd	179,6	
Friday	1st	167,5	P=29,6
	3rd	156,9	
Saturday	1st	132,5	P=24,3
	3rd	120,1	
Sunday	1st	65,6	P=93,5
	3rd	146,1	

*P<0,05

The following table presents the responses from the questionnaire on physical activity for students in their first and third years of study.

Table 2. Questionnaire for physical activity

Question	Year	Average answer	Difference
How often did you participate in the Physical Education and Sport lesson in the last 7 days?	1st	Quite often	P=70,1
	3rd	Sometimes	
What did you usually do at lunchtime (other than eating lunch) during the last 7 days?	1st	Sitting, walking somewhere	P=33,4
	3rd	Sitting, walking somewhere	
How many times, immediately after university, did you participate in any sports, dance, or games that kept you very active in the last 7 days?	1st	2 or 3 times	P=29,8
	3rd	2 or 3 times	
How many times did you participate in any sports, dance, or games that kept you very active in the last 7 evenings?	1st	4 times	P=17
	3rd	2 or 3 times	
How many times did you participate in any sports, dance, or games that kept you very active during the last weekend?	1st	4-5 times	P=70,2
	3rd	4-5 times	
Do you participate in any organized physical activities or workouts in your free time?	1st	Yes	P=64,9
	3rd	Yes	

As shown in the table, the differences between the courses are not statistically significant. However, according to data from the questionnaires, 1st-year students state that they are more active than 3rd-year students. We see from Table 1 that the data from accelerometers show the opposite. According to Axivity AX3 bands, 3rd-year students are more active.

Discussion

This study aimed to examine the amount of moderate to vigorous physical activity (MVPA) among Bulgarian students in their 1st and 3rd year at the academy. To reap the benefits of their lifestyle, students should aim for at least 150-300 minutes of moderate to vigorous physical activity (MVPA) per week.

The data from our examination showed that both 1st and 3rd-year students met the WHO guidelines for physical activity. First-year students have achieved an average of 126.9 minutes of MVPA on university days and 99.1 minutes of MVPA on weekends. Third-year students have achieved 160.2 minutes of MVPA on university days and 133.1 minutes of MVPA on weekends. That is more than the Cheng et al. (2025) study showed (107.4 on university days and 110.6 on weekends). According to Kaminska et al. (2012), women students do an average of 1 hour per week of physical activity, with about 10% of them engaging in moderate to vigorous physical activity (MVPA). Shimamoto et al. (2022) found that university students have an average of 9510 steps per day.

The data from other studies mentioned above show inconsistencies in the results from accelerometers, which can be attributed to demographic peculiarities. The data indicate that the course of education is a factor influencing students' physical activity levels. We observed this tendency, which can be related to the increasing number of university tasks.

A fundamental factor contributing to a higher level of physical activity among the students we examined is that they study in the department of physical education and have sports activities included in their curriculum. Kaminska et al. (2012) found that physical education students show higher levels of physical activity and physical fitness compared to physiotherapy students. Edelman et al. (2022) found the same thing. Students in the physical education faculty are more active than their peers in other fields, such as the natural sciences, language sciences, medicine, and law.

After a systematic review of physical activity and physical fitness among university students, Kljajevic et al. (2021) found that average scores on physical fitness tests are low, indicating a need for more active physical education programs tailored to developing fitness in university students.

To our knowledge, only a few investigations have used the Physical Activity Questionnaire (PAQ) and accelerometers. According to Wyszinska et al. (2019), a strong correlation exists between the PAQ and the number of steps per day, as well as moderate to vigorous physical activity. Eckelt et al. (2023) found that physical activity, as measured with accelerometers and the PAQ, is higher in spring and summer than in autumn and winter.

A systematic review by Skender et al. (2016) found that a questionnaire alone is insufficient to provide consistent information about physical activity. An accelerometer is needed to show consistent data related to physical activity questionnaires.

That is why we used questionnaires and accelerometers. However, the data from the questionnaires is controversial in comparison to the data from the accelerometers. The data from questionnaires shows that 1st-year students are more active than 3rd-year students.

First-year students report that they do sport 2-3 times per week in the evening, whereas 3rd-year students do sport once per week. Results from accelerometers, though, show that 3rd-year students are a more active group than 1st-year students. The data reveal a controversy: 1st-year students believe they are the more active group than 3rd-year students, but accelerometer results show the opposite.

Both groups report participating in sports 2-3 times a week. The mean time of MVPA on Saturday is 132.5 minutes, and on Sunday, 65.6 minutes for 1st-year students, and 120.1 and 146.1 minutes for 3rd-year students, respectively. Third-year students are more active on weekends, but both groups have ensured an adequate amount of moderate to vigorous physical activity (MVPA) during the weekends. That is, 1st-year students have a mean of 99,1 minutes of MVPA on weekends, and 3rd-year students have 133.1 minutes of MVPA.

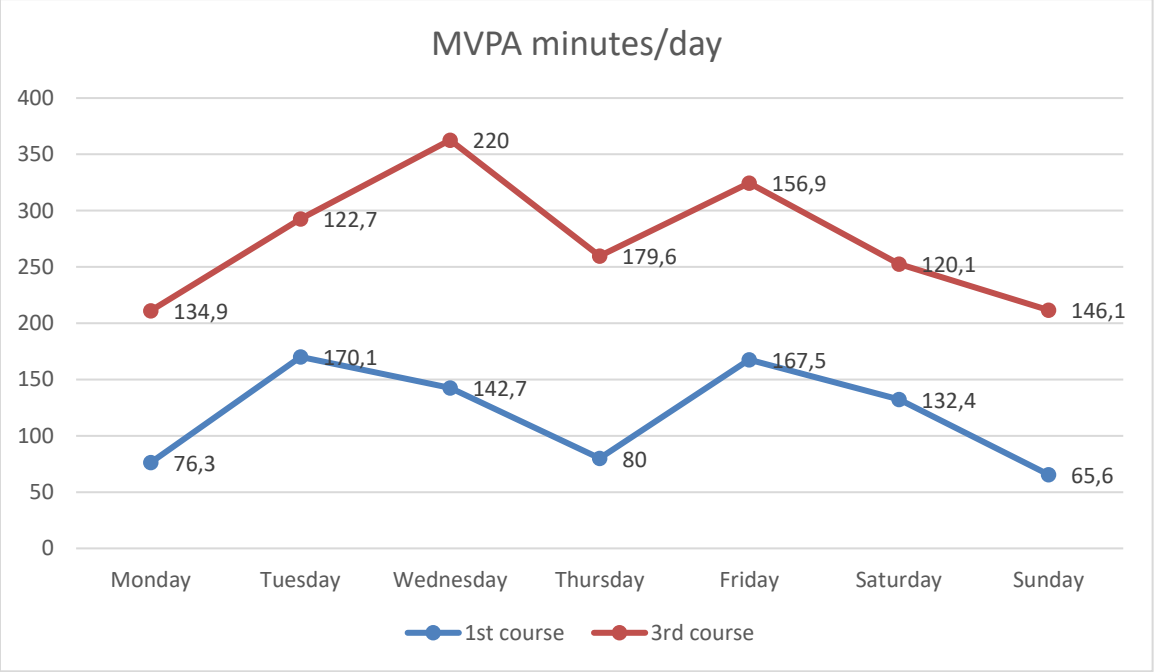
This is more than Diaz-Quesada et al. (2025) have reported among university women students (82.2 minutes of MVPA). In our research, 1st-year students achieved 126.1 minutes of moderate to vigorous physical activity (MVPA) on weekdays, and 3rd-year students achieved 160.2 minutes. This is quite more than Diaz-Quesada found in their study (94.7).

Edelman et al. (2022) found that first-year students are less active than higher-year students. We found the same tendency. A limitation of Edelmann's study is that it used only a physical activity questionnaire without accelerometers.

A positive trend is that all students comply with the recommended 150-300 minutes of physical activity per week, as recommended by the WHO. First-year students have a mean of 225.2 minutes of moderate to vigorous physical activity per day, and 3rd-year students have a mean of 293.3 minutes. All students are at or above the higher boundary of these recommendations.

The following graph illustrates the amount of moderate to vigorous physical activity for both 1st-year and 3rd-year students.

Graph 1: The amount of MVPA per day for first- and third-year students.



As shown in the figure, both the first and third years show the same trend. The highest amount of MVPA is observed in the middle of the week, while the lowest amount is recorded at the beginning and end of the week.

The lowest amount of MVPA per day for 1st-year students is on Sunday - 65.5 minutes. The highest amount of MVPA for them is on Tuesday – 170.1 minutes.
Third-year students engage in significantly more moderate to vigorous physical activity (MVPA) per day. The lowest amount for them is on Monday – 134.9 minutes, and the highest amount is on Wednesday – 220 minutes.

There is an inconsistency in the results found by other authors. For example, Bangladeshi students have only 90 minutes per week of MVPA, which is much lower than our results (Uddin et al., 2017). Spanish students achieved 40.6 minutes of MVPA per day, and 22.5 minutes of MVPA per day during the weekend (Arias-Palencia et al., 2015).

Limitations

This study has its limitations. First, we measured only women. If men had been included, the examination results might have been different.

Conclusion

Both first- and third-year students have met the World Health Organization (WHO) guidelines for weekly physical activity, which range from 150 to 300 minutes of moderate to vigorous physical activity. According to questionnaires, 1st-year students believe that they are a more active group. As per accelerometers, 3rd-year students are more active. It is seen as a positive trend, as all examined students have ensured a minimum of 150 minutes of moderate-to-vigorous physical activity (MVPA) per week.

Future research is necessary to assess the level of physical activity among both sexes and students across all years of study. This will provide an opportunity for a comprehensive analysis and conclusions.

Practical Implications

These findings provide insight into the weekends when students are most active. Practical lessons can be organized on these days. A good opportunity for organizing theoretical lessons can arise on days when students are less active.

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Accelerometer-measured physical activity of 5th-grade students during school hours

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Abstract: Physical activity is a key component of a healthy lifestyle. Therefore, this research aimed to study the level of moderate to vigorous intensity physical activity (MVPA) of 11-year-old students from the private school "Dr. Petar Beron" in Sofia, Bulgaria. The study was conducted over one week in October, 2024/2025 school year. Twenty students from the 5th grade, 10 boys and 10 girls, participated in it. Three-axis logging accelerometers, Axivity AX3, were used. The measurement was conducted in a natural school setting. The obtained data were analyzed using descriptive statistics in SPSS Statistics 27.0. The results showed that both girls and boys met the recommended levels of physical activity mentioned below. Girls had an average of 146 minutes of moderate-to-vigorous intensity physical activity daily in school settings only. Boys had 185,7 minutes. However, only about 30 minutes (30.9 for girls and 34.1 for boys) of daily moderate to vigorous intensity physical activity came from Physical Education lessons. For girls, this represents only 21.1% of physical activity, with this intensity ensured through Physical Education lessons. For boys, that is 18,3%. This means that students ensure a higher percentage of moderate to vigorous physical activity during recess and lunch periods. We confirm the tendency that boys are more active than girls at this age. Future research is needed to find how teachers can effectively support students during recess to ensure they engage in high-quality physical activity.

Keywords: Daily physical activity, recess, school physical activity.

Introduction

Physical activity is a fundamental element of a healthy lifestyle. According to the World Health Organization, children and adolescents should engage in at least 60 minutes of moderate to vigorous physical activity daily (WHO, 2020). As per their investigations, 80% of adolescents do not meet the physical activity recommendations.

In their physical activity guidelines, WHO stated that the "minimum" should be amended to "average" of 60 minutes per day (WHO, 2020). This means that the adolescent does not need to ensure a minimum of 60 minutes per day. They can ensure 40 minutes in one day and 80 minutes the next day.

The lack of physical activity is detrimental to human beings, especially children and

adolescents. Sedentary behavior among children and adolescents is related to increased adiposity, poorer cardiometabolic health, reduced physical fitness, and lower sleep quality (WHO, 2020). In our study, we found that more than 60% of 16-year-old adolescents do not meet the World Health Organization (WHO) recommendations (Mihaylov, P., 2021).

One of the primary tasks of a contemporary school is to establish an infrastructure that enables children and adolescents to be physically active, not only during physical education lessons but also during recess periods. Some contemporary studies suggest that the recess period is as important as a physical education lesson, based on the number of steps taken (Brusseau, T., et al., 2011).

One fundamental factor in facilitating both qualitative and quantitative physical activity is the use of schoolyard settings. According to Lemberg et al. (2023), well-designed schoolyards are associated with higher levels of moderate to vigorous physical activity. Silva et al. conclude that free time in school is a fundamental element for promoting physical activity (Silva, P., et al., 2015).

The information mentioned above suggests that students prefer physical activity during recess in school as a means to stay physically active. This can be referred to as basic psychological needs (Ryan, R., Deci, E., 2000). The students meet the need for autonomy, competency, and relatedness during these recess times in school.

Therefore, this investigation aimed to study the level of moderate to vigorous intensity physical activity of 11-year-old students from the private primary school “Dr. Petar Beron” in Sofia, Bulgaria.

Methods

Participants

The study was conducted with 20 students from the private primary school “Dr. Petar Beron”, 10 boys and 10 girls. The students were 5th grade (11 years old). They were wearing “Axivity AX3” bands, which are 3-axis logging accelerometers. All students provided written consent in accordance with the Declaration of Helsinki.

Procedures

A cross-sectional study was conducted.

The research continued for one school week (five days) from Monday to Friday. The students would put the Axivity bands on every morning before the first lesson and take them off every evening after the last lesson of the day.

The Axivity bands were taken after the last school day (Friday) and were processed afterwards.

From Monday to Thursday, each student has one physical education lesson per day (40 minutes each). On Friday, they have a dance lesson (40 minutes).

Every day, there are two 15-minute recess periods related to the snack, two 10-minute recesses, and one 55-minute lunch recess. Students are free to choose how to spend their free time. An important condition is that the gyms are open for them if they want to do some sport during the recess period.

Data analysis

The data were processed with IBM SPSS Statistics 27.0. Descriptive statistics were used, and an independent sample t-test was conducted.

Results

The level of moderate to vigorous physical activity during school days, from Monday to Friday, is shown in Table 1.

Table 1. Average Amount of Moderate to Vigorous Physical Activity

Day	Sex	Average Minutes	Difference
Monday	Boys	188,2	41,3
	Girls	146,9	
Tuesday	Boys	199,9	36,4
	Girls	163,5	
Wednesday	Boys	178,5	**30,4***
	Girls	148,1	
Thursday	Boys	192,2	**50,8***
	Girls	141,4	
Friday	Boys	169,4	39,1
	Girls	130,3	

P<0.05

As seen in Table 1, the boys engage in more vigorous physical activity on each of the days. The most significant difference is on Thursday – 50,8 minutes. The smallest difference is 30,4 minutes on Wednesday. The average difference in data between boys and girls is 39,6 minutes. That means boys have approximately 40 minutes more moderate to vigorous physical activity daily than girls.

Figure 1 illustrates a similar trend in volume fluctuations for both boys and girls. For both sexes, Tuesday is the most active day regarding moderate to vigorous physical activity. Following this busy day, Wednesday sees a decline in volume. Girls demonstrate a slight drop in moderate to vigorous physical activity on Thursday and Friday. Although boys experience their second busiest day on Thursday, they show a significant reduction in volume on Friday.

The tendency indicates that Tuesday is the most voluminous day, for both boys and girls, while Wednesday and Friday are less busy days for both sexes. From the figure, we see that the volume alternates every other day.

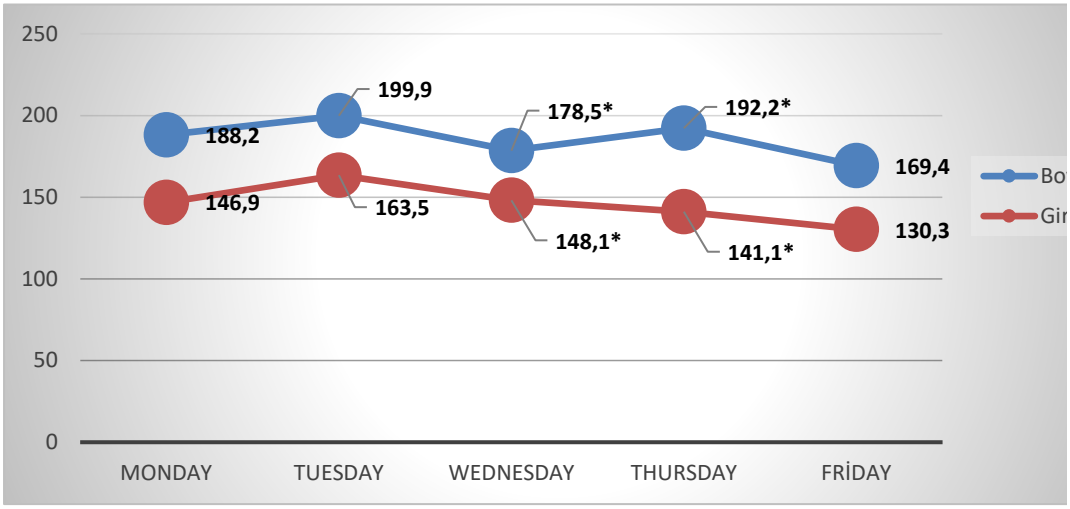

Figure 1. Volume of Moderate to Vigorous Physical Activity

The independent sample t-test reveals that the data for boys and girls on Wednesday (P = 0.05) and Thursday (P = 0.05) are statistically significant. The data on Monday, Tuesday, and Friday are not statistically significant.

Figure 2 depicts the % of moderate-to-vigorous intensity physical activity in physical education (PE) lessons.

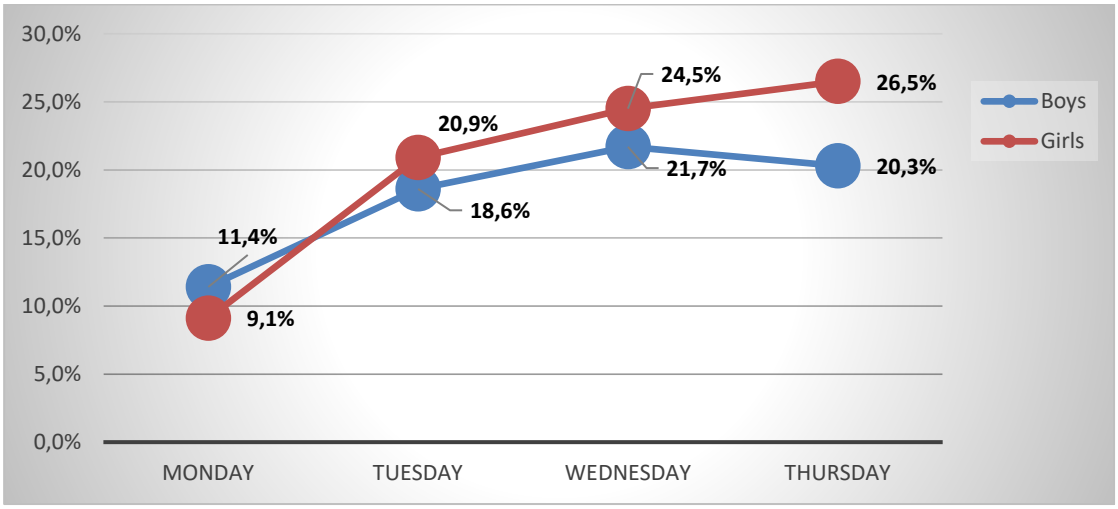

Figure 2. The percentage of moderate-to-vigorous intensity physical activity ensured from PE lessons.

Figure 2 shows a tendency for a slight increase in the percentage of moderate to vigorous intensity physical activity ensured through physical education lessons. It is interesting that on Monday, only 9.1% of girls and 11.4% of boys engage in moderate to vigorous intensity physical activity during the physical education lesson. The other approximately 90% are ensured from the recess time. In the next few days, there is a tendency for a slight rise in the percentage of moderate to vigorous physical activity ensured by physical education lessons. The highest percentage is on Friday for girls – 26.5% - and on Thursday for boys – 21.7%.

Discussion

This study examined the volume of moderate to vigorous physical activity in 20 fifth-grade students within school environments, including physical activity during recess, lunchtime, and physical education classes. To our knowledge, there are only a few studies that examine moderate to vigorous intensity physical activity in private school contexts.

The results indicate that boys engage in more vigorous physical activity in school settings than girls. This tendency is supported in other studies. Brusseau et al. (2011) found that boys take an average of 2,000 more steps than girls in school settings. These results are supported by Wood et al. (2014), Wang et al. (2019), and Bailey et al. (2012).

Lemberg et al. (2023) found that boys engage in more moderate to vigorous intensity physical activity during recess than girls. Our study supported this tendency. Boys participate in more moderate to vigorous intensity physical activity during recess than girls every day from Monday to Friday. On some days, this difference exceeds 50 minutes. We

found no significant correlations between moderate to vigorous intensity physical activity and weight, height, and BMI.

Contemporary programs are included in some schools to promote moderate to vigorous intensity physical activity. One of these programs is “Ready for recess”. According to Huberty et al (2011), this program enhances moderate to vigorous intensity physical activity in boys, but not in girls. That is interesting data, because even organized activities from teachers hardly influence the amount of physical activity among girls. According to Bleeker et al. (2015), there is a way to enhance girls' moderate to vigorous physical activity intensity during recess. That is the “Playwork” program, in which the teacher tries to involve students in physical activity by providing suitable equipment. They found that girls became more active after participating in this program.

In physical education classes, both boys and girls have a similar amount of moderate to vigorous intensity physical activity. That gives us information that the teacher has ensured efficient organization, which has included both boys and girls in the lesson. We know that 5th grade is a challenge for a physical education teacher due to the significant differences observed between genders, not only in terms of physical fitness, but also in motivation, interest, and other factors.

Interestingly, both girls and boys engage in higher moderate to vigorous intensity physical activity during recess than in physical education lessons. Gao et al. (2015) found the same tendency in first and second graders. Beiley et al. (2012) and Wang et al. (2019) suggest that less structured periods, such as recess, are a fundamental factor for promoting physical activity, especially in girls.

Saint-Maurice et al. (2011) conclude that the amount of moderate to vigorous physical activity in recess would be 30% higher if equipment is provided and activity is supervised. A crucial point is that the teacher serves as a staff provider and facilitator, while the students have the right to choose what to play and where to play.

According to Saint-Maurice, in this age, girls tend to engage in sedentary behavior if the facility is occupied by boys. Studies have shown that playgrounds play a crucial role in promoting physical activity, particularly among girls (Silva et al., 2015). Girls tend to be more active in morning recess and lunchtime.

We can conclude from the information mentioned above that there will be a difference in physical activity for both boys and girls, depending on the playground, staff provided, and supervision from the physical education teacher. Van Kann et al. (2016) found a correlation between staff-provided activities (such as footballs, soccer goals, and teacher-initiated activities) and higher moderate to vigorous intensity physical activity. This could be a major factor in addressing the lack of physical activity in school.

Viciana et al. (2016) also found that physical activity in recess is a good way to enhance moderate to vigorous physical activity. Massey et al. (2018) prove this tendency. Klinker et al. (2014) suggest that different strategies are necessary for both boys and girls, depending on the context, to ensure physical activity. This means that the physical education teacher should ensure an efficient playground for both boys and girls to engage in physical activity during recess. Andersen et al. (2015) found that grass areas have the highest probability of ensuring the greatest amount of moderate to vigorous physical activity. On the other hand, they claim that solid surface is associated with the most sedentary time among students.

This means that the school must ensure a grass surface, which will enhance the moderate to vigorous intensity physical activity in recess periods.

The data from our study showed that physical education lessons contributed 16.2% to girls' and 14.4% to boys' moderate to vigorous physical activity during a school day. This supports the aforementioned data, which indicates that both girls and boys are more active during recess. The aforementioned studies have shown that playgrounds play a significant role in increasing the amount of moderate to vigorous physical activity, particularly among girls.

Rooney & McKee (2018) found that physical education lessons contribute 6,4% of moderate to vigorous physical activity in 8-11-year students. They also conclude that the promotion of physical activity can be achieved with effective planning, organization, and management of resources by physical education teachers.

Notably, data show that object control skill competency is positively related to moderate to vigorous physical activity during lunchtime and recess periods (Cohen et al., 2014). That means games like basketball, football, and handball are suitable for enhancing moderate to vigorous physical activity during recess periods.

On the other hand, parents play a fundamental role in enhancing the moderate to vigorous physical activity of students. There is evidence for a correlation between moderate to vigorous intensity physical activity in mothers and children (Tanaka et al., 2018). In general, parents encourage their children to engage in moderate to vigorous physical activity (Geron & Zaberska, 2021).

In our opinion, recess periods are a powerful tool for enhancing moderate to vigorous intensity physical activity in students because they better meet the basic psychological needs of students (Deci & Ryan, 2000). Recess periods are the time of the school day when students have the right to choose what to play, how to play, and so on. They can even change the rules so that they can meet their competence. These settings can meet the need for autonomy, competence, and relatedness (Massey et al., 2018).

Baquet et al. (2018) found that an experimental design playground, used for 12 months, showed an increase in time spent engaging in moderate to vigorous intensity physical activity. Andersen et al. (2019) also found this tendency. According to their study, girls are more active in dance activities or on a climbing frame, while boys are more active on an obstacle course.

It has been found that the longer the recess period, the greater the amount of time spent in moderate to vigorous intensity physical activity (Hubackova, 2016). So, an important task for every school is to ensure an optimal amount of recess periods, which will positively influence moderate to vigorous intensity physical activity in students.

Limitations

This study is not without limitations. First, the small sample can distort the results from the Axivity AX3 bands. Second, we do not know what activities the students engaged in during their recess periods. This information would have been beneficial for us to draw clear conclusions.

Conclusion

Both boys and girls meet the World Health Organization's guidelines for daily physical activity, although boys tend to be more active than girls. Only approximately 20% of moderate to vigorous intensity physical activity is ensured through physical education lessons, while the remaining 80% comes from other activities. Recess and lunchtime periods are fundamental factors for enhancing 5th-grade physical activity in a school setting.

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Motor development and related factors in children. Effects of an experimental teaching intervention through different teaching styles

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Abstract: School physical education contributes decisively to the child's educational process and the teaching of motor competencies implies not only a careful selection of tasks and organizational methods, but above all the analysis of presentation methods (Colella, 2019). An effective didactic-educational process requires the planning and analysis of the motor task and the equipment to be used, the structuring of spaces and, in particular, the deepening of the relational modalities between teacher, student, class group and environment. The proposal of motor tasks through the use of different strategies and teaching styles makes it possible to enhance the mediation functions in the child's motor learning process and in the promotion of healthy lifestyles (Stodden et al., 2008; Robinson et al., 2015). The following study aims to compare the effects of variability of practice and variation of teaching styles through which motor tasks based on the discovery of executive variations, motor development and perceived self-efficacy were proposed. The sample is composed of 5 primary school classes (N = 74 children), divided by gender (males: N = 38, age 8.97±0.82; females: N = 36, age 9.03±0.77). The results, following the didactic intervention (T0 vs T1), show statistically significant differences ($p<0.05$) in all motor tests and in the questionnaire on perceived self-efficacy, in both groups. The didactic intervention was carried out by proposing motor tasks on the variability of practice to promote interconnections between motor skills, according to a non-linear didactic approach (Chow et al., 2007). Production teaching styles, oriented towards enhancing the student's motor responses, promote the learning process and constitute mediating factors for the educational process as they promote the links between motor, cognitive, emotional and social functions.

Keywords: Motor competence; teaching styles; variability of practice; motor development; primary school.

Introduction

Physical education represents a strategic educational area to promote a global development of children that embraces not only the motor sphere, but also the cognitive, social and

affective sphere. Through structured motor activities, methodologically grounded and appropriate to developmental stages, physical education assumes an educational role that goes far beyond the disciplinary field, flowing in an interdisciplinary and participatory sense into the broader school training project (Durden-Myers et al., 2018). Therefore, it is not limited to the acquisition of motor competencies, but also promotes the establishment of knowledge, skills and attitudes that make it possible to participate consciously, autonomously and over time – in line with the concept of physical literacy (Durden-Myers, Green & Whitehead, 2018; Cairney et al., 2019; Fortnum et al., 2018).

The level of development of the motor competencies acquired activates a circular process towards trajectories of health and well-being (Stodden et al., 2008; Robinson et al., 2015). Motor competence is configured as a multidimensional construct in which skills (knowing how to do), knowledge (knowing) and attitudes (knowing how to be) are integrated and require flexible educational practices that can be adapted to the context (Colella, 2019; Newell, 1986; Wulf & Lewthwaite, 2016).

In this perspective, Nonlinear Pedagogy, according to Ecological Dynamics, task variability and experimentation of motor responses-executions, has shown promising results: interventions based on practice variability and motor creativity increase children's motor development and emotional involvement (Chow et al., 2016; Rudd et al., 2021).

The most recent evidence supports the significant role of the school context in daily physical activity, showing that, during school hours, children accumulate between 14 and 61 minutes per day of moderate-vigorous activity (MVPA) during physical education lessons (Grao-Cruces et al., 2020), with significantly higher levels of MVPA than on days when it is not practiced (Fairclough & Stratton, 2006; Human Kinetics Review, 2023). This figure underlines the importance of the school in contributing to the fulfillment of international guidelines on physical activity.

Further evidence comes from various studies: den Uil et al (2023), investigated the relationship between actual motor competence (AMC), perceived competence (PMC), physical activity, fitness and weight status in Dutch children (4–13 years). The results highlight a strong correlation between AMC and PMC from early childhood, and a progressive association between these variables and physical activity and fitness during development. This study reinforces Stodden's model by highlighting that the role of personal perception assumes an increasing weight in motor engagement starting from school age, supporting the need to develop motor skills from a young age (den Uil et al., 2023). A further relevant didactic and theoretical development is represented by the Teaching Styles Spectrum by Mosston and Ashworth (2008), as a tool to align teaching styles with the expected outcomes. The intentional alternation and interaction between directive and non-directive styles (in particular those that favor open and autonomous responses) allow to develop and increase both motor competencies and cognitive and

cognitive and affective competencies (Mosston & Ashworth, 2008; Pill et al., 2024).

However, the most recent scientific evidence shows that not all physical education teachers have real knowledge and a correct and conscious use of the spectrum of teaching styles (Monacis et al., 2024; Espada et al., 2025). For an educational intervention in physical education to be effective, an accurate design of the motor task, the use of space, equipment and the relationships between teacher, students and context is essential (Colella, 2019).

In the light of this evidence, the educational intervention covered by this study is structured on three synergistic dimensions:

a) design of motor tasks with executive variants that stimulate the functional adaptation of the gesture;
b) targeted selection and alternation between teaching styles, with particular emphasis on those oriented towards autonomous production (guided discovery, learner designed);
c) multidimensional analysis of the effects induced by stylistic variation, considering not only motor competencies, but also cognitive and affective dimensions (self-perception).

This educational intervention was tested in a primary school in the province of Lecce, promoted by the Laboratory of Didactics of Motor Activities, with the aim of systematically observing and understanding the teaching-learning processes in a design and innovative context.

Self-perception

Physical Self-Perception (PSP) is a complex psychological construct that reflects how the individual assesses their physical abilities and body image. It includes dimensions such as strength, endurance, coordination, sports competence and physical appearance, and is an integral part of the development of motor identity (Fox & Corbin, 1989). In developmental age, PSP plays a crucial role in motivating physical participation, acting as a bridge between real motor competence and observable motor behaviors. Consolidated studies (Stodden et al., 2008; Barnett, 2016) have shown that self-perception acts as a mediator between motor skills, fitness and active behavior, generating a positive spiral towards a healthy lifestyle, or negative in the case of distorted perceptions.

Babic et al. (2014), in a meta-analysis of over 50 studies, confirmed the significant association between positive PSP and higher levels of physical activity in young people, emphasizing the importance of developing an accurate motor self-image. This finding is reinforced by De Meester et al. (2016), who showed that children with realistic and positive motor perception are more physically active, fitter and have a more balanced BMI. Structured educational interventions starting from the youngest children can promote an increasing relationship between effective and perceived motor competence, physical

activity and fitness during development (den Uil et al., 2023).

In a further study, Monacis et al. (2022) found that PSP partially mediated the relationship between body mass index and physical activity in Italian children, and that enjoyment for physical activity further strengthened this association, highlighting the need for an integrated motivational approach. During preadolescence, PSP takes on an increasing weight in predicting the satisfaction of psychological needs and self-determined motivation towards physical education, both of which are determinants of high levels of MVPA.

Environmental and individual factors, such as gender, BMI and the presence of school sports facilities, significantly influence the perception of the physical self. In an adolescent context, Abdo et al. (2023) showed that a positive PSP is closely related to higher body image satisfaction and higher levels of psychological well-being, underscoring the urgency of promoting healthy and inclusive body perception even in school cultures at high risk of aesthetic stereotypes.

In light of these data, it is crucial that physical education includes teaching strategies that stimulate motor awareness, perceived success and self-evaluation, with safe and fun environments (Ceciliani, 2016).

Teaching styles and variability of practice

The linear and non-linear teaching approaches to motor learning represent two profoundly different models of instructional design in physical education. In reality, in the teaching of physical education they are complementary.

Linear pedagogy is based on Information Processing Theory, according to which motor learning is divided into ordered stages – cognitive, associative, autonomous – through explicit instructions, standard motor models and predefined and progressively more complex exercises (Fitts & Posner, 1967; Gentile, 2000).

In this paradigm, the teacher plays an active and directive role: he identifies the most necessary motor skills, directs analytical practice and limits the variability of movement to facilitate the memorization and reproducibility of skills (Rudd et al., 2021).

Nonlinear pedagogy, on the other hand, originates in the framework of the ecological-dynamic approach (Newell, 1986; Davids et al., 2008) and considers learning as an emerging phenomenon: motor competencies arise from the interaction between the individual, task and environment. In this perspective, the role of the teacher changes into a facilitator: he builds rich and contextualized environments, and uses constraints – spatial, temporal or material – to stimulate the exploration of flexible motor solutions. Movement variability is not seen as a disturbance or obstacle, but as a crucial resource for learning to

manage uncertainty and develop functional adaptation (Renshaw et al., 2010; Chow et al., 2016). Recent studies indicate that an external attentional focus promotes more functional performance and greater efficiency in motor learning (Soderstrom & Bjork, 2015; Wulf & Lewthwaite, 2016).

These two pedagogical models find a point of connection in the Teaching Styles Spectrum by Mosston and Ashworth (2008), which organizes teaching models along a decision-making continuum. In the "directive" part of the spectrum (Style A–C), embodied by the linear approach, the teacher defines the task, the sequence and the style, aiming at motor precision, uniformity and the elimination of variability. Conversely, in the "autonomous" part (Style F–H), closer to non-linear pedagogy, the educator promotes guided discovery, autonomous invention and creative solutions, exploiting variability to favor individual adaptation (Mosston & Ashworth, 2008).

It is important to underline that both ways of understanding teaching should not be considered in absolute opposition, but rather as complementary tools. The linear approach can promote stability and the initial organization of motor skills, while the non-linear approach stimulates adaptive strategies, problem solving and intrinsic motivation. Numerous studies suggest that a conscious use of directive and non-directive styles — calibrated according to age, context and objectives — can improve not only motor mastery, but also the perception of competence and student involvement (Pill et al., 2024; Espada, Calero & Navia, 2025).

In conclusion, the Teaching Styles Spectrum provides a useful framework for understanding the pedagogical implications of linear and non-linear models: through the informed choice of style, the dynamics of teacher-student responsibility, the management of variability and the degree of decision-making autonomy assigned to students in their motor learning path are defined.

Aims

This study aims to explore and compare the impact that different teaching modalities can have on the development of motor coordination and self-perception of primary school children.

Sample

The sample consists of 74 children attending four primary school class groups (Males = n: 38; Females = n:36), divided only according to gender differences and into a single experimental group (table 2).

Table 2. Sample Description

Gender	*N*	*Age*	*Height*	*Weight*	*BMI*
Male	38	8,97±0,82	1,36±0,08	35,08±8,87	18,80±3,19
Female	36	9,03±0,77	1,36±0,08	34,99±9,71	18,69±3,88
TOT	**74**				

Materials and methods

The following tests were administered for the evaluation of motor abilities, validated in the literature (Falk et al., 2001; Morrow et al., 2000; Ruiz et al., 2011): standing long jump, 4x10 meter shuttle, seated front throw and 20 meters slalom. In addition, in order to detect psychological aspects related to the motor experience, a self-report was used: the PSP_C questionnaire for the evaluation of self-perception (Colella et al., 2008).

All motor tests and the self-assessment questionnaire were carried out at two distinct times: pre-intervention (t0) and post-intervention (t1), in order to measure the changes attributable to a 15-week educational path, during which a total of 24 hours of physical education lessons were carried out.

The teacher's didactic behavior was defined a priori by means of a structured observation grid, containing descriptors corresponding to the teaching styles mainly used in the conduct of lessons and in the management of educational communication and motor tasks (Colella et al., 2020; Tables 3 and 4).

Table 3. Reproduction Styles: Teacher Behavior Descriptors Used

Teaching style of reproduction	Teacher behavior descriptors
Practice	a) Presents the motor task and communicates the learning objective; b) Prepares the organizational methods and operational spaces (individual tasks, in pairs, routes, relays, circuits, in which the use of small tools is also foreseen; group and team games; etc.); the executive variants are predefined and few in number; c) Prepares the organization of sub-groups; d) Indicates the methods of execution, the number of sets, repetitions, the intensity of the task and the difficulty of execution on which to practice; communicates the criteria for the success of the task; e) It corrects the error directly and *indirectly*.
Inclusion	a) Presents the motor task and states the learning objective; b) It presents the executive and organizational methods, according to different levels of difficulty/intensity, increasing or reducing the number of executive variants and the use of tools; c) Adapts the motor task through executive variations, according to the needs of the students; d) Communicates the relationships between motor skills performed/required and related motor skills; e) It corrects the error directly and *indirectly*.

Table 4. Production Styles: Teacher Behavior Descriptors Used

Teaching Style of Production	Teacher Behavior Descriptors
Guided discovery	a) Sets out the objective, presents the motor task and recalls the motor skills already acquired (in formal and non-formal contexts); b) Proposes a motor task and asks questions on possible spatial-temporal-qualitative-qualitative executive variants / how to use a tool / management of spaces and environments; c) It proposes a motor task and stimulates the discovery of similarities and differences with other tasks/tools/activities through questions and stimulus-situations (in how many ways? How can you ?.....); d) It requires the repetition of the motor task without repeating the same task but independently discovering the executive variants; e) Communicate questioning/descriptive feedback to the learner.
Problem Solving	a) Communicates the objective, presents the motor task and recalls the motor skills already acquired; b) It proposes the execution of a motor task and solicits open, divergent motor responses (Who can ...? How many other ways is it possible... if I am in this position? ....) c) Asks questions and solicits open-ended motor responses, in which each student is autonomous in the use of any skill/choice of position, etc.); d) Asks questions and solicits motor responses through combinations of executive variations; e) Proposes motor tasks within space-time constraints; f) Communicate questioning/descriptive feedback to the learner.

Procedure

For the implementation of the experimental intervention, four primary school classes were involved, made up of children who regularly attended physical education lessons conducted by a qualified teacher, in possession of a master's degree in Science and Techniques of Preventive and Adapted Motor Activities. Due to the limited sample size, it was not possible to include a control group. Therefore, the research adopted a single-group experimental design, with measurements taken before (t0) and after (t1) the intervention.

The educational path was divided into three learning units (see Table 5), each of which represented a specific thematic area:

a) exercises on motor skills with the use of small tools, enhancing space-time variants in executive gestures;
b) group games aimed at developing orientation skills and cooperation between peers;
c) activities for the improvement of motor coordination, with attention to the organization of movement at a global and segmental level.

The design of the learning units was initially taken care of by the research team and, at a later stage, discussed with two experienced physical education teachers working in primary school. This step has ensured the alignment of the educational proposals with the school context and the planned curricular objectives.

The activities took place twice a week from February to May, with sessions lasting 45 minutes for each group-class. The intervention emphasized the prevalent adoption of teaching styles oriented towards autonomous production (used for at least 50% of the time available in each lesson), such as guided discovery and open-ended problem solving, according to the taxonomy proposed by the Spectrum of Teaching Styles (Mosston & Ashworth, 2008). The intent was to stimulate the active involvement, reflection and decision-making autonomy of the children in the execution of motor tasks.

In parallel, reproductive styles – in particular individualised practice and inclusion style – have been integrated in order to support the learning of basic technical skills and ensure the participation of all children, regardless of their starting level.

The motor proposals were organized through a variety of operational scenarios: individual, in pairs and in small group activities, making use of small tools and providing for the intentional modulation of spaces, materials and executive constraints.

The teacher has adopted a communicative mode based on openness, encouragement and stimulation of divergent motor thinking, in line with the principles of the non-linear approach to learning.

Table 5. Educational proposals

Learning units	Objectives	Contents	Organizational methods	Teaching styles
Motor skills and small tools: the spatio-temporal executive variants	• Perform basic motor skills and executive variants with the use of small tools; • Discover and distinguish the specific use of tools; • Distinguish the rules referring to the activities practiced.	Motor tasks with small tools: hoop and ball, mainly considering relationships: a) body stationary and tool in motion; b) body and tool in motion.	Individuals and in pairs	• Practice Style • Guided discovery style
Motor coordination	• Combine motor skills according to spatial and temporal variations; • Perform motor skills by adapting the strength and speed of execution • Analyze and Evaluate (verbalize) the motor experiences performed.	Motor combination tasks and spatial-temporal differentiation also with the use of small tools; Paths with specific interactions of basic motor skills and executive variants.	In pairs	• Practice Style • Guided discovery style • Problem-solving style
Group games and spatial-temporal orientation	• Anticipate the progress and result of an action.; • Perform and vary motor skills in minimal time; • Organize a group game; • Compare and apply different rules.	Ball games preparatory to team games.	Class group and small groups	• Practice Style • Style of inclusion • Problem-solving style • Guided discovery style

Results

In addition to the descriptive statistics (M± SD), the Student's T-Test was carried out, in order to highlight significant differences within the group.
The significance index has been set to $p < .05$.

Statistical analysis (T0 vs T1) showed significant differences in both groups (males and females) both in motor tests (tables 6a-6b) and in self-report (table 7a).

Table 6a.

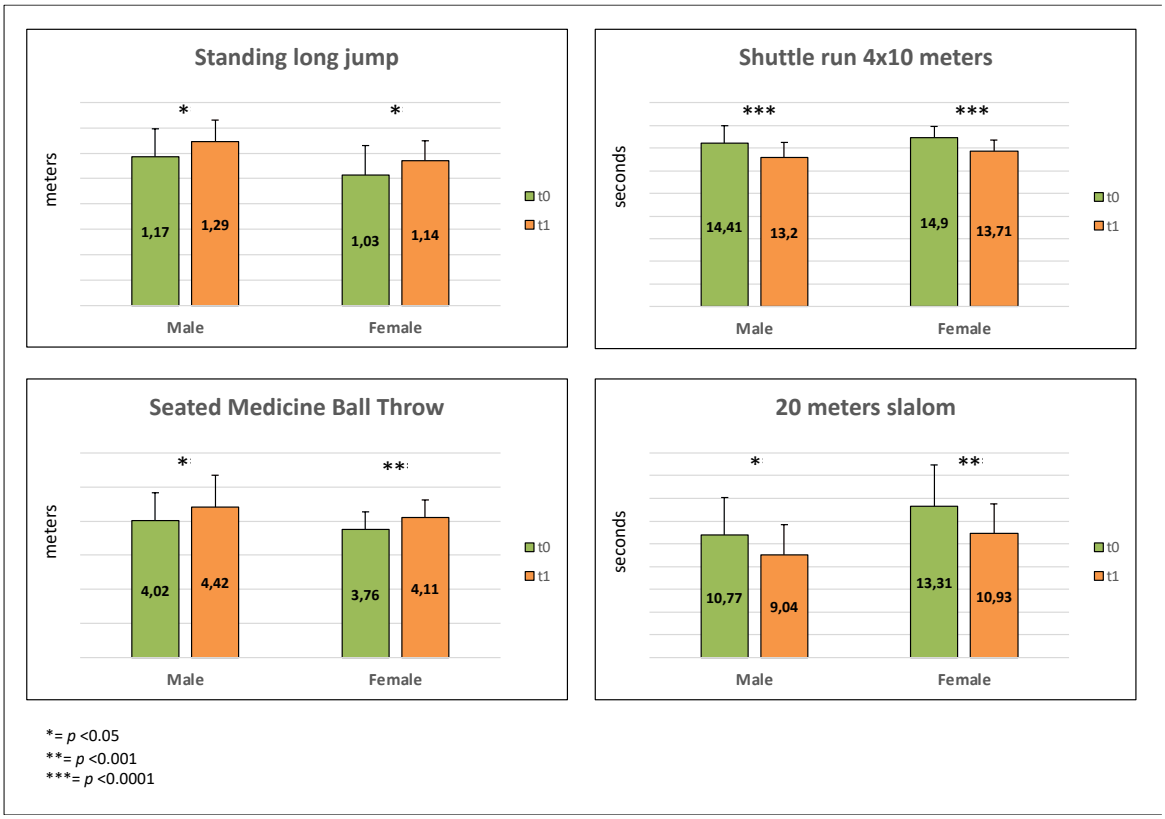
Gender	*SLJ t0*	*SLJ t1*	*p*	*4x10m t0*	*4x10m t1*	*p*
Male	1,17±0,22	1,29±0,23	.015	14,41±1,59	13,20±1,29	.000
Female	1,03±0,17	1,14±0,16	.011	14,90±1,03	13,71±0,98	.000

Table 6b.

Gender	*SMBT t0*	*SMBT t1*	*p*	*20m slalom t0*	*20m slalom t1*	*p*
Male	4,02±0,80	4,42±0,92	.047	10,77±3,29	9,04±2,65	.014
Female	3,76±0,52	4,11±0,52	.006	13,31±3,63	10,93±2,60	.002

Table 7a.

Gender	*SE t0*	*SE t1*	*p*
Male	19,53±2,49	20,76±2,36	.029
Female	18,00±2,72	19,25±2,47	.044



*= p <0.05
**= p <0.001
***= p <0.0001

Figure 1. Graphs of motor tests, mean, standard deviation and student's t-test between pre (t0) and post intervention (t1)

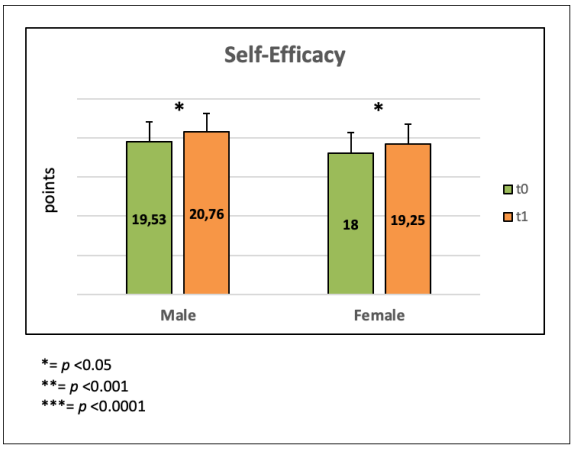


Figure 2. Graphs of scores on student's Self-efficacy, mean, standard deviation and t-test between pre (t0) and post intervention (t1)

Conclusion

The data that emerged from the research highlight the effectiveness of the intentional modulation of teaching styles, with particular reference to those that favor original and creative motor responses of the student, in generating significant improvements in motor coordination and self-perception among primary school children.

The role of the teacher as a facilitator and mediator of learning processes is central, through the proposal of open motor tasks, characterized by high executive variability and oriented to stimulate unconventional motor responses. The adoption of a didactic design based on meaningful learning environments and diversified motor experiences has favored the activation of interconnections between cognitive, motor and relational dimensions.

In this framework, the emphasis on task variability and autonomous exploration is configured as a key element to support engagement and the enhancement of motor competence during development, in line with the principles of nonlinear pedagogical models and with the teaching styles proposed by the Mosston and Ashworth spectrum.

Limitazioni

Among the main methodological criticalities of the study we can highlight:
1.the lack of a control group made it impossible to make direct comparison with other teaching methods or with the absence of intervention;
2.the limited number of participants could influence the statistical robustness of the analyses;

3.the experimentation took place in a single school, a circumstance that may reduce the transferability of the results to other educational contexts;
4.The assessment of psychological dimensions was carried out by means of a validated self-report tool, but still subject to potential biases related to individual perceptions or social desirability.

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Examining the effect of professional bodybuilders' social media use on body satisfaction and narcissism levels

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Abstract: Bodybuilding is not only a physical activity but also a lifestyle that influences self-perception and social approval. Social media serves as a platform for individuals to showcase their appearance and seek validation, potentially affecting narcissistic tendencies. Few studies focus on professional bodybuilders, where physical appearance is central. This research examines the impact of social media use on body satisfaction and narcissism in professional bodybuilders. The sample included 104 volunteer professional bodybuilders (26 female, 78 male). Data were collected using the Personal Information Form, Social Media Usage Scale, Body Satisfaction Scale, and Narcissistic Personality Inventory. Independent Sample T-Test, ANOVA, Tukey HSD, and Pearson correlation tests were conducted using IBM SPSS Statistics 29.0, with significance set at $p<0.05$. Results showed a significant difference in the exhibitionism sub-dimension of narcissism based on gender ($p<0.05$), but no significant differences were found in social media use or body satisfaction ($p<0.05$). Age did not significantly affect social media use, body satisfaction, or narcissism ($p<0.05$). A significant correlation was found between social media use and body satisfaction ($p<0.05$). Social media use was significantly related to body satisfaction among professional bodybuilders. Given the complexity of psychological tendencies in bodybuilders, further research is needed to better understand these effects.

Keywords: Bodybuilding, social media use, body satisfaction, narcissism.

Introduction

With the advancement of technology, social media usage has become increasingly widespread. Today, the significant growth of social media encourages the dissemination of user-generated content (such as photos, videos, selfies, etc.), the increase in self-published personal images, and the facilitation of self-promotion and attracting attention (Weiser, 2018). Therefore, although social media usage has the potential to provide risky opportunities, particularly among teenagers and young adults (Livingstone, 2008;

Munno et al., 2017), it is regarded as "a way of being" (Kuss & Griffiths, 2017). The literature review emphasizes the crucial role of social media usage in shaping physical appearance standards (Levine et al., 2004).

Research shows that awareness, perceived pressure, and internalization are significantly associated with body image measures. According to Nadkarni and Hofmann (2012), social media usage fulfills two social needs: self-presentation and the need to belong (Boursier & Manna, 2018; Doğan & Çolak, 2016). The internalization of the thin body ideal is directly linked to body dissatisfaction (Stice & Agras, 1998; Suisman et al., 2012). Recently, the psychological mechanisms underlying social media sharing behavior, such as social pressure, attention-seeking, belonging, documentation, archiving, preserving special moments, and creativity, have been investigated (Bruno et al., 2018; de Vaate et al., 2018). Attitudes toward these shares have been analyzed in an attempt to predict the fundamental role of self-presentation and self-disclosure, as well as self-enhancement through the approval of others (Diefenbach & Christoforakos, 2017; Etgar & Amichai-Hamburger, 2017).

The current use of social media platforms by active young users/visual content creators provides an easy environment for achieving narcissistic goals such as self-promotion and attracting attention, as well as for socializing through experiences of self-objectification. Experimental evidence shows a clear relationship between social media use and body esteem/satisfaction, often influenced by others' approval and comparisons made through social media platforms (Boursier et al., 2020). A growing number of personality studies suggest that narcissism is one of the strongest predictors of self-promotional content on social media (Carpenter, 2012).

Narcissism is defined as "a personality trait reflecting a grandiose and exaggerated self-concept" and is characterized by an unrealistic positive self-view (Buffardi & Campbell, 2008), particularly regarding attributes such as status, physical appearance, social popularity, and intelligence (Campbell et al., 2002). Many studies have reported that narcissism is a significant predictor of social networking practices (Weiser, 2018; Sanecka, 2017; Wang et al., 2018). Compared to individuals with low narcissism, those with high narcissism are more likely to use social media platforms to gain positive reactions and increase popularity through visual content-sharing practices (Fox et al., 2018; Sanecka, 2017).

In recent years, two emerging discourses have been focused on in Western societies: an increase in healthy weight and muscle mass (Rodgers, 2016; Frederick et al., 2022). The healthy weight discourse, supported by health institutions and social media, emphasizes maintaining a socially acceptable body mass through a balanced diet and regular exercise, focusing on health rather than appearance (Kim & Willis, 2007). The muscle mass increase discourse has also gained popularity, and individuals' internalization of this concept is

increasingly influential (Rodgers et al., 2018). Furthermore, athletes are often exposed to a combination of general societal pressures related to appearance and sport-specific expectations regarding their performance and body composition. These factors can make them particularly vulnerable to social media usage behaviors as they try to balance athletic performance demands with gendered body ideals (Staśkiewicz-Bartecka et al., 2024).

In this context, studies indicate that there may be a relationship between narcissism and body image concerns with social media usage. To our knowledge, no prior research has examined the impact of social media usage on body satisfaction and narcissism levels among professional bodybuilding athletes. Therefore, the aim of this study is to explore the possible relationships between social media usage, body satisfaction, and narcissism levels among professional bodybuilding athletes. Considering that social media usage can be regarded as a marketing strategy for physical appearance (body image) approval and self-enhancement, this study will examine the relationship between social media usage, body satisfaction, and narcissism levels among professional bodybuilding athletes.

Methods

Research Model

In this study, the relational survey model, one of the quantitative research methods, was used. The relational survey model examines whether variables change together and, if so, how they change (Karasar, 2012).

Participants

The study sample consisted of 104 volunteer professional bodybuilding athletes aged 18 and over, selected using the convenience sampling method.
Participants voluntarily took part in the study by filling out an online form via Google Forms.

The data collection tool was sent online to the participants who were previously determined and whose approval for participation in the study was obtained via personal e-mail, WhatsApp and social media, and feedback was received that the application was completed. Reminder information messages were sent at most 4 times at one-week intervals until feedback was received. If the information message that the data collection tool was completed was not received within 4 weeks, the participant was removed from the study and another participant was included in his/her place.

Data Collection Tools

Personal Information Form

A "Personal Information Form" prepared by the researchers was used to identify the sociodemographic characteristics of the participants. The form collected data on age, gender, years of sports experience, bodybuilding category, training and nutrition habits, etc.

Social Media Usage Scale

The "Social Media Usage Scale" was developed by Deniz and Ünal in 2019 to examine the relationship between the rapidly growing influence of social media and individuals' thoughts, attitudes, and behaviors. The scale was applied to a research group of 516 individuals spanning the Baby Boomers (1944–1964) and Generation Z. The scale consists of two dimensions: competence and continuity, comprising eight items measured on a five-point Likert scale: "not suitable for me at all," "slightly suitable for me," "moderately suitable for me," "very suitable for me," and "completely suitable for me." The scale is used to measure opinions, attitudes, and behaviors. With a Cronbach's alpha value of .82, the scale is considered valid and reliable (Deniz & Tutkun-Ünal, 2019).

Body Satisfaction Scale

The "Body Satisfaction Scale" was developed by Avalos et al. in 2005. Its Turkish validity and reliability study was conducted by Bakalım and Karçkay in 2016. The original scale had a Cronbach's alpha coefficient of 0.94. In the Turkish adaptation, the internal consistency coefficient was found to be 0.87 for women and 0.85 for men, with no significant difference between the two groups (Bakalım & Karçkay, 2016). The Turkish version of the scale consists of two factors and nine items. The first factor, "General Body Satisfaction," includes items 1, 2, 3, 4, 5, 8, and 9 (e.g., "I accept my body as it is despite its flaws," item 3). The second factor, "Investment in Body Image," includes items 6 and 7 (e.g., "I don’t worry too much about my body shape or weight," item 7). The scale is evaluated based on total scores, with no reverse-scored items. It is structured as a five-point Likert scale, with higher scores indicating greater body satisfaction (Kaya, 2022).

Narcissistic Personality Inventory (NPI-16)

The "Narcissistic Personality Inventory (NPI-16)" was used to determine participants' levels of narcissism. This inventory is a shortened version of the 40-item inventory developed by Raskin and Terry (1988), condensed into 16 items by Ames et al. (2006). The Turkish adaptation was conducted by Güngör and Selçuk (2015). The inventory consists of narcissism-consistent statements, where statements in the first rows of items 1, 3, 6, 8, 9, 11, 14, and 16, as well as the second rows of items 2, 4, 5, 7, 10, 12, 13, and 15, align with

narcissistic traits.

Statistical Analysis

The statistical analyses of the data were conducted using IBM SPSS Statistics 29.0 (Statistical Package for the Social Sciences Version). Qualitative data were presented as frequency (n) and percentage (%), while quantitative data were presented as mean (M) and standard deviation (SD). The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. Parametric tests were applied to data that met the normality assumption. An independent samples t-test was used to compare differences between groups, with variance equality evaluated using Levene's test. One-way ANOVA was applied to determine differences between group variables, and Tukey's HSD post hoc test was used for significant differences. Additionally, relationships between variables were assessed using Pearson correlation analysis. All analyses were conducted at a 95% confidence interval, with a p-value < 0.05 considered statistically significant.

Findings

This section provides a detailed analysis of the impact of social media use on body satisfaction and narcissism in professional bodybuilders.

Table 1. Sociodemographic Characteristics of Participants

Variables		**n**	**Mean ± SD**
Height (m)		104	1.765±0.079
Body Weight (kg)		104	85.53±16.745
Body Mass Index		104	27.25±4.054
Gender	Female	26	25.0
	Male	78	75.0
Age	18-24 years	27	26.0
	25-34 years	62	59.6
	35-44 years	15	14.4

Duration of interest in bodybuilding	**0-2 years**	**5**	**4.8**
	3-5 years	29	27.9
	6-10 years	43	41.3
	11 years or more	27	26.0
Number of bodybuilding competitions participated in	1 time	32	30.8
	2-5 times	50	48.1
	6-10 times	15	14.4
	11 times or more	7	6.7
Competition category	Bikini Fitness	15	14.4
	Bodybuilding	13	12.5
	Other	11	10.6
	Fitness	46	44.2
	Classic Bodybuilding	15	14.4
	Wellness	4	3.8
Number of training days per week	1-2 days	2	1.9
	3-4 days	10	9.6
	5-6 days	92	88.5
Training duration	30-60 minutes	40	38.5
	1-1.5 hours	45	43.3
	1.5-2 hours	15	14.4
	More than 2 hours	4	3.8
Primary focus in training program	Upper Extremity Workouts	12	11.5
	Lower Extremity Workouts	7	6.7
	Upper-lower extremity and cardio-workouts	85	81.7

Upon examining Table 1, it is observed that the study includes 104 participants, of whom 25% are female and 75% are male. The age distribution of the participants is as follows: 26% are between 18-24 years old, 59.6% are between 25-34 years old, and 14.4% are between 35-44 years old.

The average height of the participants is 1.765±0.079 m, their average body weight is 85.53±16.745 kg, and their average body mass index (BMI) is 27.25±4.054.

Regarding the duration of engagement in bodybuilding, 4.8% have been involved for 0-2 years, 27.9% for 3-5 years, 41.3% for 6-10 years, and 26% for 11 years or more.
In terms of participation in bodybuilding competitions, 30.8% have competed once, 48.1% have competed 2-5 times, 14.4% have competed 6-10 times, and 6.7% have competed 11 or more times.

Regarding competition categories, 14.4% compete in bikini fitness, 12.5% in bodybuilding, 44.2% in fitness, 14.4% in classic bodybuilding, 3.8% in wellness, and 10.6% in other categories.

Table 2. Participants' Nutritional Status

Variables		n	%
Average Daily Caloric Intake	2000-2500 kcal	15	14.4
	2500-3000 kcal	35	33.7
	3000-3500 kcal	23	22.1
	3500 kcal and above	31	29.8
Protein Source	Animal-based proteins	90	86.5
	Plant-based proteins	0	0
	Both	14	13.5
Carbohydrate Intake During Competition Preparation	Increase	9	8.7
	Maintain the same	6	5.8
	Slightly reduce	58	55.8
	Significantly reduce	31	29.8
Person Who Prepares the Nutrition Plan	Trainer	67	64.4
	Nutritionist	3	2.9
	Self	34	32.7
Daily Fat Intake	20-30 gr	33	31.7
	30-50 gr	44	42.3
	50-70 gr	17	16.3
	70 and above	10	9.6
Water Consumption During Competition Period	Maintain the same	23	22.1
	Varies depending on the situation	1	1.0
	Reduce water intake	8	7.7
	Increase water intake	72	69.2

Use of Water Cutting Techniques	**Yes**	**68**	**65.4**
	No	36	34.6
Number of Daily Meals	2 meals	1	1.0
	3 meals	18	17.3
	4-5 meals	72	69.2
	6 meals and above	13	12.5
Use of Supplements	Yes	87	83.7
	No	17	16.3
Types of Supplements Used	Supplements	32	30.8
	Vitamins and minerals	14	13.5
	Anabolic steroids	12	11.5
	All of the above	14	13.5
Most Frequently Used Supplements	Protein powder	32	30.8
	Creatine	4	3.8
	Amino acids	11	10.6
	All of the above	57	54.8

Upon examining Table 2, it is found that 14.4% of participants consume an average of 2000-2500 kcal per day, 33.7% consume 2500-3000 kcal, 22.1% consume 3000-3500 kcal, and 29.8% consume 3500 kcal and above. 86.5% of participants get their protein from animal sources, and 13.5% get protein from both animal and plant sources. Regarding carbohydrate intake during competition preparation, 8.7% increase their intake, 5.8% maintain it, 55.8% slightly decrease it, and 29.8% significantly reduce it. 64.4% have their nutrition plan prepared by their trainer, 2.9% by a nutritionist, and 32.7% prepare it themselves. Regarding fat intake, 31.7% consume 20-30 g per day, 42.3% consume 30-50 g, 16.3% consume 50-70 g, and 9.6% consume 70 g and above. During the competition period, 22.1% maintain their water consumption, 7.7% reduce it, and 69.2% increase it. 1% reports variability depending on the situation. 65.4% use water-cutting techniques, while 34.6% do not. In terms of daily meals, 1% have 2 meals, 17.3% have 3 meals, 69.2% have 4-5 meals, and 12.5% have 6 or more meals.

Table 3. Participants' Social Media Usage, Body Satisfaction, and Narcissism Levels

Variables	n	Mean ± SD
Social Media Usage		
Continuity Subscale	104	10.95±4.410
Competence Subscale	104	11.37±4.769
Total Social Media Usage Score	104	22.32±8.254
Body Satisfaction		
General Body Satisfaction	104	23.83±8.807
Body Image Investment	104	6.32±2.791
Total Body Satisfaction Score	104	30.14±10.677
Narcissism Levels		
Authority Subscale	104	0.41±0.568
Self-Sufficiency Subscale	104	0.96±0.835
Superiority Subscale	104	1.21±0.746
Exhibitionism Subscale	104	1.59±0.832
Exploitativeness Subscale	104	1.46±0.891
Entitlement Subscale	104	1.05±0.597
Total Narcissism Score	104	6.68±2.137

Upon examining Table 3, the participants in the study have the following average scores: Continuity level: 10.95 ± 4.410, competence level: 11.37 ± 4.769, total social media usage score: 22.32 ± 8.254, general body satisfaction level: 23.83 ± 8.807, body image investment level: 6.32 ± 2.791, total body satisfaction score: 30.14 ± 10.677, authority level: 0.41 ± 0.568, self-sufficiency level: 0.96 ± 0.835, superiority level: 1.21 ± 0.746, exhibitionism level: 1.59 ± 0.832, exploitativeness level: 1.46 ± 0.891, entitlement level: 1.05 ± 0.597, total narcissism score: 6.68 ± 2.137.

Table 4. Social Media Usage, Body Satisfaction, and Narcissism Levels by Gender (Independent Samples T-Test)

Variables	Gender	n	Mean ± SD	t	df	p
Social Media Usage						
Continuity Subscale	Women	26	10.12±3.351	-1.118	60.089	0.192
	Men	78	11.23±4.696			
Competence Subscale	Women	26	11.73±4.754	0.449	102	0.654
	Men	78	11.24±4.798			
Total Social Media Usage Score	Women	26	21.85±7.330	-0.335	102	0.739
	Men	78	22.47±8.578			
Body Satisfaction						
General Body Satisfaction	Women	26	24.73±8.464	0.602	102	0.548
	Men	78	23.53±8.951			
Body Image Investment	Women	26	6.35±2.667	0.061	102	0.952
	Men	78	6.31±2.848			
Total Body Satisfaction Score	Women	26	31.08±9.960	0.512	102	0.609
	Men	78	29.83±10.950			
Narcissism Levels						
Authority Subscale	Women	26	0.42±0.504	0.099	102	0.921
	Men	78	0.41±0.591			
Self-Sufficiency Subscale	Women	26	0.88±0.766	-0.540	102	0.590
	Men	78	0.99±0.860			
Superiority Subscale	Women	26	1.04±0.774	-1.372	102	0.173
	Men	78	1.27±0.733			
Exhibitionism Subscale	Women	26	1.27±0.827	-2.293	102	**0.024***
	Men	78	1.69±0.811			
Exploitativeness Subscale	Women	26	1.58±0.987	0.761	102	0.449
	Men	78	1.42±0.861			
Entitlement Subscale	Women	26	0.88±0.653	-1.624	102	0.108
	Men	78	1.10±0.572			
Total Narcissism Score	Women	26	6.08±2.432	-1.684	102	0.095
	Men	78	6.88±2.006			

*p < 0.05

Upon examining Table 4, it was found that there were no significant differences in the social media usage and body satisfaction subscales based on gender ($p > 0.05$). However, a significant difference was observed in the Exhibitionism Subscale of narcissism, where men showed higher scores compared to women ($p < 0.05$).

Table 5. Social Media Usage, Body Satisfaction, and Narcissism Levels According to Participants' Age (One-Way ANOVA)

Variables	Age	n	Mean ± SD	F	p
Social Media Usage					
Continuity Subscale	18-24 years	27	10.41 ± 4.405	0.451	0.638
	25-34 years	62	11.29 ± 4.646		
	35-44 years	15	10.53 ± 3.420		
Competence Subscale	18-24 years	27	12.11 ± 5.213	0.644	0.527
	25-34 years	62	11.27 ± 4.722		
	35-44 years	15	10.40 ± 4.188		
Total Social Media Usage	18-24 years	27	22.52 ± 8.657	0.243	0.785
	25-34 years	62	22.56 ± 8.461		
	35-44 years	15	20.93 ± 6.902		
Body Satisfaction					
General Body Satisfaction	18-24 years	27	21.81 ± 6.873	1.625	0.202
	25-34 years	62	25.10 ± 9.131		
	35-44 years	15	22.20 ± 10.094		
Body Image Investment	18-24 years	27	5.56 ± 2.847	1.385	0.255
	25-34 years	62	6.61 ± 2.718		
	35-44 years	15	6.47 ± 2.924		
Total Body Satisfaction	18-24 years	27	27.37 ± 8.111	1.746	0.180
	25-34 years	62	31.71 ± 11.133		
	35-44 years	15	28.67 ± 12.187		
Narcissism Levels					
Authority Subscale	18-24 years	27	0.48 ± 0.643	2.553	0.083
	25-34 years	62	0.32 ± 0.505		
	35-44 years	15	0.67 ± 0.617		

Self-Sufficiency Subscale	18-24 years	27	0.85 ± 0.864		
	25-34 years	62	0.98 ± 0.839	**0.369**	**0.692**
	35-44 years	15	1.07 ± 0.799		
Superiority Subscale	18-24 years	27	1.07 ± 0.730		
	25-34 years	62	1.23 ± 0.798	0.947	0.391
	35-44 years	15	1.40 ± 0.507		
Exhibitionism Subscale	18-24 years	27	1.67 ± 0.877		
	25-34 years	62	1.53 ± 0.804	0.323	0.725
	35-44 years	15	1.67 ± 0.900		
Exploitativeness Subscale	18-24 years	27	1.48 ± 0.849		
	25-34 years	62	1.47 ± 0.953	0.043	0.958
	35-44 years	15	1.40 ± 0.737		
Entitlement Subscale	18-24 years	27	1.15 ± 0.456		
	25-34 years	62	1.08 ± 0.635	2.634	0.077
	35-44 years	15	0.73 ± 0.594		
Total Narcissism Score	18-24 years	27	6.70 ± 1.938		
	25-34 years	62	6.61 ± 2.250	0.135	0.874
	35-44 years	15	6.93 ± 2.120		

*p < 0.05

Upon examining Table 5, no statistically significant differences were found between the subscales of social media usage, body satisfaction, and narcissism levels according to the participants' age (p > 0.05).

Table 6. Correlation Between Social Media Usage Levels and Body Satisfaction Levels (Pearson Correlation)

Variables	**Body Satisfaction**		
	General Body Satisfaction	**Investment in Body Image**	**Total Body Satisfaction Score**
Social Media Usage			
Continuity Subscale	r = -0.193	r = -0.180	r = -0.207
	p = 0.049*	p = 0.067	**p = 0.035***
Competency Subscale	r = -0.063	r = -0.088	r = -0.074
	p = 0.528	p = 0.377	p = 0.453

Total Social Media Usage Score	r = -0.139	r = -0.147	r = -0.153
	p = 0.158	p = 0.137	p = 0.120

*p < 0.05

When examining Table 6, a weak statistically significant negative linear relationship was found between the continuity subscale of participants' social media usage and the general body satisfaction subscale (r = -0.193) as well as the total body satisfaction score (r = -0.207) (p < 0.05). It was determined that there was no statistically significant correlation between the competency subscale of social media usage and the total social media usage score with the body satisfaction body image subscale (p > 0.05).

Table 7. Examination of the Relationship Between Participants' Social Media Usage Levels and Narcissistic Levels (Pearson Correlation)

Variables		**Social Media Usage**		
		Continuity Subscale	**Competency Subscale**	**Total Social Media Usage Score**
Narcissism Level				
Authority Subscale	r	0.070	0.080	0.084
	p	0.480	0.420	0.399
Self-Sufficiency Subscale	r	0.155	0.123	0.154
	p	0.116	0.213	0.119
Superiority Subscale	r	0.056	0.003	0.032
	p	0.571	0.979	0.750
Exhibitionism Subscale	r	-0.106	-0.123	-0.128
	p	0.284	0.213	0.196
Exploitativeness Subscale	r	-0.007	0.028	0.013
	p	0.947	0.774	0.897
Entitlement Subscale	r	-0.047	-0.105	-0.086
	p	0.635	0.289	0.386
Total Narcissism Score	r	0.042	0.005	0.025
	p	0.675	0.961	0.801

*p < 0.05

Upon examining Table 7, it was found that there is no statistically significant correlation between the subscales of social media usage and the subscales of narcissism level (p>0.05).

Table 8. Correlation Between Body Satisfaction Levels and Narcissism Levels of Participants

Variables		Body Satisfaction		
		General Body Satisfaction	Body Image Investment	Total Body Satisfaction Score
Narcissism Level				
Authority Subscale	r	-0.030	-0.041	-0.036
	p	0.761	0.682	0.720
Self-Sufficiency Subscale	r	0.055	0.043	0.056
	p	0.583	0.666	0.571
Superiority Subscale	r	0.017	0.093	0.039
	p	0.860	0.346	0.696
Exhibitionism Subscale	r	-0.022	0.093	0.018
	p	0.826	0.346	0.858
Exploitativeness Subscale	r	-0.052	0.007	-0.041
	p	0.603	0.945	0.681
Entitlement Subscale	r	0.107	0.119	0.119
	p	0.281	0.229	0.228
Total Narcissism Score	r	0.019	0.128	0.049
	p	0.846	0.196	0.620

*p<0.05

From Table 8, it can be observed that there is no statistically significant correlation between the body satisfaction levels and the narcissism levels across the subscales (p>0.05).

Discussion and Conclusion

The aim of this study was to identify the potential relationships between social media use, body satisfaction, and narcissism levels among professional bodybuilders. Considering that social media usage can be seen as a marketing strategy to promote physical appearance (body image) approval and self-improvement, this study could serve as a pioneering study to uncover the relationship between social media use, body satisfaction, and narcissism levels among professional bodybuilders. The findings related to the psychological dimension of the research suggest that participants may be influenced by various psychological factors in relation to bodybuilding.

The finding that body satisfaction levels decreased as continuity levels increased suggests that the more actively participants engage in bodybuilding, the more their general body satisfaction and body perception may be negatively affected. However, no significant relationship was found between body image investment levels and continuity levels. A large discrepancy between self- and ideal ratings of muscularity has been found in Western cultures, and a significant association has been found between muscular dissatisfaction and increased life dissatisfaction, depression, and decreased self-esteem (Olivardia et al., 2004; Pope et al., 2000). This could imply that focusing continuously on physical development may not directly increase investments in body image.

Cognitive and personality variables such as perfectionism, fear of negative evaluation, and low self-esteem are reported to be associated with body dissatisfaction in both men and women (Davis et al., 2005; Stice, 2002). The lack of a significant relationship between social media use and body satisfaction or body image investment suggests that the contribution of social media to bodybuilding does not directly affect the participants' personal perceptions. It has been stated that believing that one is less muscular than one actually is an important factor in men's body dissatisfaction (Olivardia et al., 2004). Additionally, the significant differences found in exhibitionism levels based on gender show that male participants have higher exhibitionism levels than females. This could indicate that men may be more outwardly focused and more inclined to concentrate on their physical image in relation to bodybuilding.

The findings of the research provide important insights into the training habits, nutrition routines, and psychological tendencies of individuals interested in bodybuilding. A large portion of the participants are experienced athletes who train in a disciplined manner and adjust their nutrition habits accordingly. The use of supplements is widespread, with participants using various supplements to support their physical development. Some studies suggest that it may be seen in adverse situations, such as compulsive weight lifting, strict adherence to dietary regimens designed to enhance the appearance of muscularity, avoidance of situations where one's body is visible to others, and abusing steroids (Pope et. Al., 1997). Recent studies have shown that the desire for a more muscular body shape leads

to eating behavior problems and body dissatisfaction issues in bodybuilders (Devrim et al., 2018). Psychological factors have complex effects on the participants' overall body satisfaction and body image investment levels. However, there is no direct relationship between social media usage and these psychological factors.

In conclusion, the study examined the relationships between training habits, nutrition routines, and psychological factors among individuals interested in bodybuilding. The results show that a large portion of the participants are experienced athletes who train regularly and discipline themselves. Their nutrition habits generally involve high-calorie intake and animal-based protein sources. Furthermore, the use of supplements is widespread, as participants use various supplements to support their physical development. Psychologically, it was found that as the continuity in bodybuilding increased, the body satisfaction levels decreased.

However, there is no direct relationship between social media use and body satisfaction or body image investment. Gender differences were also notable in exhibitionism levels, with male participants exhibiting higher levels of exhibitionism compared to female participants. This study highlights the need for more research investigating how long-term bodybuilding habits affect psychological well-being. Future studies should also include more diverse groups of participants to better understand the role of social media use in bodybuilders.

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Teacher training for motor development and the prevention of sedentary behaviour: Active Breaks in the primary school curriculum

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Abstract: In the current Italian context, marked by rising levels of sedentary behaviour and consequent negative health impacts, there is an evident need for educational interventions that promote movement and regular physical activity. Within the school setting, introducing Active breaks (ABs) as part of the curriculum can support students' well-being and foster more meaningful connections among learning experiences. In this perspective, it is crucial that these interventions be methodologically purposeful, integrating with the content of various subjects. To assist teachers in this educational challenge, a dedicated repository is proposed, where they can find resources, methodologies, and practical proposals organized into categories. Through consultation of this portfolio, a teacher training path is offered, enabling educators to design personalized teaching interventions that ensure inclusion and respect for individual needs, in line with national recommendations.

Keywords: Active breaks, sedentary behaviour, teacher training.

Introduction

Numerous national and international studies emphasize the critical role of regular physical activity in promoting physical, psychological, and social well-being. Nonetheless, recent data highlight a concerning rise in sedentary behaviour among children and adolescents, which is increasingly associated with overweight, obesity, and musculoskeletal disorders (Italian National Institute of Health, 2024). These issues are often compounded by unhealthy lifestyle habits that lead to a persistent energy imbalance—where caloric intake exceeds energy expenditure—contributing to a general decline in youth health (Ali et al., 2024). Such trends are widely recognized as early risk factors for the onset of chronic diseases in adulthood. Addressing this scenario requires a dual strategy: encouraging more active lifestyles and reducing sedentary time (Bull et al., 2020), while also integrating structured and pedagogically sound approaches into education systems to support meaningful physical experiences. Within this framework, the concept of Physical Literacy (PL) has emerged as a foundational element. By developing motor skills, intrinsic motivation, confidence, and self-efficacy, PL fosters a long-term commitment to an active

and healthy lifestyle. Primary schools represent a key environment for advancing PL, offering a structured context where movement-based experiences can be purposefully incorporated into educational programming. In recent years, a variety of multi-component school-based interventions have been implemented to expand movement opportunities and support children's holistic development through evidence-based and feasible strategies (Daly-Smith et al., 2023). Among the most widely adopted approaches are Active Breaks—brief, structured movement sessions integrated into the school day. Evidence shows that Abs enhance student motivation, improve classroom behaviour, and may even support academic performance (Jiménez-Parra et al., 2022; Mavilidi et al., 2020). However, their implementation is still hindered by several challenges. Teachers often report difficulties related to time management and express concern that such activities may disrupt the flow of curricular instruction. These barriers are frequently rooted in the misconception that Abs are peripheral or unrelated to educational objectives. To overcome these challenges, it is crucial to reframe how Abs are designed and implemented, highlighting their pedagogical value and adopting a structured methodology that facilitates their integration into classroom practice. When effectively planned, such breaks can help sustain student attention and engagement while minimizing distraction (Centre for Education Statistics and Evaluation, 2020). To increase the effectiveness of physical activity promotion in schools, targeted teacher training is essential. Equipping educators with practical knowledge, structured guidelines, and replicable models can support the development of motor strategies that align with curricular goals. In this light, the present paper, which the abstract was presented at the 19th FIEPS European Congress, proposes an operational model for the creation of a personal repository for teachers, aimed at collecting high-quality Abs proposals that are aligned with PL principles and integrated into the broader educational framework.

PL and Its Role in Child Development

In recent years, the concept of PL has emerged as a focal point of interest among educators and researchers worldwide. Recognized as a multidimensional construct, PL encompasses physical, emotional, cognitive, and, in some frameworks, social domains of movement education (Dlugonski et al., 2022). A comprehensive analysis of various definitions has revealed four recurring dimensions: motor competence, psychosocial attributes, cognitive understanding, and integrated personal growth. According to the International PL Association, PL refers to the combination of motivation, confidence, physical ability, knowledge, and comprehension that enables individuals to value and take ownership of lifelong physical activity engagement (Bailey et al., 2023). Despite minor differences in emphasis across models, educational applications of PL consistently underline the importance of embodied experiences as central to learning. The aim is not solely to develop motor proficiency but also to cultivate self-belief, motivation, and critical awareness in relation to movement. This perspective represents a shift from performance-based metrics to inclusive, learner-centered development trajectories that are accessible to individuals of all ages, abilities, and backgrounds (Whitehead et al., 2010; Santos et al., 2022).

Key international policy documents—such as the World Health Organization's Global Action Plan on Physical Activity 2018-2030 (WHO, 2018) and UNESCO's Quality Physical Education Guidelines (Unesco, 2015)—recognize PL as a foundational element in fostering long-term health and wellbeing. These frameworks also acknowledge its contribution to the acquisition of essential life skills through physical education. Nevertheless, putting PL into practice remains a complex task. The conceptual richness of PL, coupled with disciplinary differences in interpretation and a shortage of practical training tools, has hindered its consistent implementation. Bridging this gap requires a strong investment in the professional development of educators. Specifically, teachers must be equipped with holistic competencies and clear pedagogical strategies to create meaningful learning environments that nurture children's lasting engagement in physical activity.

Abs as a Strategy for Health Promotion and Learning

In school settings, structured active breaks, commonly referred to as Abs (ABs), are gaining increasing recognition as an effective strategy to reduce sedentary behaviour while enhancing both physical health and educational outcomes. A recent systematic review and meta-analysis (Watson et al., 2022) demonstrated that interrupting prolonged sitting through school-based AB interventions significantly increases overall physical activity levels, including moderate-to-vigorous physical activity (MVPA). These breaks, typically lasting between 5 and 15 minutes and implemented at different times throughout the school day, have proven effective in replacing sedentary time with meaningful movement. Within a structured methodological framework, the TransformUs Abs (TAB) model (Daly-Smith et al., 2023) provides an organized structure for the systematic integration of ABs into the daily classroom routine. This model identifies five categories of activity:

1.Structured motor activities integrated with lessons;
2.Transition movements between learning segments;
3.Short energizing sessions;
4.Behaviour management activities;
5.Movement-based learning reinforcements.

By incorporating physical activity into academic content, this approach promotes active participation without disrupting instructional continuity (Norris et al., 2020). Scientific literature highlights that ABs not only support physical health but also improve student behaviour, attention, and executive functions, even in early primary school (Mavilidi et al., 2020; Donnelly et al., 2016). For instance, randomized studies such as the ACTIVA-MENTE program (Reyes-Amigo et al., 2024), which used brief, video-guided daily breaks, reported significant increases in student engagement, enjoyment, and motivation. ABs are highly adaptable to various educational contexts and can be tailored to specific learning objectives. According to the classification proposed by Salmon et al. (2020), ABs fall into

three main types:

•Non-curricular: Physical activities not linked to academic content;
•Curriculum-integrated: Motor activities designed to reinforce school subjects (e.g., mathematics or language through movement);
•Cognitively challenging: Tasks that combine physical effort with mental engagement, such as problem-solving, memory, or decision-making.

This structure promotes both quantitative benefits (increased physical activity time) and qualitative advantages (enhanced experiential learning). To ensure effective and safe implementation of Active Breaks, institutions such as the Centers for Disease Control and Prevention (CDC) and SHAPE America (2019) recommend five essential criteria: structured planning, adequate and safe spaces, constant supervision, clear and developmentally appropriate instructions, and inclusive, adaptable activities. These guidelines ensure that ABs are safe, inclusive, and developmentally appropriate for all students, fostering a positive school climate where movement becomes a natural and valued component of the school day.

The Role of Teachers: Required Competencies and Training Needs

The successful implementation of Abs in schools largely depends on the specific pedagogical competencies of teachers. Educators must be able to design and manage movement-based interventions that are meaningfully integrated into the teaching process, applying evidence-based methodologies aligned with curricular objectives. Common barriers, such as lack of time, inadequate physical space, limited access to specific teaching resources, and concerns about student participation, frequently hinder the implementation of Abs in classroom practice (Watson et al., 2022). Additional limiting factors are linked to concerns over children's physical safety and teachers' fear of being held accountable in the event of accidents (Jerebine et al., 2022). However, emerging evidence suggests that active play and movement at school can be effectively promoted by providing adequate training for educational staff. These breaks should therefore be reinterpreted as intentional didactic interventions, carefully planned in alignment with national curriculum guidelines and supported by a solid methodological framework (Colella, Monacis, & Limone, 2020). For this reason, continuous professional development is essential and should focus on the analysis and design of motor tasks, adjustment of intensity and cognitive-motor load, planning of differentiated activities, and promotion of inclusive practices and interdisciplinary connections (Daly-Smith et al., 2023). A crucial aspect of teacher preparation involves familiarity with the Spectrum of Teaching Styles (Mosston & Ashworth, 2008), whose relevance has been confirmed by recent studies (Espada, Calero, & Navia, 2025). Teachers should be capable of alternating between reproductive styles (teacher-directed instruction) and productive styles (student-centered learning), thus promoting diverse motor responses and inclusive, dynamic learning environments.

Teacher training should also encompass the integration of digital technologies and artificial intelligence to enhance the design and implementation of ABs. Interactive whiteboards and digital tools can support the delivery of visually rich and engaging motor tasks that foster student motivation and enjoyment (Movement in Learning, 2025). Finally, teachers should be equipped with practical tools for designing interdisciplinary Abs that link physical activity to academic subjects (language, mathematics, geography, music). These strategies must respect students' individual differences and foster full participation, supporting a holistic approach to child development. To achieve this, teachers need access to structured materials and operational guidelines that enable the consistent and reflective integration of ABs into the broader educational framework.

Framework for Implementing Active Breaks: Practical Guidelines

To support the systematic inclusion of ABs in educational practice, it is essential to develop operational guidelines that assist teachers in the planning, delivery, and assessment of such interventions. Effective AB implementation should be grounded in the principles of:

•Accessibility, ensuring inclusivity for all learners regardless of ability level;
•Progressiveness, allowing for gradual development of motor and cognitive complexity;
•Contextual flexibility, enabling adaptation to the spatial, temporal, and curricular constraints of different school environments (Daly-Smith et al., 2023; Norris et al., 2020).

The core philosophy underpinning this framework is the integration of movement into pedagogical routines, aligning physical tasks with subject-area objectives. ABs should be strategically scheduled—lasting 5 to 10 minutes—at transitional moments in the school day or during periods of reduced attention. To support this integration, teachers may utilize planning portfolios, digital tools, and assessment rubrics specifically designed for movement-based learning (Watson et al., 2022). Teachers are encouraged to reflect on key environmental and logistical questions before designing each intervention:

•What physical space is available for movement?
•How much time is feasible for the activity within the instructional schedule?

Each AB should be designed through an analysis of motor tasks and organizational structure—whether individual, pair-based, or group activities—carefully adjusting intensity and cognitive-motor demand to match the students' needs and curricular alignment (Colella, Monacis, & Limone, 2020). To foster clarity and systematic application, ABs can be categorized into three primary types:

1.Postural and movement patterns, including static or dynamic variations to promote body awareness;
2.Motor coordination activities, targeting agility, balance, and spatial orientation;
3.Interdisciplinary ABs, linking movement directly to curricular subjects such as mathematics, literacy, or science (Salmon et al., 2020; Mavilidi et al., 2020).

Each category should follow a three-phase structure:

- Warm-up/activation phase (1–2 minutes) to prepare the body and mind;
- Main phase (5–7 minutes) focusing on task execution;
- Cool-down/deactivation phase (1–2 minutes) to restore concentration.

This structured approach enables educators to design evidence-informed ABs that are both developmentally appropriate and educationally effective, ultimately supporting their routine integration within the broader school curriculum and fostering a more active, inclusive learning environment.

Fig.1. Example of a repository of Active Breaks for teachers

Conclusions

Effectively designing Active Breaks in schools requires targeted teacher training to develop the methodological skills necessary for interdisciplinary planning and the informed use of educational technologies. Training should not only address the benefits of physical activity but also provide teachers with a solid understanding of fundamental motor principles and practical strategies to create and deliver meaningful, effective interventions.
To achieve this, teacher training programs should incorporate modules on:

•Designing and analyzing motor tasks, both integrated with and independent of curricular content;
•Methods for adapting activities to the varied skill levels of students;
•Approaches for managing movement-based activities within the classroom environment and leveraging technology to support physical activity.

An important component of this training should include the development of an Active Break repository. This structured collection of motor activity proposals would allow teachers to access and contribute to a database of activities that align with specific learning objectives, student competencies, and class needs. By having a diverse range of activities organized by category, teachers would be better equipped to tailor Active Breaks to the unique context of each group, ensuring that these interventions are effective and aligned with intentional educational goals.

Such efforts would foster active participation in building a school culture that prioritizes health and daily physical activity as integral to the educational process, thereby supporting the development of Physical Literacy from the earliest years of schooling.

Author contributions

The article is the result of a study jointly designed and developed by all authors, with the following specific contributions: Sabrina Annoscia authored Sections 3, 4, and 5; Sara Ladiana authored Section 2; and Dario Colella authored the Introduction. The Conclusions and the QR code were prepared collaboratively by all authors.

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Physical education interventions to improve physical fitness in youth. A systematic review

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Abstract: The physical and mental health benefits of physical activity (PA) are widely recognized, and schools play a central role in promoting healthy lifestyles. However, adolescents do not meet the WHO recommendations on physical activity; therefore, educational interventions in school settings aim to increase the amount of PA and improve physical fitness (PF) levels, a key health indicator. Nevertheless, an increase in PA does not always correspond to an improvement in PF, making it necessary to experiment with effective and sustainable teaching strategies to be implemented in secondary schools. A literature review was conducted using the PRISMA method to analyze the effects of experimental educational interventions, published between 2015 and 2024, carried out in high schools during curricular physical education (PE) classes, aimed at developing PF. A total of 228 studies were identified. After removing duplicates and study analysis, twelve studies were included. The results showed that the intervention led to improvements in PF in all but one study. Moreover, four studies also reported improvements in related factors and enhanced attention. Cardiorespiratory endurance was the most investigated component and the one that showed the greatest benefits. Most studies had a duration of less than 15 weeks, while only two interventions lasted more than 9 months.The studies highlighted that HIIT interventions through strength circuits and gamification activities during PE classes appear to improve PF components. Future research should move in this direction to integrate interventions on motor learning and motor coordination, optimize teaching strategies to enhance PF, and promote health lifestyles.

Keywords: Physical fitness, physical education, health, adolescents, school.

Introduction

The physical and mental health benefits of regular physical activity (PA) and exercise are widely recognized in the scientific literature (Hills et al., 2024). The World Health Organization (WHO, 2020) recommends that children and adolescents engage in at least 60 minutes per day of moderate to vigorous physical activity (MVPA). Schools represent an

ideal setting to promote PA among youth. However, PA performed during school physical education (PE) classes is not sufficient to implement preventive measures against non-communicable diseases (Beale et al., 2021), and this is further compounded by the growing prevalence of sedentary behaviors in recent years (Hills et al., 2024). For this reason, many school-based interventions aim to increase PA levels by extending PE class time and implementing multicomponent projects (Yuksel et al., 2020). These interventions involve various educational strategies and the integration of two or more elements within the same program (Porter et al., 2024; Bandera-Campos et al., 2025). Multicomponent programs may include PE, PA during school hours, before/after school activities, staff wellness, and family/community involvement (Russ et al., 2015) and are often based on socio-ecological models that recognize behavior change as the result of multiple levels of influence—personal, organizational, community, and policy—and the interactions between them (Reed et al., 2008).

Among the many benefits of PA is the potential improvement of physical fitness (PF) (Hills et al., 2024). However, some studies have shown that increasing PA does not always translate into improved PF levels (Bahls et al., 2020). PF is defined as a set of factors that directly influence strength, endurance, or motor skills and can only be assessed through specific tests. It represents a general state of physical well-being that enables individuals to perform daily, work-related, and recreational activities effectively (Ortega, 2008).

The main health-related components of PF include body composition (BMI), cardiorespiratory fitness (CRF), musculoskeletal fitness (MF), and flexibility.

PF is considered a key health indicator as it is associated with various factors such as abdominal adiposity, cardiovascular risk, and musculoskeletal development (Ortega et al., 2008). It also reduces the risk of chronic diseases (Lang et al., 2024), supports skeletal system development (Torres-Costoso et al., 2020), and is linked to a lower risk of all-cause mortality in adulthood (Laukkanen et al., 2022).

Moreover, PF has been associated with better quality of life, mood, and academic performance in children and adolescents (Bermejo-Cantero et al., 2021), improved cognitive functioning (Williams et al., 2022), and greater psychosocial well-being (Faigenbaum et al., 2022), regardless of PA levels (Barker et al., 2018).

Recent studies have also shown a positive association between CRF and both the onset of depression and the use of antidepressants, although this relationship is not yet fully understood (Ballin et al., 2025).

Given the relevance of PF for overall health, it is essential to monitor its development in adolescents to ensure an accurate assessment of its components (Hills et al., 2024).

Numerous studies and institutional initiatives have launched programs to raise awareness among students and teachers about the direct and indirect effects of PF on health, as well as its critical role in motor learning (Wang et al., 2024; Komatni et al., 2022; Colella et al., 2020).

Schools, at all educational levels, can play an important role in identifying students with low motor development levels and in proposing educational interventions aimed at acquiring and maintaining healthy lifestyles through PA.

However, most school-based interventions aimed at improving PF primarily focus on increasing the quantity of PA, either by adding more PE lessons or through multicomponent approaches (e.g., walking buses, active breaks, sports initiation), often involving families and the wider community. These programs have shown efficacy in increasing MVPA levels (Nezondet et al., 2023) and, in some cases, in improving PF components (Castilho dos Santos et al., 2024).

There is a need for further studies to identify the most effective, inclusive, and educationally sustainable strategies. It becomes essential to understand both the type of intervention and the methodologies that may increase PF levels. While increasing PE lesson time is often included in these interventions, it is not always feasible in all school contexts.

In addition to expanding PE hours, an alternative strategy could be the enhancement of physical literacy (PL), defined as an educational process aimed at acquiring and developing motor skills, knowledge, and behaviors for the conscious and responsible practice of PA across the lifespan (Whitehead, 2013). Improving PL in adolescents could help guide teaching actions toward both qualitative and quantitative proposals, aimed at fostering awareness of the value of daily PA in various organizational settings and, consequently, contributing to increased PF levels.

Some studies suggest a positive relationship between PL and PF (Gilic et al., 2022), while others indicate that this correlation is not always evident (Nur Fajrin et al., 2025).

Although the literature has extensively examined the role of PE in promoting healthy lifestyles and health-related PF, the wide heterogeneity in intervention types and teaching methods highlights the need to identify best practices for enhancing PE quality in relation to improving health-related PF in adolescents aged 11 to 18 years.

Therefore, the aim of this review is: (1) to investigate the effects of experimental teaching interventions conducted during PE classes that are specifically designed to develop conditional capacities, examining their duration, type, and organizational methods; and (2) to determine at which ages the most significant effects have been observed.

Accordingly, this study aims to analyze the effects of school-based educational interventions, identifying the PF components that appear to be most sensitive to exercise.

Methods

A systematic review of the literature was conducted following the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Moher, Liberati, Tetzlaff, & Altman, 2009), with the aim of analyzing studies reporting interventions or methodologies implemented in secondary schools aimed at improving the quality of physical education (PE) in relation to the enhancement of health-related physical fitness (PF) components among adolescents aged 11 to 18 years.

The literature search was conducted across four electronic databases: PubMed, SPORTDiscus, Scopus, and Web of Science. Articles published between January 1, 2015, and January 31, 2025, were considered. Three keyword groups were identified using synonyms and related terms, combined with the Boolean operator OR:

•"fitness" OR "cardiorespiratory endurance" OR "aerobic capacity" OR "muscular strength" OR "muscular endurance" OR "body composition" OR "flexibility" OR "motor skills"
•"Physical education" OR "PE" OR "P.E."
•"intervention" OR "randomized controlled trial" OR "RCT" OR "experimental study" OR "longitudinal study" OR "controlled trial"

After removing duplicates, a first screening was carried out based on the relevance of titles and abstracts. A second, more detailed screening followed, during which articles were selected if they met all of the following inclusion criteria:

•Experimental or quasi-experimental studies;
•Full-text, peer-reviewed articles;
•Educational interventions implemented during curricular PE hours (excluding multicomponent or extracurricular interventions);
•Studies that analyzed health-oriented factors of PF and potentially related variables;
•Samples composed of adolescents aged 11 to 18 years, without physical or intellectual disabilities.

The exclusion criteria involved studies based on activities conducted outside of curricular PE hours, interventions aimed at increasing the number of weekly PE lessons, literature reviews, conference proceedings, monographs, dissertations, and similar documents.

All studies that met the inclusion criteria were then analyzed independently and separately. The analysis for each selected study included: (i) author(s)/year/location; (ii) study design/sample/age; (iii) intervention(s); (iv) duration of the study; and (v) main results.

Results

The initial database search yielded a total of 228 articles. After removing duplicates (121 records), 107 articles were screened based on titles and abstracts, and 27 potentially eligible full-text articles were further examined (Figure 1).

Among the full-text articles assessed, 16 were excluded for not meeting the inclusion criteria: multicomponent intervention (25%), intervention not conducted during curricular PE hours (6.25%), not open access (25%), non-English language (6.25%), abstract-only availability (6.25%), or non-eligible age range of participants (31.25%).

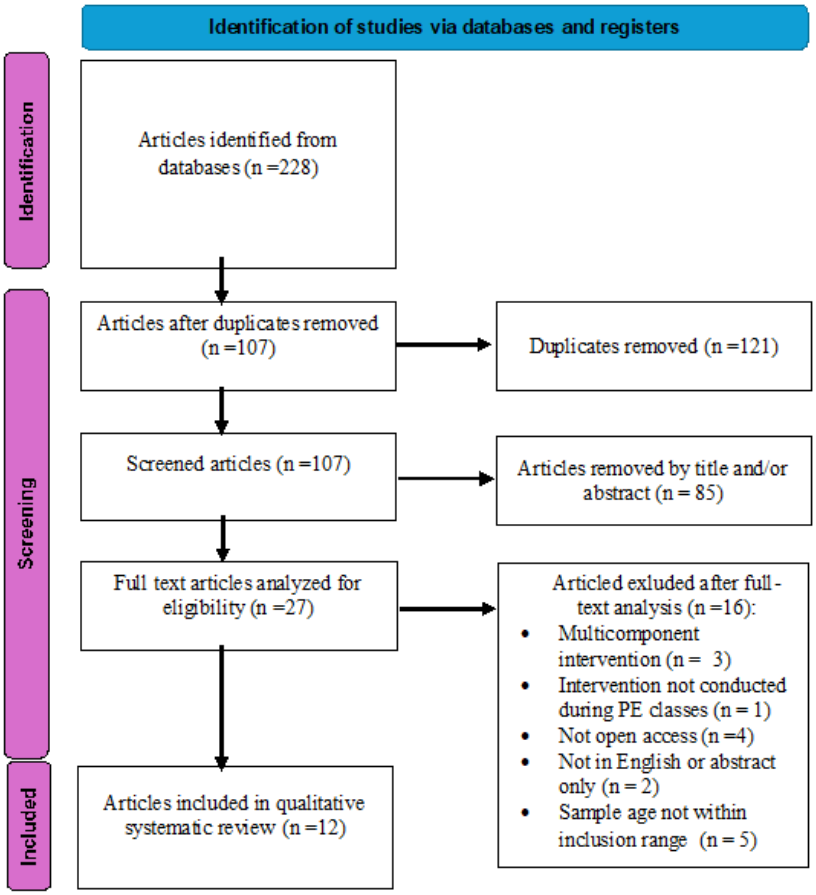

Figure 1. PRISMA flow diagram illustrating the study selection process

Twelve studies were selected, analyzed, and included in this review.

Sample sizes ranged from a minimum of 60 participants (Jovanovic et al., 2024) to a maximum of 2084 (Kolle et al., 2020), with participants aged between 11 and 17 years. The studies were conducted in Spain (Guijarro-Romero et al., 2020a; 2020b; 2020c; 2022; Perez-Ramirez et al., 2024; Fernandez-Vazquez et al., 2024), China (Zhao et al., 2022), Norway (Kolle et al., 2020), Croatia (Juric et al., 2023), Poland (Domaradzki et al., 2023; Domaradzki & Kozlenia, 2024), and Serbia (Jovanovic et al., 2024).

Three studies investigated the effects of a high-intensity interval training (HIIT) program on PF (Juric et al., 2023; Domaradzki, 2023; Domaradzki & Kozlenia, 2024), and one study specifically examined the impact of a 15-minute HIIT intervention conducted during the first part of each PE lesson (Jovanovic et al., 2024).

One study evaluated the effect of an MVPA-based intervention structured into two phases: the first part focused on PF development using circuit training, HIIT, and interval exercises; the second part consisted of high-intensity sports activities, targeting adolescents with varying initial fitness levels (Guijarro-Romero et al., 2020b). Another study explored how students' intrinsic motivation toward PE influenced the effects of an MVPA program (Guijarro-Romero et al., 2020a).

An additional study assessed the impact of an intervention involving strength-focused activities followed by outdoor tasks and body expression work, examining the effects of MVPA on cardiorespiratory fitness (Guijarro-Romero et al., 2020c).

Guijarro-Romero et al. (2020d) also evaluated the effects of a high-intensity intervention divided into two parts: one focused on resistance and strength development through specific tasks, and a second involving HIIT in the form of sport-specific activities (soccer and basketball) with technical and tactical components aimed at increasing student motivation. Perez-Ramirez et al. (2024) analyzed the effects of a resistance and strength training intervention on PF and cognitive function, while Zhao et al. (2022) examined the outcomes of a full-body strength development program. Kolle et al. (2020) investigated the impact of a two-lesson-per-week program targeting CRF and muscular strength: in the first session ("Be Happy"), students formed small groups based on their hobbies and chose physical activities of interest (e.g., sports, dance, outdoor games); in the second session ("Don't Worry"), they returned to the classroom to reflect on or present their chosen activities while training specific skills. Lastly, Fernandez-Vazquez et al. (2024) assessed the effect of using virtual reality and gamification, combined with a practice-based teaching approach, on motor skill learning and students' perceived effort.

Most studies assessed PF through standardized motor tests; PA levels were measured using both objective methods (accelerometry) and subjective tools (questionnaires). Motivation was evaluated through self-report instruments, while cognitive function was assessed using the D2 Test of Attention (Brickenkamp & Zillmer, 1998).
The frequency of interventions was largely aligned with national school PE regulations, most commonly involving two lessons per week.

Intervention durations ranged from 9 weeks to 1 year. Five studies (48%) analyzed interventions lasting 9 weeks or less, six studies (50%) assessed interventions lasting between 10 and 15 weeks, and only one study (8%) reported a program lasting more than 9 months.

BMI was assessed in all studies. The PF evaluation tools included: the 20-Meter Shuttle Run Test (34%), Eurofit test battery (50%), Alpha-Fit battery (8%), and Harvard Step Test (8%). Cognitive function was evaluated using the D2 Test (8%), and motivation was measured with the Perceived Locus of Causality-II Scale (PLOC-II).

The results showed improvements in PF across all studies, except for one (8%), in which no statistically significant effects were found.

In terms of organizational structure, most interventions involved high-intensity activities and circuit training. Only one study investigated the use of technology as a strategy to improve PF components, with specific attention to the teaching style (Fernandez-Vazquez et al., 2024).

All studies yielded positive outcomes regardless of participants' age. The PF components that showed the most substantial improvements were CRF and muscular strength, although the outcomes were influenced by the nature and context of each intervention.

Table 1. Presents a detailed analysis of the studies included in the review

Author	Sample	Objectives	Intervention	Duration	Results
Guijarro-Romero et al., 2020a	Tot 165 (Age 12.9 ± 0.9)	To assess the effect of HIT activities on cardiorespiratory endurance based on students' motivation	HIT activities (e.g., jump rope, fartlek, circuit training)	2 days/week, 9 weeks	Increase ($p<0.05$) in CRF only among highly motivated students. No significant effect for moderately motivated students.
Guijarro-Romero et al. (2020)b	Tot 95 (Age 12.39 ± 0.75)	To examine the effect of a teaching intervention on physical fitness and activity levels among students with different initial fitness profiles	HIT activities: circuit training, running games, fartlek, interval training	2 days/week, 9 weeks	Increase ($p<0.05$) in physical fitness and physical activity levels.
Guijarro-Romero et al. (2022)c	Tot 92 (Age 12.4 ± 0.7)	To evaluate the effects of an MVPA-based program with outdoor activities and body expression on CRF	9 weeks of specific strength and CRF exercises and 6 weeks of outdoor and body expression activities in MVPA	2 days/week, 15 weeks	Increase ($p<0.05$) in CRF in the MVPA group
Jovanovic et al., (2024)	Tot 60 (Age 15-17)	To investigate the effects of implementing HIIT during the initial phase of physical education classes on health-related PF	A HIIT exercise program adapted for high school students and implemented during the preparatory phase of the lesson	2 days/week, 12 weeks	The experimental group showed a significant improvement in cardiorespiratory fitness and strength compared to the control group ($p<0.05$)
Zhao et al. (2022)	Tot 123 (Age 13.46 ± 0.60)	To assess the effectiveness of a strength-training program on muscular fitness and perceived motor competence	Bodyweight strength exercises, resistance bands, dumbbells	3 days/week, 10 weeks	Increase ($p<0.05$) in muscular fitness and perceived physical competence. No improvement ($p>0.05$) in push-ups vs control.

Kolle et al. (2020)	**Tot 2084 (Age 14 ± 0)**	**To evaluate the effectiveness of an intervention on PA, CRF, and muscular strength in adolescents**	**Student autonomy in lesson choice (traditional sports e lifestyle sports)**	**2 days/week, 9 months**	**Null or negative effects (p>0.05), except slight improvements in abdominal strength.**
Guijarro-Romero et al., 2020d	Tot 126 (Age 13.6 ± 0.7)	To compare the effectiveness on CRF of a specific HIT program versus sport-oriented HIT activities	Traditional HIT strength/endurance and invasion games HIT	2 days/week, 9 weeks	Increase (p<0.05) in CRF in both groups.
Juric et al., 2023	Tot 207 (Age 10–15)	To determine the effectiveness of a 10-minute HIIT program on physical fitness and adiposity	10 minutes at the start of class, resistance and strength-based HIT exercises	2 days/week, 12 weeks	Increase (p<0.05) in CRF. No effect (p>0.05) on BMI or other fitness components.
Pérez-Ramírez et al. (2024)	Tot 72 (Age 15.38 ± 0.78)	To analyze the effects of resistance and strength-based interventions on body composition, physical fitness, and cognitive functions	Structured HIT exercises and strength-oriented circuit training	2 days/week, 8 weeks	Increase (p<0.05) in body composition, aerobic capacity, and muscular strength. Positive effects on attention and concentration (D2 Test). Resistance group improved VO2 max and concentration; strength group improved strength.
Fernández-Vázquez et al., 2024	Tot 75 (Age 13.58 ± 0.68)	To evaluate the effect of Virtual Reality (VR) and Gamification (GAM) combined with practice-style teaching (PTS) on motor skills and perceived effort	50 min sessions with stations, VR condition (Xbox Kinect, Nintendo Switch, Oculus Quest 2)	2 days/week, 6 weeks	Increase (p<0.05) in grip strength and balance. Improvement (p>0.05) in lower limb strength and plate-tapping in GAM and VR groups. No effect in PTS group. Lower perceived effort in GAM and GAM+VR groups.

Domaradzki, 2023	**Tot 187 (Age 16.2 ± -)**	**To determine the minimal detectable change (MDC) in blood pressure and CRF after a school-based HIIT intervention**	**14-minute Tabata HIIT program**	**1 day/week, 10 weeks**	**Significant reduction in systolic BP ($p < .001$) and improvement in CRF ($p > .002$)**
Domaradzki & Koźlenia, 2024	Tot 73 (Age 16)	To analyze differences in changes in muscular fitness	Tabata-based HIIT intervention	2 days/week, 10 weeks	Increase ($p<0.05$) in leg power and abdominal strength.

Discussion

The results of this review confirm that experimental educational interventions conducted during physical education (PE) lessons can promote improvements in physical fitness (PF) among adolescents, particularly in cardiorespiratory endurance and muscular strength. These two components emerged as the most responsive to exercise, even in short-duration programs, provided that the interventions are structured with appropriate methodologies and with attention to load progression and intensity.

Although the time allocated to PE in schools is generally insufficient to meet the minimum recommended levels of physical activity (Beale et al., 2021), the findings of this review show that even a limited number of weekly PE lessons, if well-structured and methodologically supported, can determine significant improvements in health-related Physical Fitness.

The positive impact of school-based programs on motor skills is well established. In fact, many interventions implemented in schools target the enhancement of PF in adolescents. The review by García-Baños et al. (2020) analyzed studies in which interventions were implemented during PE classes or school hours in secondary schools to improve muscular strength. The authors found that the included studies used different training loads, materials, and exercises, and reported significant improvements in muscular strength, maximal isometric strength, push-up performance, abdominal strength, and muscular endurance.

Castilho dos Santos et al. (2024) evaluated the impact of the ActTeens program on PA and health-related PF among Brazilian adolescents. Although the program included aerobic and strength exercises, along with lifestyle guidance through mHealth strategies, it did not lead to improvements in overall PA levels. However, it did result in improvements in lower-body muscular strength, although no significant differences were observed in upper-body muscular and cardiorespiratory fitness. Tong et al. (2022) examined the effects of the KDL-ASP (Know it, Do it, Love it – Active School Plan) on PA levels in children and

adolescents. The intervention included small bouts of PA ranging from low to high intensity during math and foreign language lessons, playground activities, walks or hikes, organized sports with parents, and awareness initiatives about the importance of PA and sports. After one academic year of implementing the KDL-ASP, PA levels improved among participants. The most evident improvements were seen in girls' speed and in boys' strength and cardiopulmonary capacity at grade level five. Kriemler et al. (2011) conducted a review aimed at summarizing recent reviews on strategies to increase PA and PF in youth and performed a systematic review of newer intervention studies. The authors highlighted that school-based multicomponent intervention strategies appeared to be the most promising and consistent approach, despite some controversy regarding the effectiveness of family involvement, the targeting of healthy populations at higher risk, or the optimal duration and intensity of interventions. The review confirmed the potential of multicomponent programs to enhance PF.

According to Yuksel et al. (2020), multicomponent school-based interventions have the potential to prevent obesity and promote both PA and PF, especially when they prioritize content quality, intervention duration, and the importance of PA within the curriculum. However, these interventions typically include multiple elements and require the participation of various actors, focusing on extending PE lesson time, implementing extracurricular activities, or introducing active breaks.

Porter et al. (2024) identified, in their review, a framework of 11 opportunities for activity: six within the regular school day, three within extended school hours, and two within the broader school environment. However, these types of interventions often involve implementation and operational costs that can vary considerably. In contrast, improving teaching strategies alone could generate positive effects without increasing school expenses. Therefore, the cost-effectiveness of interventions is a key factor that must be carefully considered in future program design and implementation.

Limitations

This study presents some limitations that should be acknowledged. The selected studies exhibited substantial heterogeneity in terms of experimental design, intervention duration, session frequency, instructional methods, and assessment tools used to measure physical fitness (PF). This variability limits the ability to make direct comparisons across studies and reduces the generalizability of the findings. Additionally, due to the methodological differences and the wide range of measured outcomes, it was not possible to conduct a quantitative meta-analysis. This limits the estimation of the overall effectiveness of the interventions. Furthermore, only articles published in English and available in full-text open access were included, which may have led to the exclusion of potentially relevant studies published in other languages or in non-accessible journals, introducing a possible selection bias.

Conclusion

Despite the positive results highlighted by the studies analyzed, a significant methodological gap emerged: nearly all interventions focused primarily on the quantity and intensity of physical activity, neglecting essential aspects of pedagogical practice such as task presentation, active student participation, intrinsic motivation, and the enjoyment of movement. These dimensions—crucial to fostering long-term and conscious adherence to physical activity—remained marginal in most of the included studies.

One potential approach to bridge this gap is through the promotion of physical literacy (PL), defined as the combination of motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engaging in physical activity for life (Whitehead, 2013). Developing PL in adolescents may contribute not only to improved health and increased physical activity levels (Britton et al., 2022; Yan et al., 2024), but also positively influence physical fitness, especially when educational approaches aim to engage the cognitive and affective domains in addition to the physical (Gilic et al., 2022). Moreover, perceived PL has been shown to act as a mediating factor in the relationship between moderate-to-vigorous physical activity and improvements in fitness (Yan et al., 2024).

The studies confirm a traditional approach in the PE curricula of secondary schools, often based on a multi-activity model that favors athletically gifted students. However, this approach does not effectively promote the acquisition of competencies and attitudes necessary for an active and inclusive lifestyle (Ennis, 1996; 2011). In order for physical education to effectively address the issues related to physical inactivity, a cultural shift is needed that prioritizes learning over mere performance.

In this regard, the socio-ecological model offers a valuable theoretical framework for understanding how individual, interpersonal, school, and community-level factors interact to influence the adoption of active behaviors (Solmon, 2015). Within this framework, the quality of teaching plays a crucial role. It is essential to give equal importance to psychological and affective aspects as to the purely physical ones (Carcamo-Oyarzun et al., 2023). Teaching methodologies should promote the development of both perceived and actual motor competence by supporting autonomous motivation and providing engaging and meaningful learning experiences.

Moreover, the motivational climate of the PE lesson is a key variable. Teachers play a decisive role in creating stimulating educational environments that foster active student engagement and intrinsic motivation (Solmon, 2015). In this context, strategies such as the TARGET model (Ames, 1992a; 1992b) can help to establish classroom climates that satisfy students' basic psychological needs for competence, autonomy, and relatedness, encouraging more autonomous forms of behavioral regulation.

Another significant methodological reference is represented by the Spectrum of Teaching Styles, developed by Mosston and Ashworth (2008), which views teaching as a decision-making chain between teacher and student, focusing on how to teach rather than what to teach (Pill et al., 2023). This approach allows educators to tailor instructional strategies to group needs, fostering authentic learning across all domains of physical literacy. When applied consciously, these styles can help teachers build high-quality, inclusive, and effective learning environments (Colella, 2016). In this light, the teacher's role becomes a critical driver of the student experience. A supportive, engaging, and participative teacher can transform a PE lesson into a genuine opportunity for learning, well-being, and behavioral change (Brandisauskiene et al., 2023).

Future research should focus on interventions that not only address what is taught during PE lessons in terms of improving physical fitness, but also on how it is taught. Emphasis should be placed on instructional approaches that increase adolescent motivation, enjoyment, and participation, in order to foster greater awareness of the importance of physical fitness and the adoption of healthy lifestyles throughout life.

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Can muscular fitness components predict cardiorespiratory endurance of elementary school students?

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Abstract: Cardiorespiratory fitness is defined as the body's ability to perform moderate to high-intensity activities of prolonged duration, which, together with components of muscular fitness, positively influences the cardiorespiratory profile of children and it's an important predictor of physical and mental health in youth. The aim of this study was to determine the predictive significance of coordination, agility, explosive strength, flexibility, and repetitive strength tests on the cardiorespiratory fitness of boys and girls in elementary school. The study involved 4,256 girls and 5478 boys aged 10 to 14 years, and measurements were conducted within the framework of the CRO-FIT project during the 2008/2009 school year. The sample of variables included 4 measures for assessing morphological characteristics, 15 tests for evaluating muscular fitness, and a 600-meter running test for girls and an 800-meter running test for boys. The results showed that the tests Backward Polygon, Side Steps, Narrow Split Forward Bend, and Medicine Ball Throw from Lying Position were statistically significant predictors of cardiorespiratory fitness measured by the 600-meter running test for girls. However, the results of motor skill tests for boys did not show a statistically significant correlation with the 800-meter running test. These results can show direction in programming of physical education classes to enhance cardiorepiratory endurance by improving motor skills in girls and aiming boys towards extracurricular activities.

Keywords: Cardiorespiratory fitness, children, school, physical education.

Introduction

Cardiorespiratory endurance or cardiovascular fitness (CRF) refers to the ability of large muscle groups, or the entire body, to perform moderate to high-intensity activities for longer durations. CRF reflects the overall capacity to deliver oxygen from the atmosphere to the mitochondria in order to carry out physical activity. It can be measured directly (VO2max) or it can be estimated from the peak work rate – both measured and estimated CRF strongly predict health outcomes (Ross, R., et al., 2016). A higher level of cardiorespiratory endurance reduces the risk of chronic diseases and abdominal obesity (Sagat et al., 2023). These findings suggest that CRF levels during youth and their improvement may be associated with a lower risk of developing obesity and cardiometabolic diseases later in life (Garcia Hermoso, A. et al., 2020). It is an important predictor of physical and mental health in young people (Raghuveer, G. et al., 2020) and,

along with muscular fitness, shows positive effects on depression, anxiety, mood, and self-confidence, as well as academic achievements of children and adolescents. Both systems have a positive, cumulative effect on the cardiorespiratory profile of children (Ortega, F.B. et al., 2008). Furthermore, it is expected that musculoskeletal, motor, and cardiorespiratory fitness increases over time; older boys and girls perform better than younger ones because those traits are dependent on the development of experience and skills over time (Emeljanovas, A. et al., 2020).

Today's children have a weaker physical, psychological, and cognitive status from an early age, with an increasing risk of cardiovascular diseases. The increased time they spend from a young age in front of television or computer screens is also associated with a lower level of fitness (Carson et al., 2016), leading to an increase in obesity, more sedentary time, and a decrease in moderate to intense activity levels, which are influenced by the sociological and economic changes of the modern era (Raghuveer, G. et al., 2020). Also, heredity, diet, age, sex and social and physical environments have an impact on cardiorespiratory fitness and physical activity in general (Lang, J.J., et.al., 2018). The findings of the research conducted on adolescents in the capital of Croatia, Zagreb, are concerning: 59.4% of girls and 45.5.% of boys did not meet recommended daily physical activity, and one fifth of adolescents had excess weight (16.1% girls, and 22.2% boys) and one quarter had high blood pressure (21.6% girls, and 27.0% boys) (Radman, I., et.al, 2020).

One of the tasks of the school system is, among other things, to identify children with poorer muscular and aerobic status and to encourage them to engage in physical activity, especially promoting more intense exercise (Ortega, F.B. et al., 2008). Early intervention and prevention strategies that target youth cardiorespiratory fitness (CRF) may contribute to the maintenance of health parameters later in life (Garcia Hermoso, A. et al., 2020).

Recent findings have shown that the primary factors responsible for a healthy level of muscular and cardiorespiratory fitness in children are body mass index and the type and intensity of sports they engage in. This findings can also be implemented in the school day through specifically focused extracurricular activities and strength training (Rosa, G.B. et al., 2024).

Therefore, when planning and programming the Annual Curriculum, physical education teachers must pay particular attention to the uniqueness of each student, especially regarding gender, which extends throughout teaching, learning, and assessment. When planning physical education lessons, they should consider students' interests, motivation, and performance, adjusting them to the physiological differences between boys and girls, all with the aim of increasing interest in physical education and exercise. Furthermore, when designing extracurricular activities, it is important to consider that the groups will be mixed and heterogeneous, so it is necessary to select a sport that will engage as many children as possible in extracurricular activities and, at the same time, increase motivation

to participate in these activities. Moreover, it is worth exploring other ways to improve children's cardiorespiratory endurance through activities that are more interesting to them and will not lead to dropout, which is often the case with activities like continuous running.

The goal of this research was to examine the predictive value of four morphological measures and 15 motor skills tests on cardiorespiratory endurance in boys and girls aged 10 to 14, as measured by the 600-meter and 800-meter running tests.

Materials and Methods

Study Participants

The sample of participants in the study consisted of a total of 9,734 students, including 4,256 girls and 5,478 boys aged 10 to 14 years. Measurements were conducted as part of the CRO-FIT project during the 2008/2009 school year (Neljak, B., et al., 2011). The sample of participants in this project covered all counties in the Republic of Croatia.

Measurement protocol

Measurements were conducted in three time periods. The first part was carried out in November 2008, the second in February, and the third in April 2009. The sample of variables was defined by four measures of morphological characteristics, fifteen motor ability tests, and one test of functional abilities. All measures and tests are listed in the Methodology for the Evaluation of Kinanthropological Characteristics of Students in Physical and Health Education: CROFIT Standards .

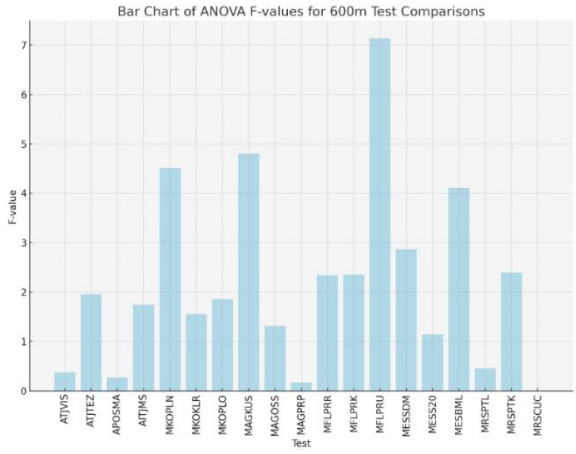
Statistical analysis

Descriptive statistics were used to calculate the means of the analyzed variables, and the normality of the data distribution was tested using the Shapiro-Wilk W test. A univariate analysis of variance (ANOVA) was used to determine the predictive relationship between the results of the motor ability tests and the values of the functional ability test, specifically the 600-meter running test for girls and the 800-meter running test for boys in elementary school.

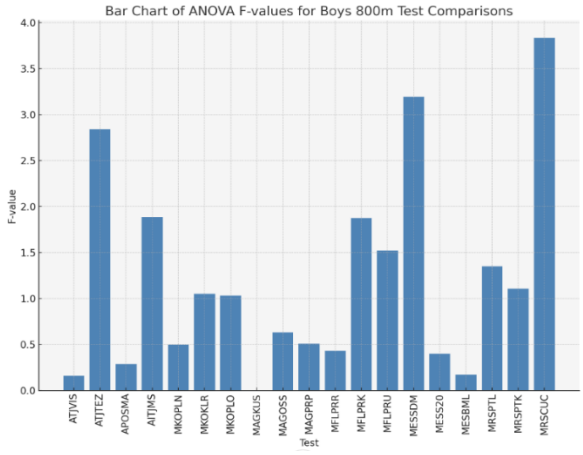
Results

Univariate analysis of variance yielded F-values that determine the values of morphological measures and motor ability tests in explaining the variance in functional ability tests, which were conducted using tasks such as the 600-meter run for girls (Graph 1) and the 800-meter run for boys in primary school (Graph 2).

Graph 1.



Graph 2.



The obtained p-values for the tests of backward polygon (MKOPLN), side steps (MAGKUS), forward bend in narrow split (MFLPRU), and medicine ball throw from lying (MESBML) show a statistically significant correlation with the 600-meter running test (F600ZO) in girls aged 10-14 years (Table 1). In contrast, the p-values for the motor skills tests in boys do not show a statistically significant correlation with the 800-meter running test, although the squat test (MRSCUC) with a p-value of 0.050 (Table 2) is on the treshold of the significance.

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Table 1. (girls)

Test	F-value	p-value
ATJVIS	0.372	0.542
ATJTEZ	1.958	0.162
APOSMA	0.277	0.599
AITJMS	1.744	0.187
MKOPLN	**4.509**	**0.034**
MKOKLR	1.562	0.211
MKOPLO	1.854	0.173
MAGKUS	**4.803**	**0.028**
MAGOSS	1.314	0.252
MAGPRP	0.171	0.679
MFLPRR	2.340	0.126
MFLPRK	2.352	0.125
MFLPRU	**7.137**	**0.008**
MESSDM	2.868	0.090
MESS20	1.148	0.284
MESBML	**4.111**	**0.043**
MRSPTL	0.457	0.499
MRSPTK	2.399	0.121
MRSCUC	0.010	0.920

Table 2. (boys)

Test	F-value	p-value
ATJVIS	0.160	0.689
ATJTEZ	2.840	0.092
APOSMA	0.288	0.591
AITJMS	1.885	0.170
MKOPLN	0.497	0.481
MKOKLR	1.050	0.306
MKOPLO	1.033	0.310
MAGKUS	0.001	0.981
MAGOSS	0.632	0.427
MAGPRP	0.511	0.475
MFLPRR	0.433	0.510
MFLPRK	1.876	0.171
MFLPRU	1.523	0.217
MESSDM	3.192	0.074
MESS20	0.400	0.527
MESBML	0.173	0.677
MRSPTL	1.349	0.246
MRSPTK	1.105	0.293
MRSCUC	**3.833**	**0.050**

Discussion

The results obtained in this research show that 600m running performance is associated with the values of certain motor skill tests in girls—specifically tests of coordination, agility, flexibility, and explosive strength — due to their statistically significant correlation with the 600m run test, which assesses cardiorespiratory endurance in female students. In contrast, among boys, the test results do not show a statistically significant correlation with the 800m run, except for the squat test, which is at the threshold of statistical significance with a p-value of 0.050. This could indicate a potential direction for further research.

In girls, the reason for the observed correlations could be the activation of the same muscle groups within the locomotor system. This means that running 600m requires activation of similar muscle groups—particularly flexibility of the hamstring muscles and activation of core stabilizers. It is also known that girls at this age tend to perform better on flexibility tests than boys.

Girls of this age can achieve good scores in performing test MESBML – Medicine ball throwing from lying position, even with lower body mass. This test provides a relatively pure measure of upper body explosive strength. Positive relationship between explosive strength of the upper and lower limbs probably contributed to the significant F-value of this test in relation to the criterion variable.

Among the boys who participated in this study, no motor skill showed a deviation significant enough to be considered a "predictor variable." The only exception was the motor ability of repetitive strength—squats—with a p-value approaching to potential predictive value. This could be attributed to the relationship between lower body muscle strength needed for repeated overcoming of body weight during squats, and the required flexibility and strength of the thigh muscles necessary for running 800 meters—though not sufficient to be considered statistically significant.

Since the targeted development of repetitive strength typically begins after puberty, it is possible that the squat test would show a stronger correlation with 1000m running performance, which is assessed in high school. This is another potential direction for future research.

Furthermore, the differences in results between boys and girls may generally be attributed to better motor performance in boys, thanks to lower fat percentages, later onset of puberty, and higher levels of physical activity during free time. Findings from Peralta's observational study suggest that physical education plays a positive and significant role in promoting CRF, especially among boys. For girls, habitual physical activity seems to play a more significant role in the promotion of CRF (Peralta, M., et al., 2020), and performance outcomes that may be almost exclusively attributed to physical education classes.

Conclusion

The results of this study indicate that motor and functional abilities in girls can be viewed as interrelated, as the values from flexibility, agility, explosive strength, and coordination tests showed statistically significant correlations with functional ability tests, unlike in boys.

Targeted development of coordination, agility, flexibility, and explosive strength can contribute to improved performance in the 600-meter run test, and thereby indirectly support the overall development of functional abilities in girls aged 10 to 14.

By focusing on motor skills to improve aerobic capacity, it is possible to positively influence the negative trend of declining cardiorespiratory endurance in girls, provide a direction for advancement in physical education within the school system, and more precisely guide boys toward suitable extracurricular activities based on their results.

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Investigation of youth soccer coaches teaching behaviors

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Abstract: The purpose was the investigation of teaching behaviors of soccer coaches in U14 age group by using systematic observation. Participants consist of 4 male soccer coaches who coaching U14 youth soccer context. Coaches mean ages were 31.7 and they have 8.4 years coaching experiences on average. Each coach does coaching for the different youth soccer team. Non-Participant observation technique was used as data collection method. During the 6-week period, each coaches' training sessions were recorded 3 times and total 12 training were recorded as video. The obtained data were analyzed using Arizona State University Observation Instrument (ASUOI) that was developed by Lacy ve Darts (1989) and adapted Turkish by Yapar (2016). 12 recorded training videos were analyzed by using ASUOU categories with 10-second intervals to investigate coaches' behaviors. Observed coaching behaviors coded and determined in which behavior groups the coaching behaviors clustered as numerical and percentages. As a result 6432 coaching behaviors were observed in 1072 min training video record. When the distribution of coaching behaviors was analyzed according to ASOUI categories; 3683 instructional behaviors (57,26%) (Pre-instruction 1293, Concurrent instruction 913, Post-instruction 536, Questioning 376, Physical assistance 75, Positive modeling 408, Negative modeling 82); 723 Supportive and Encouraging Behaviors (11,23%) (Hustle 456, Praise 162 and Scold 105); and 2026 Non-Teaching behaviors (31,51%) (Management 1161, Silence 573 and Uncodable behaviors 292). In conclusion, The most commonly used behaviors of youth soccer coaches in U14 teams were instructional behaviors, Non-Teaching behaviors and Supportive and Encouraging Behaviors followed the instructional behaviors.

Keywords: Coach behavior, youth soccer, systematic observation.

Introduction

Sport has long been recognized as one of the most effective and widely participated organized activities among children and adolescents, offering a unique environment for holistic development (Bloom & Sosniak, 1985; Larson & Verma, 1999; Whiting, 1980). When designed intentionally and delivered with pedagogical structure, youth sport programs not only contribute to physical health and motor skill acquisition, but also serve as powerful platforms for socialization, emotional regulation, and life skill development such as teamwork, leadership, discipline, and resilience. These developmental opportunities

are particularly salient during early adolescence that was a period marked by rapid biological, cognitive, and social changes.

Studies indicated that if training is appropriately tailored to the age group and aligns with developmental objectives, it can significantly enhance crucial sports outcomes such as enjoyment, skill acquisition, and positive youth development. Simultaneously, such an approach helps mitigate risks like burnout, injuries, and early dropout (Fredricks & Eccles, 2006). These observations highlight the critical importance of examining not just the content coaches deliver, but also their pedagogical methods, as their actions directly influence the motivational atmosphere and learning environment. (Cope et.al.,2017)

Despite the value of systematic observation methods, there is still detailed observational research focused specifically on soccer coaches working with U14 athletes. Most prior studies have explored coaching behavior broadly across youth categories (e.g., Cushion et al., 2012) leaving a gap in the literature concerning how instructional, supportive, and managerial behaviors manifest during this transitional developmental phase. Addressing this gap, the present study systematically investigates the observable teaching behaviors of U14 soccer coaches in naturalistic training settings. By doing so, it aims to provide empirically grounded insights into current coaching practices, inform coach education programs, and ultimately contribute to the optimization of the youth sport experience.

To effectively understand and improve youth sports settings, especially during pivotal stages like the U14 age group, it is imperative to observe and evaluate coaching practices rigorously and objectively.

Methods

This was a The Arizona State University Observation Instrument (ASUOI) was employed as the primary tool for data collection. Originally developed by Lacy and Darts (1989), the ASUOI is a systematic observation instrument designed to categorize and quantify coaching behaviors. For the purpose of this study, the Turkish adaptation of the ASUOI by Yapar (2016) was utilized. This instrument allowed for a detailed and objective analysis of the coaches' behaviors during the recorded training sessions.

Participants: The participants in this study consisted of four male soccer coaches, all of whom coached male U14 youth soccer teams. Their average age was 31.7 years (SD = 2.03), and they possessed an average of 8.4 years of coaching experience (SD = 1.17).

The selection of these participants was based on several criteria: their willingness to volunteer for the study, the specific coaching context of U14 youth soccer, their accumulated coaching experiences, and the popularity of their respective clubs and the success of their teams.

Data collection : Data for this study were collected using a non-participant observation technique. Over a period of six weeks, each of the participating coaches' training sessions was video-recorded three times, resulting in a total of 12 recorded training sessions. These video recordings served as the primary source of data for subsequent analysis.

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Observer Training: To ensure the accuracy and consistency of data collection, observers underwent rigorous training. This training focused on achieving a clear understanding of all categories within the Arizona State University Observation Instrument (ASUOI). Communication with other experts in systematic observation was maintained to refine understanding and application of the instrument. Observers were thoroughly familiarized with the coding procedure and the coding sheet, ensuring standardized data entry. Extensive practice sessions with videotapes of coaching sessions were conducted to hone observation skills and minimize potential errors.

Validity and Reliability: The validity and reliability of the data collection process were meticulously assessed. Face and content validity were established to ensure that the ASUOI adequately measured the intended coaching behaviors. To ascertain the consistency of coding by a single observer over time, intra-observer reliability was calculated, yielding a high agreement rate of 93%. Furthermore, to confirm consistency across different observers, inter-observer reliability was determined, achieving a robust agreement rate of 82.22%. These high reliability scores indicate that the observation and coding procedures were consistent and dependable, strengthening the trustworthiness of the study's findings.

Data Analysis: The analysis of the collected video data involved a systematic approach. All 12 recorded training videos were analyzed using the Arizona State University Observation Instrument (ASUOI) with a 10-second interval coding scheme. This method allowed for a detailed and granular examination of coaching behaviors. The data obtained from the coding process were then quantified for each ASUOI category, providing a numerical count of every observed behavior. To further facilitate interpretation and comparison, these quantified data were presented as percentages of total behaviors and as rates per minute (RpM), offering insights into the frequency and distribution of various coaching actions during the training sessions.

Results

The analysis of coaching behaviors revealed a clear distribution across different categories. Instructional behaviors constituted the largest proportion, accounting for 57% of all observed actions, with a total count of 3683 instances. Non-Teaching behaviors followed, making up 32% of the total, with 2026 recorded instances. Lastly, Supportive and Encouraging Behaviors represented 11% of the observed actions, totaling 723 instances. This distribution indicates that U14 soccer coaches primarily focus on instructional interactions, followed by non-teaching activities and then supportive and encouraging behaviors.

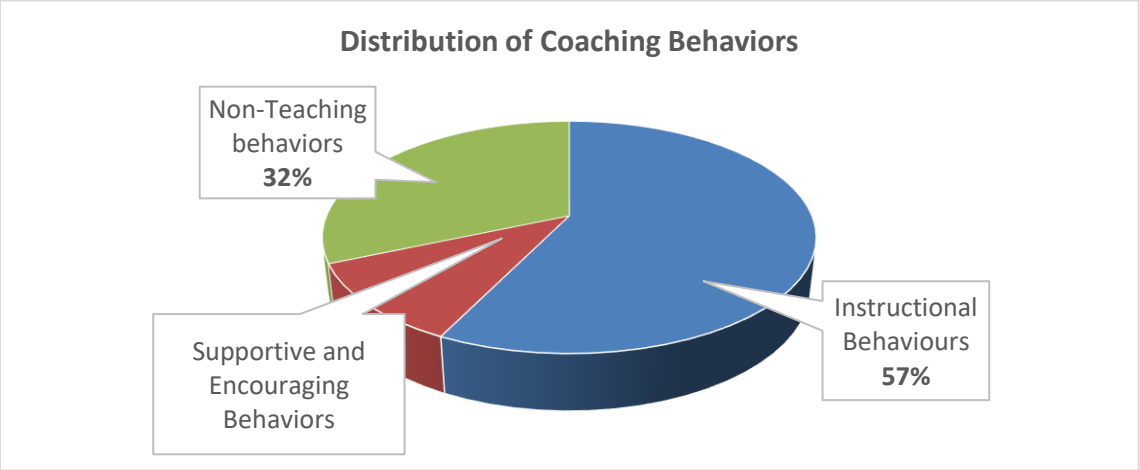
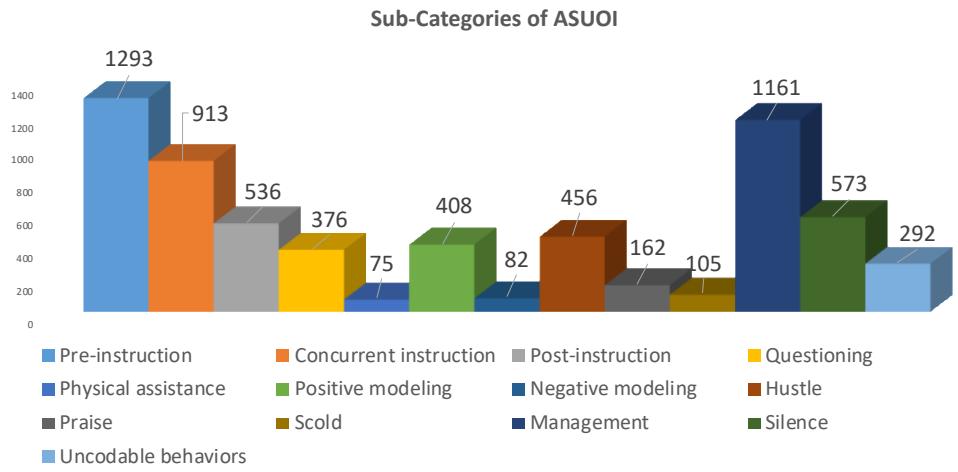


Table 1. Distribution of Coaching Behaviors

	N	%
Instructional behaviors	3683	57
Supportive and Encouraging Behaviors	723	11
Non-Teaching behaviors	2026	32

Detailed examination of coaching behaviors reveals the specific distribution within each main category. Among instructional behaviors, pre-instruction was the most frequent at 20%, followed by concurrent instruction at 14%, post-instruction at 8%, questioning at 6%, and both positive modeling and physical assistance at 6% and 1% respectively. Negative modeling also accounted for 1% of instructional behaviors. For supportive and encouraging behaviors, 'hustle' was the most common at 7%, with praise at 3% and scolding at 2%. Lastly, within non-teaching behaviors, management activities comprised the largest share at 18%, followed by silence at 9%, and uncodable behaviors at 5%.



Tables 2. Frequencies and RpM of Sub-Categories of ASUOI

Coaching Behavior Codes	Frequency	Percentages	RpM
Pre-instruction	1293	20,10	1,21
Concurrent instruction	913	14,19	0,85
Post-instruction	536	8,33	0,50
Questioning	376	5,85	0,35
Physical assistance	75	1,17	0,07
Positive modeling	408	6,34	0,38
Negative modeling	82	1,27	0,08
Hustle	456	7,09	0,43
Praise	162	2,52	0,15
Scold	105	1,63	0,10
Management	1161	18,05	1,08
Silence	573	8,91	0,53
Uncodable behaviors	292	4,54	0,27

Discission and Conclusion

The study's findings indicated that Instructional Behaviors represented the most frequently observed category within the ASUOI framework, accounting for 57% of all recorded instances (f=3683). Specifically, within the instructional behavior category,

'Pre-instruction' emerged as the predominant behavior among U14 youth soccer coaches, comprising 20.1% of observations (f=1293). These results align with previous research in the literature, including studies by Claxton (1988) and Partington and Cushion (2014), suggesting a consistent emphasis on instructional strategies in youth soccer coaching. Questioning stands as a significant component within instructional behaviors. In this study, observed questioning behavior constituted the fourth most frequent coaching action, recorded at 376 instances, representing 5.85% of total behaviors. Research involving elite youth coaches has consistently demonstrated that highly skilled coaches tend to employ more questions compared to their less experienced counterparts (Becker & Wrisberg, 2008). Furthermore, management behaviors were identified as the most prevalent non-teaching actions in this investigation, with 1161 occurrences, making up 18.05% of all observed behaviors. This finding aligns with previous studies indicating that expert coaches typically allocate less time to management tasks during training sessions (Ford, Yates & Williams, 2010).

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Perceived barriers to movement education among turkish preschool teachers: Examining the impact of gender, school type, and location

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Abstract: Movement education in early childhood plays a crucial role in developing fundamental motor skills and promoting lifelong physical activity. Preschool teachers are key facilitators of this process, yet various challenges may impact their effectiveness. This study examines preschool teachers' perceived barriers in teaching movement education and how these perceptions vary by gender, school type, and location. The sample included 204 preschool teachers (14 male, 190 female) from 25 provinces in Turkey, with educational backgrounds ranging from associate degrees (5.4%) to bachelor's degrees (82.4%) and master's degrees (12.3%). Their ages ranged from 21 to 50 years (M = 32.19), with an average of 9.2 years of teaching experience. Among them, 177 worked in public schools and 27 in private schools, with an average class size of 13.4 students. Additionally, 47 teachers worked in provincial centers, 93 in district centers, and 64 in village schools. Data were collected using the " Perceived Barriesrs to Teaching Movement and Physical Activity Scale" (Sofo & Asola, 2015), adapted into Turkish by Yapar & Yalçınkaya (2022). This 11-item, 5-point Likert scale assesses perceived barrires, with higher scores indicating greater challenges (Cronbach's α = .738). Results showed that teachers generally perceive low level of barriers (M = 2.04), with the most significant challenge being a lack of peer support (M = 3.20). No significant differences were found based on gender (p = 0.682), school type (p = 0.237), or location (p = 0.147). In conclusion, preschool teachers report low perceived barriers to movement education, regardless of demographic factors. Enhancing peer support may further improve movement education practices.

Keywords: Movement education, preschool teachers, perceived barriers.

Introduction

Physical activity plays a fundamental role in the physical, cognitive, social, and emotional development of children. The early years of life are considered a critical period for establishing physical activity habits and the foundations of motor development (Timmons et al., 2012). Movement skills acquired during early childhood can positively impact not only children's physical health but also their self-confidence, social relationships, and

learning capacity (Stodden et al., 2008).

Therefore, structured (e.g., physical education classes) and unstructured (e.g., free play) movement activities offered during the preschool period significantly contribute to increasing children's physical activity levels and supporting their motor development (National Association for Sport and Physical Education (NASPE) (NASPE, 2004; MEB, 2016). This period, where fundamental movement skills are acquired, is also crucial for children's future participation in sports and their adoption of active lifestyles (Gallahue & Ozmun, 2006).

Literature has also shown that motor skills gained in early childhood are linked to cognitive outcomes such as academic achievement, attention span, cognitive flexibility, and executive functions (Best, 2010; Donnelly et al., 2016). From this perspective, it is evident that quality movement experiences provided at an early age are effective not only for physical development but also for cognitive development.

However, it is also known that teachers face various obstacles in implementing movement activities. Research indicates that preschool teachers perceive factors such as insufficient physical space, lack of equipment, time constraints, inadequate in-service training, and low self-efficacy as significant barriers (Zeng et al., 2017). Furthermore, some teachers are reported to have concerns about children's safety or misconceptions that physical activity might negatively affect academic learning (McGowan, et.al., 2023)

In this context, identifying the perceived barriers of preschool teachers regarding the teaching of movement activities and examining whether these barriers differ according to various variables is of great importance for promoting quality movement education in early childhood. The aim of this research was to investigate the barriers perceived by preschool teachers when teaching physical activity based on their gender, school type where they are working and school location.

Methods

Participants: The participants consisted of 204 preschool teachers (14 male and 190 female) from 25 different provinces of Turkey. Snowball sampling method was used tor sampling.

Data collection: The data were obtained with the ‘Scale of obstacles perceived by preschool teachers during movement education’ developed by Sofo and Asola (2015) and adapted into Turkish by Yapar and Yalçınkaya (2022). The scale has a 5-point Likert type structure consisting of 11 items in total and one dimension. As the scores given to the scale increase, it is understood that the perception of obstacles is high. Croanbach's alpha value of the scale was found as .738

Data analysis: To understand the general trends and perception levels regarding the scale items, descriptive statistics and measures of central tendency were calculated. An independent samples t-test was used to determine to control differences in perceived obstacles to movement activities based on participants' gender and the type of school they worked in. Additionally, a One-Way ANOVA was conducted to test for significant differences in teachers' perceptions based on the location of their school (Village, District and Province).

Results

The descriptive statistic indicated that participants consisted of 204 preschool teachers (14 male and 190 female) from 25 different provinces of Turkey. When the graduation status of the participants was examined, it was calculated that 11 (5,4%) were associate degree, 168 (82,4%) bachelor's degree and 25 (12,3%) master's degree graduates. It was observed that the participants were between the ages of 21-50 (x=32.19) and had 9.2 years of professional experience. 177 of the participants work in public schools and 27 of them work in private schools and they teach 13.4 students per class on average. 47 of the participants teach in the provincial center, 93 in the district center and 64 in village schools. (See table 1)

Tablo 1. Descripteve statistics for participants

Variable	Category / Value	n	%
Graduation Status	Associate Degree	11	5.4%
	Bachelor's Degree	168	82.4%
	Master's Degree	25	12.3%
Age	Mean ($\bar{x}$)	204	32.19 years
Professional Experience	Mean ($\bar{x}$)	204	9.2 years
School Type	Public School	177	84.75 %
	Private School	27	15.25 %
Class Size	Mean number of students per class		13.4 students
School Location	Provincial Center	47	23.0%
	District Center	93	45.6%
	Village School	64	31.4%

The analysis revealed that teachers have a low perception of obstacles in movement education, with an overall mean score of 2.04. The highest-rated challenge was the lack of support from colleagues (x = 3.20).

No significant differences were found based on gender, with female (x = 2.06, SD = 0.59) and male (x = 2.01, SD = 0.31) teachers showing similar perceptions (t = 0.416, df = 20.81, p = 0.682). (see table 2)

Table 2. Gender Based comparison of periceved barriers

	N	Mean	SD	t	df	p
Female	190	2.064	0.587	0.242	202	0.682
Male	14	2.006	0.308			

Similarly, school type had no significant effect, despite public school teachers (x = 2.05, SD = 0.58) reporting slightly higher scores than private school teachers (x = 1.93, SD = 0.47) (t = 1.201, df = 38.89, p = 0.237). (See table 3)

Table 3. School type comparison of periceved barriers

	N	Mean	SD	t	df	*p*
Public	177	2.054	0.584	1.201	202	0.237
Private	27	2.006	0.308			

School location also showed no significant differences among teachers in villages (x = 1.91, SD = 0.54), districts (x = 2.11, SD = 0.63), and provinces (x = 2.15, SD = 0.41) (F = 1.810, df = 203, p = 0.147). (See table 4)

Table 4. Comparison of school location

School Location	Mean	SD	N	df	F	*p*
Village	1.913	0.545	64			
District	2.108	0.633	93	201	1.810	0.147
Province	2.149	0.412	22			

Discussion and Conclusion

This study reveals that preschool educators generally perceive minimal obstacles when it comes to integrating movement activities into their curriculum. An average scale score of 2.04 suggests that teachers do not encounter significant impediments in delivering movement education. This outcome might signify an increasing institutional awareness and enhanced teacher proficiency in incorporating physical activity into early childhood programs. Prior research consistently underscores that well-prepared teachers and supportive school environments are crucial for the successful implementation of physical activity initiatives (Temel & Erden, 2020; McLachlan et al., 2012).

However, the most frequently cited barrier was insufficient collaboration from fellow teachers within the school. This finding underscores the potential challenges arising from a lack of internal school cooperation. Similarly, the foundational work by Sofo and Asola (2015) identified limited institutional backing and a dearth of collaborative efforts as key factors diminishing teacher motivation for providing movement education. This highlights

the imperative of cultivating a cooperative school culture that champions physical activity and movement practices.

Interestingly, despite the absence of statistical significance, teachers in public schools reported a slightly higher perception of barriers compared to their counterparts in private institutions. This subtle difference could potentially be attributed to challenges such as restricted access to resources, inadequate physical spaces, or insufficient administrative support often encountered in public school settings (Bulca & Demirhan, 2015). These nuanced distinctions warrant further investigation in subsequent research endeavors.

Based on these findings, it is advisable to strengthen institutional support systems to alleviate the perceived challenges faced by educators. Fostering collaborative work environments, establishing peer-support networks, and ensuring the provision of administrative and material resources can collectively create a more conducive environment for movement education. Moreover, offering continuous professional development opportunities can bolster teachers' expertise and confidence in leading movement activities, thereby potentially mitigating perceived limitations.

The current study utilized a forced-choice Likert format for data collection. Thus, the results only identified the perceived barriers to teaching physical activity. Future research using qualitative approaches such as open-ended questionnaires and/or interviews would provide more insight on why and how the perceived barriers impact the teaching of movement and physical activity at the pre-school level.

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Effects of teaching styles on motor competencies learning at school. Preliminary study

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Abstract: Physical literacy (PL) represents a fundamental model for teaching physical education and promoting physical activity in various educational contexts. PL encompasses the interaction of diverse and complementary factors, including motor skills, knowledge, and individual attitudes toward physical activity across different settings and life stages. Physical education instruction is based on the analysis of motor tasks, the selection of equipment and available spaces, and, most importantly, the study of interactions among teachers, students, motor tasks, and the environment, following the ecological-dynamic model of learning. The teaching strategies and methodologies adopted by physical education instructors influence motor learning processes by either facilitating or inhibiting essential educational mediation mechanisms. These processes are crucial for developing students' motor competence and fostering active lifestyles and values. Aim. This study aims to analyze the effects of teaching styles on motor learning and related factors. Methods. A systematic literature review was conducted using the PRISMA model to examine experimental studies that applied the Spectrum of Teaching Styles in physical education in primary and middle schools. The review focused on the relationship between these teaching styles and children's motor, cognitive, emotional, and social development. Thirteen studies were selected, analyzed, and included in the review. Results. The findings indicate that the use of teaching styles in physical education can effectively promote and adapt student engagement and the learning process. The teaching styles model promotes different learning approaches and the relationships among physical literacy (PL) factors. The spectrum follows a continuum ranging from the "command style" (Style A), where the teacher makes all decisions, to the "self-teaching style" (Style K), in which the student independently manages their own learning process. Between these two extremes, nine intermediate styles are identified, each modulating the level of teacher and student involvement, influencing organizational methods and practice variability.

Keywords: Teaching styles; physical literacy; motor competencies; schools.

Introduction

In recent years, the promotion of physical activity among children and youth has become a priority in educational and public health policies, in light of growing scientific evidence

supporting its importance for physical health, mental well-being, and cognitive development (Arufe Giraldez et al., 2024). Today, children and adolescents are highly vulnerable due to increasingly sedentary lifestyles, which are reflected in alarming rates of overweight, obesity, and psychological issues, as highlighted by recent large-scale studies (Rodriguez-Ayllon et al., 2019; Guthold et al., 2020). In this context, it is essential to adopt socio-educational programs based on a multi-context approach that integrates school-based, extracurricular, family, and community interventions (Arufe Giraldez et al., 2024).

No single setting alone has proven capable of ensuring the achievement of recommended physical activity levels; rather, a synergistic action among school, family, and community is necessary to promote continuous and active engagement in physical practice. Multi-context strategies are grounded in the evidence that children and adolescents spend their time in different environments, each offering specific opportunities for physical activity—provided that such environments are methodologically structured and supported (Chong et al., 2024; WHO, 2019).

This integrated vision aligns with the evolving conceptualization of motor competency. Within physical education and extracurricular physical activity, motor competency has gained increasing centrality, framed within a broader view of learning as a multidimensional and contextualized process. Motor competency is not limited to the technical execution of a motor skill but is conceived as a complex and dynamic construct, resulting from the integration of skills, knowledge, and behaviors, situated and modulated within meaningful action contexts (Ubaldy, 2005; Colella, 2018). It reflects the individual's ability to mobilize cognitive, emotional, perceptual, and motor resources to cope with variable and real-life situations, thus developing not only motor skills but also autonomy, awareness, adaptability, and transferability.

Within this perspective, physical literacy (Whitehead, 2010; 2013) provides a key theoretical framework, proposing a model that integrates motivation, confidence, physical competencies, knowledge, and understanding to foster active and mindful participation in physical activity across the lifespan.

To promote such competencies, teaching should not be limited to the transmission of predefined, standardized content. Rather, it must intentionally modulate interventions in relation to students' educational needs, environmental constraints, and the nature of the proposed tasks. In this regard, the choice of teaching styles becomes crucial. Teaching styles represent specific modalities through which the educator structures interactions with students, organizes the educational setting, and guides learning processes (Colella, 2019).

Promoting physical literacy therefore requires a thorough methodological reflection that values the intentional and differentiated use of teaching styles, as emphasized by Garn and Byra (2002) and Colella (2016), particularly regarding their influence on students'

cognitive-emotional, motor, and social engagement.

Over the past decades, the field of physical education has undergone significant methodological evolution, shifting from linear and prescriptive approaches focused on the transmission of technical gestures, to more complex and reflective didactic models (Metzler, 2011; Kirk, 2010). Traditional approaches have been criticized for their limited capacity to promote authentic and meaningful learning, as they are often grounded in a technocratic and decontextualized vision that fails to foster genuine cognitive and emotional involvement (Dudley, 2015).

In this landscape, pedagogical frameworks that address the diversity of educational needs and the complexity of contemporary teaching practices become essential. The Spectrum of Teaching Styles model developed by Mosston and Ashworth (2008) serves as a key reference, dividing styles into two broad categories: reproduction styles and production styles.

Reproduction styles are characterized by a high degree of teacher control over content, execution, and timing. They include the command, practice, reciprocal, self-check, and inclusion styles. These styles are effective for transmitting standardized skills, managing large groups, and supporting the initial phases of learning. However, they risk promoting repetitive and less meaningful instruction that neither fosters creativity nor encourages the transfer of competencies (Garn & Byra, 2002; Chow, 2013).

Evidence shows that integrating different styles enhances motor learning by fostering a rich and functional motor repertoire conducive to developing physical literacy (Colella, 2016; Whitehead, 2010). The Spectrum, with its eleven landmark styles, constitutes a true pedagogical structure in which every teaching episode is the result of a shared decision-making chain between teacher and student.

Unlike models that prescribe rigid content, the Spectrum focuses on the “how” and “why” of methodological choices, operating as a form of micro-pedagogy capable of nurturing broader educational models (Ashworth, 2020; Kemmis, 2019). The Spectrum provides structure and direction to the educational process.

Production styles, on the other hand, include guided discovery, convergent discovery, divergent production, individual program, learner-initiated, and self-teaching. These styles assign students an active role in constructing motor knowledge by encouraging exploration, reflection, and adaptation. Teaching becomes a dynamic and dialogical context where students experiment, make decisions, generate solutions, and construct meaning (Goldberger, Ashworth & Byra, 2012; Colella, 2019).

The Spectrum is also grounded in a non-versus philosophy (Mosston & Ashworth, 2008), rejecting rigid hierarchies among styles and encouraging their functional use based on educational objectives, context, and group characteristics (Casey et al., 2020; Gore, 2022). This approach fosters inclusivity, intentionality, and coherence between educational intentions and practical implementation.

It moves beyond didactic approaches based on predefined, sequential tasks, contributing to the development of non-linear pedagogy (Chow et al., 2016), a paradigm that views learning as the outcome of complex interactions among the learner, environment, and task, and their interconnections (Chow et al., 2007).

Variability, error, discovery, and adaptation are not obstacles to be eliminated, but didactic resources to be enhanced. Competencies emerge not from mechanical repetition of technical gestures, but from the exploration of stimulus-situations, manipulation of spatial-temporal constraints, and reflective analysis of action (Chow et al., 2007; Pesce, 2002; Bortoli & Robazza, 2016).

Within this framework, physical literacy is conceived as a transformative process where students develop motor competencies not only through technical improvement, but also by learning to interpret, decide, and act consciously in complex motor settings (Whitehead, 2010; Colella, 2016).

Operationally, the conscious adoption of Spectrum styles enables the design of diverse teaching episodes tailored to specific objectives and individual student characteristics. For example, to develop feedback skills in cooperative settings, the reciprocal style may be employed alongside strategies such as self-check or individual practice (Ashworth, 2020; SueSee & Barker, 2019).

The teacher's ability to consciously integrate multiple styles—sequentially or according to students' proficiency levels—is key to fostering self-efficacy and intrinsic motivation, two essential elements in the process of motor literacy (Bandura, 2000; Khodaverdi et al., 2015). Within this framework lies the Teaching Games for Understanding (TGfU) model, which aims to promote game intelligence, tactical awareness, and autonomous decision-making. In contrast to technique-centered traditional approaches, TGfU uses modified games to stimulate students to adapt, solve problems, and reflect on the consequences of their motor choices, encouraging meaningful and transferable learning (Bunker & Thorpe, 1982; Chow et al., 2007).

The complementarity between TGfU, non-linear pedagogy, and production styles in the Spectrum outlines a teaching approach rooted in intentionality, reflection, and learner autonomy.

A central element of non-linear pedagogy is the transfer of competencies—the learner's ability to apply acquired knowledge and skills in different settings. Production styles foster the development of flexible motor competencies that can be adapted to novel situations by generalizing principles and strategies. Learning is not confined to a single setting but is constructed as an open and reworkable system in which past motor experiences form the basis for future actions (Schmidt & Wrisberg, 2000; Pesce et al., 2015).

In this logic, physical literacy develops as a cumulative journey, where the learner's motor repertoire expands through ongoing interaction with diverse environments, tasks, and stimuli (Gallahue et al., 2012; Lubans et al., 2010).

Literature has also highlighted the strong relationship between teaching styles and motivation. The choice of style is not neutral; it determines the motivational climate in the educational setting. Production styles, in particular, are associated with mastery orientation, cooperation, and personal growth—elements that enhance intrinsic motivation and student engagement (Ames, 1992; Bortoli et al., 2005).

The TARGET model provides a useful operational framework for designing learning environments that value individual progress, active participation, and formative assessment. Conversely, rigid and prolonged use of reproduction styles may lead to a performance-oriented climate focused on error, peer comparison, and sanction, negatively affecting students' perceived competence and self-efficacy (Jung & Choi, 2016).

Thus, didactic intentionality and the teacher's ability to adapt styles according to objectives and group characteristics are key elements for high-quality physical education. Ultimately, the fluid and flexible integration of reproduction and production styles—as proposed by the Spectrum—forms an essential foundation for authentic, inclusive, and holistic motor education (Williams & Pill, 2019; Colella, 2016; Whitehead, 2013).

Methods

A systematic literature review was conducted using the PRISMA model, "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (Moher, Liberati, Tetzlaff, & Altman, 2009), to analyze the effects of teaching styles on motor learning and related factors. The literature search was performed across four electronic databases (PubMed, SPORTDiscus, Scopus, and Google Scholar), focusing on articles published between January 1, 2014, and December 31, 2024.

Within the methodological framework of the review, three main research questions were formulated to guide and delimit the investigation:

a) Have experimental studies been published using the Spectrum of Teaching Styles, or is it only employed as a methodological reference model?
a1) Target age range: 6–14 years.
b) What are the stated objectives of the experimental studies that adopt the Spectrum of Teaching Styles in the school context?
c) Do the findings from these studies pertain exclusively to the motor domain, or do they also include cognitive, emotional, and social dimensions? If so, which domain has been most frequently explored?

The literature search employed the following databases: PubMed, SPORTDiscus, Scopus, and Google Scholar. Articles published from January 1, 2014, to December 31, 2024, were considered. The following search strings were used, combining specific keywords with Boolean operators:

•"teaching style" OR "teaching styles" AND "experimental intervention" OR "experimental interventions" AND "children" AND "school" OR "schools" AND "physical education"
•“teaching styles” OR “teaching style” AND “schools” AND “physical education” AND “children” AND “experimental intervention” OR “experimental intervention study”
•"spectrum teaching styles" AND “schools” AND “physical education” AND “children” AND “experimental intervention” OR “experimental intervention study”
•“teaching styles” OR “teaching style” AND “physical education” AND “children” OR “experimental intervention” AND “experimental intervention study” AND “schools”

After removing duplicates, an initial selection of studies was conducted based on the relevance of titles and abstracts. A more detailed screening followed, identifying articles that met all of the following inclusion criteria:

•Experimental or quasi-experimental design;
•Studies from any country and in any language;
•Full-text articles;
•Experimental studies using the Spectrum of Teaching Styles in physical education in primary and middle school, examining its relationship with children’s motor, cognitive, emotional, and social domains;
•Participants aged between 6 and 14 years without physical or intellectual disabilities.

Studies involving extracurricular activities, literature reviews, conference papers, monographs, dissertations, and similar documents were excluded. All studies meeting the inclusion criteria were analyzed independently and separately by the two authors (SL and DC). Any disagreements regarding study selection were resolved through critical discussion between the authors.

The analysis of the selected articles was structured to report, for each study: (i) author(s)/year/location; (ii) experimental design/sample/age; (iii) intervention(s); (iv) duration of the study; (v) outcomes.

Results

The initial database search yielded 78 results. After the removal of duplicates (4 studies), 74 articles were screened based on title, abstract, and references. Of these, 20 eligible articles were assessed in full text (Figure 1).

Among the full-text articles deemed eligible, 7 studies were excluded for not meeting the inclusion criteria: in one study, the Spectrum of Teaching Styles was not used in the intervention; in three studies, the sample did not meet the inclusion criteria; and in three studies, the experimental intervention was conducted in an extracurricular context.

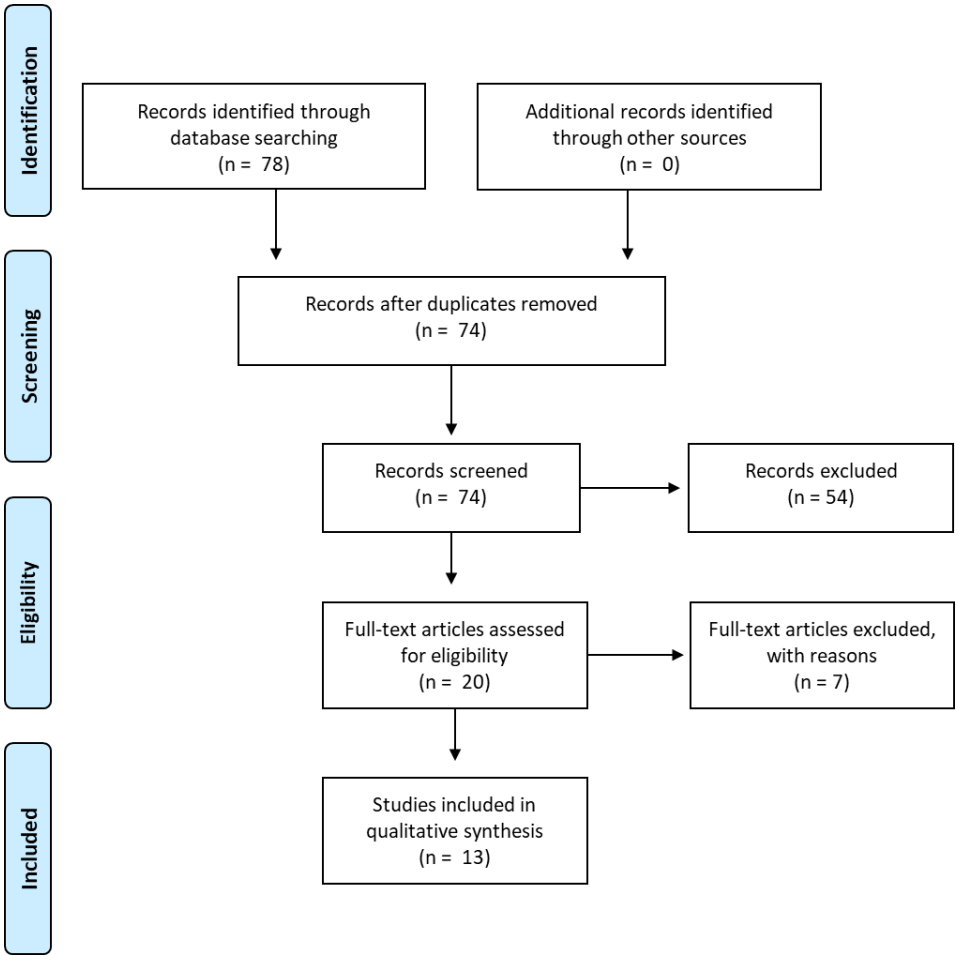

Figure 1. Flowchart of the review process steps.

Thirteen studies were selected, analyzed, and included in the review. The studies involved sample sizes ranging from 28 participants (Hon et al., 2021) to 601 participants (Chatzipanteli et al., 2015), with ages between 6 and 14 years.

The studies were conducted in Italy (Invernizzi et al., 2019; Monacis et al., 2023; Monacis et al., 2022; Colella & Bonasia, 2019), Spain (Fernández-Vázquez et al., 2024; Murillo & Mateos, 2021; Cuéllar-Moreno, 2016), Greece (Mouratidou et al., 2022; Digelidis et al., 2018; Chatzipanteli et al., 2015), Malaysia (Hon et al., 2021), Costa Rica (Martínez-Rodríguez, 2024), and Turkey (Özgül et al., 2019).

Analysis of the included studies revealed significant variability in the use of teaching styles within physical education, with a clear trend toward adopting styles from the production cluster of the Spectrum of Teaching Styles (Mosston & Ashworth, 2002), often contrasted with more traditional reproduction-based approaches.

In particular, the command style was used in eight studies (Invernizzi et al., 2019; Monacis et al., 2023; Monacis, Colella & Limone, 2022; Colella & Bonasia, 2019; Murillo & Mateos, 2021; Martínez-Rodríguez, 2024; Özgül, Atan & Kangalgil, 2019; Cuéllar-Moreno, 2016), often as a form of control or as a didactic benchmark. These studies generally showed that although the command style can enhance technical accuracy in specific motor tasks (e.g., teaching volleyball service), it is less effective in promoting intrinsic motivation, perceived self-efficacy, and student satisfaction.

Conversely, guided discovery emerged as one of the most effective and widely adopted practices, present in eight studies (Invernizzi et al., 2019; Monacis et al., 2023; Monacis, Colella & Limone, 2022; Colella & Bonasia, 2019; Murillo & Mateos, 2021; Martínez-Rodríguez, 2024; Chatzipanteli, Digelidis & Papaioannou, 2015; Cuéllar-Moreno, 2016). This style fostered greater cognitive and emotional engagement, the development of autonomous strategies, and improvements in metacognitive processes. Chatzipanteli et al. (2015), for example, reported significant improvements in all assessed dimensions (procedural knowledge, planning, monitoring, mental imagery).

The inclusion style, used in three studies (Mouratidou et al., 2022; Chatzipanteli et al., 2015; Özgül et al., 2019), also demonstrated encouraging results, particularly in personalizing learning and enhancing intrinsic motivation. For instance, the study by Özgül et al. (2019) found that students engaged in an inclusive setting improved both their volleyball-specific psychomotor skills and their overall attitude toward physical education. The reciprocal style was applied in three studies (Mouratidou et al., 2022; Chatzipanteli et al., 2015; Cuéllar-Moreno, 2016), confirming its potential to foster peer cooperation, accountability, and social learning. Notably, Cuéllar-Moreno (2016) found that using the reciprocal style in combination with guided discovery significantly increased appropriate classroom behavior and student attentiveness.

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Although less common, the self-check style was examined in the study by Digelidis et al. (2018), which reported a positive impact on self-regulation and intrinsic motivation in basketball learning settings.

Five studies (Monacis et al., 2023; Monacis et al., 2022; Invernizzi et al., 2019; Chatzipanteli et al., 2015; Cuéllar-Moreno, 2016) employed combinations of styles (e.g., guided discovery, problem-solving, inclusion, reciprocal), with particular attention to non-linear task adaptation. These combinations supported more complex and integrated learning and reinforced perceived self-efficacy and motor engagement (Colella & Bonasia, 2019). Finally, only one study (Murillo & Mateos, 2021) used a crossover design to directly compare the effectiveness of two styles (command and problem-solving) within a teaching unit. The results highlighted a greater impact of the problem-solving approach on emotional factors and socio-emotional development.

In summary, production styles—or combinations of production and reproduction styles, particularly guided discovery, inclusion, and reciprocal—emerged as effective teaching tools for promoting active, reflective, and motivating motor learning, with cross-domain effects on cognitive, emotional, and social competencies.

The analysis of results across studies was strongly influenced by the variety and quality of the assessment tools employed, which proved crucial in detecting the effectiveness of the adopted teaching styles. The studies utilized a wide range of instruments to assess the motor, cognitive, motivational, and behavioral dimensions of the educational experience in physical education (Table 1).

Table 1. Summary of methods and assessment tools

Author and Year	*Assessment Tool*	*What It Measures*	*Method*
Jia Sheng et al., 2021	Brady Wall Volley Test	Psychomotor skill in forearm passing	Quantitative, Parametric
	PACES	Perceived enjoyment during physical activity	Quantitative, Parametric (Likert scale)
Invernizzi et al., 2019	Multistage Fitness Test (MFT)	Cardiorespiratory fitness level	Quantitative, Parametric
	Test of Gross Motor Development (TGMD-2)	Overall motor competence	Quantitative, Parametric

	Self Description Questionnaire (SDQ)	
PACES	Perceived enjoyment of physical activity	Quantitative, Parametric (5-point Likert)
PAQ-C	Weekly physical activity outside school	Quantitative, Parametric (Likert 1–5)
Semi-structured Interviews	Children's perception of PE lessons and instructors	Qualitative, Non-parametric
Teaching Styles Questionnaire	Use of Mosston's teaching styles	Quantitative, Non-parametric (Likert 1–5)
Video Analysis + IFITS	Teaching styles used	Quantitative, Parametric
SLJ	Lower body explosive strength	Quantitative, Parametric
MBT	Upper body explosive strength	Quantitative, Parametric
20 m Sprint	Speed	Quantitative, Parametric
Physical Self-Efficacy Scale	Physical self-perception	Quantitative, Non-parametric
PACES (Carraro et al.)	Enjoyment perceived	Quantitative, Non-parametric
Anthropometric + Cole	Weight status	Quantitative, Parametric
MOBAK-5-6	Basic motor competencies	Quantitative, Non-parametric
BMI + Cole	Weight status	Quantitative, Parametric
Wilcoxon, Mann-Whitney	Group differences	Quantitative, Non-parametric
SportComp Motor Test	Overall motor skills	Quantitative, Parametric
Flamingo Test	Static balance	Quantitative, Parametric
Plate Tapping Test	Coordination speed	Quantitative, Parametric
Handgrip Strength Test	Grip strength	Quantitative, Parametric
Lateral Jump Test	Speed and balance	Quantitative, Parametric
PCERT	Perceived effort	Quantitative, Non-parametric
Interviews + Focus Groups	Experience and motivation	Qualitative
LAPOPECQ	Motivational climate	Quantitative, Parametric (5-point Likert)
Physical Activity Intention	Intention for PA	Quantitative, Parametric (7-point Likert)
TGMD-2	Gross motor skills	Quantitative, Parametric
PSP_C	Physical self-efficacy	Quantitative, Parametric (Likert scale)
TMMS-24	Emotional intelligence	Quantitative, Non-parametric (5-point Likert)
Development Channels	Perceived development channels	Quantitative, Non-parametric (Scale 1–7)
Kolmogorov, Wilcoxon, Spearman	Pre-post & correlations	Quantitative, Non-parametric
Dribbling test	Dribbling control	Quantitative, Parametric
Chest-pass test	Pass accuracy	Quantitative, Parametric
Shooting test	Shooting skill	Quantitative, Parametric
Enjoyment Scale	PE lesson enjoyment	Quantitative, Non-parametric (Likert)
SIMS	Motivation types	Quantitative, Non-parametric (Likert)

Martínez-Rodríguez, 2024	*AMPET*	*Achievement motivation*	*Quantitative, Non-parametric*
	3JS	Motor coordination	Quantitative, Non-parametric
Chatzipanteli et al., 2015	Metacognitive Process Questionnaire	Metacognitive skills	Quantitative, Parametric (Likert)
	Motivation Questionnaire	Motivation types	Quantitative, Parametric (Likert)
	Lesson Satisfaction Scale	Lesson satisfaction	Quantitative, Parametric (Likert)
Özgül et al., 2019	PESAS	Attitudes toward PE	Quantitative, Parametric (Likert)
	VPST	Volleyball skills	Quantitative, Parametric
Cuéllar-Moreno, 2016	Rhythm Test	Rhythmic coordination	Quantitative, Parametric
	Technical Test	Dance execution	Quantitative, Parametric
	Conceptual Test	Conceptual understanding	Quantitative, Parametric
	Attention Questionnaire	Attention capacity	Qualitative + Quantitative
	Satisfaction Questionnaire	Lesson satisfaction	Quantitative, Non-parametric
	Placheck Method	Behavioral observation	Quantitative, Non-parametric (observation)

The duration of the analyzed interventions varied widely, reflecting the diverse educational and methodological aims of the projects.

In several studies, the intervention was carried out over an extended period ranging from 8 to 16 weeks, with an average frequency of 2–3 lessons per week (Invernizzi et al., 2019; Monacis et al., 2023; Chatzipanteli et al., 2015; Özgül et al., 2019). These durations allowed for the observation of significant improvements both in motor and motivational domains.

In other cases, the instructional design was more limited, with intervention units lasting 4–6 weeks (Digelidis et al., 2018; Murillo & Mateos, 2021), or even restricted to a few lessons, such as in the experimental study by Martínez-Rodríguez (2024), which consisted of a single lesson per week over three months and did not yield significant improvements in motor competencies.

Some studies focused on shorter didactic micro-cycles, such as the study by Cuéllar-Moreno (2016), which included 12 lessons, or the study by Hon et al. (2021), consisting of a single session. These shorter interventions revealed that when duration is limited, the positive effects are mainly related to affective-relational or attentional aspects rather than

substantial changes in motor development.

The findings of the analyzed studies converge in highlighting the effectiveness of teaching styles from the production cluster, particularly when applied in structured and continuous instructional contexts.

In the study by Invernizzi et al. (2019), the Multi-Teaching approach led to significant improvements in motor competencies and cardiorespiratory capacity, along with increased enjoyment and weekly physical activity volume—especially in groups exposed to production styles.

Monacis et al. (2023) confirmed the effectiveness of production styles in enhancing not only motor performance but also perceived self-efficacy and enjoyment, with results superior to those achieved through traditional instruction.

Similarly, Monacis, Colella, and Limone (2022) demonstrated that a non-linear teaching approach—centered on practice variability and task personalization—fostered significant improvements in motor competencies, while also reducing disparities between children of normal weight and those with overweight.

The qualitative study "Motoria-Mente" (Fernández-Vázquez et al., 2024) reported increases in motor adaptability, response variety, and motivation, particularly in symbolic-expressive contexts, confirming the impact of production styles in the school setting.

Mouratidou et al. (2022) found that the inclusion and reciprocal styles enhanced students' intention to engage in physical activity and improved the task-oriented motivational climate.

Colella and Bonasia (2019) also reported a significant increase in motor skills and perceived physical self-efficacy among groups involved in activities guided by discovery-based and problem-solving styles.

In the crossover design proposed by Murillo and Mateos (2021), the group that first experienced problem-solving achieved better outcomes in emotional intelligence and cognitive development.

Digelidis et al. (2018) showed that the reciprocal style improved technical basketball performance, while the self-check style promoted intrinsic motivation.

Martínez-Rodríguez (2024) observed that one lesson per week was insufficient to produce significant changes in motor competencies, although the guided discovery style contributed to reducing error-related anxiety.

Chatzipanteli et al. (2015) found consistent improvements in all metacognitive dimensions in groups exposed to student-initiated styles, along with increases in intrinsic motivation and perceived satisfaction.

In the study by Özgül et al. (2019), the group following the inclusion style achieved better outcomes in both volleyball-specific psychomotor skills and attitudes toward physical education, clearly outperforming both the command and control groups.

Finally, Cuéllar-Moreno (2016) documented that the integrated use of guided discovery and reciprocal styles led to higher levels of attention, satisfaction, and appropriate behavior, proving to be more educationally effective than the use of the command style alone. Table 2 presents a summary analysis of the reviewed studies.

Table 2. Study review table.

Author (Year)	Country	Participants	Objective	Teaching Styles / Interventions	Duration	Main Results
Hon et al. (2021)	Malaysia	28 students	Evaluate command vs guided discovery (with mobile) on volleyball skills and enjoyment	CS (control) vs GD + mobile (experiment)	1 x 30 min lesson	No sig. differences, but GD + mobile showed greater improvement in skills and enjoyment
Invernizzi et al. (2019)	Italy	121 students	Effectiveness of multi-teaching and active reflection approach (MTA)	MTA (IG) vs standard PE (CG)	2x/week, 12 weeks	IG improved in fitness, motor skills, enjoyment, and PE perception
Monacis et al. (2023)	Italy	124 students	Assess PE intervention with varied teaching styles	EG (varied TS), CG (regular PE)	2x/week, 16 weeks	Both improved fitness, but PSP and enjoyment increased only in EG
Monacis et al. (2022)	Italy	120 students	Assess motor competence under tech-based PE with/without teacher mediation	EG: non-linear, varied TS + tech; CG: linear tech-based	8 weeks	EG improved significantly across all MOBAK subtests
Fernández-Vázquez et al. (2024)	Spain	75 students	Effect of VR and GAM with Practice TS on motor skills and effort	PTS (control), PTS+GAM, PTS+GAM+VR	2x/week, 6 weeks	GAM lowered perceived effort; VR + GAM improved motor skills more

Mouratidou et al. (2022)	**Greece**	**157 students**	**Effect of reciprocal/inclusion TS on lifestyle adoption**	**EG1: reciprocal, EG2: inclusion, CG: regular**	**2x/week, 9 weeks**	**EGs showed more task-oriented climate and intent to adopt active lifestyle**
Colella & Bonasia (2019)	Italy	84 students	Compare motor skills and self-efficacy via expert-led production styles	EG: problem-solving, led discovery; CG: traditional	14 lessons	EG showed greater motor mastery and self-efficacy
Murillo & Mateos (2021)	Spain	86 students	Analyze emotional intelligence (EI) via mindfulness & biodanza	DI vs PS, crossover design	1x/week, 4 weeks	PS enhanced EI and social/cognitive/emotional dev. more than DI
Digelidis et al. (2018)	Greece	106 students	Impact of reciprocal & self-check TS on motivation, autonomy, basketball skills	Reciprocal, self-check, CG (same content)	3x/week, 6 weeks	TS groups improved in skills, self-check had highest motivation and enjoyment
Martínez-Rodriguez (2024)	Costa Rica	40 students	Study effect of DI vs GD on motivation & coordination	DI vs GD	1x/week, 3 months	No significant differences found in motor skills or motivation
Chatzipanteli et al. (2015)	Greece	601 students	Study student-activated TS on self-regulation, motivation, satisfaction	EG: Reciprocal, self-check, inclusion, GD, convergent/divergent	16 weeks	EG scored higher in all self-regulation and motivation indicators
Özgül et al. (2019)	Türkiye	100 students	Assess command & inclusion TS on volleyball skills and development	Command, Inclusion, CG (traditional)	2h/week, 8 weeks	Inclusion TS led to best volleyball skill and motivation improvement
Cuellar-Moreno (2016)	Spain	159 students	Compare Command vs Mixed TS on learning & satisfaction	Command (CG), Reciprocal + GD (EG)	12 lessons	EG had better scores in all variables especially attention and satisfaction

Discussion

The analysis of the selected studies highlights that production teaching styles, as defined in Mosston and Ashworth's Spectrum of Teaching Styles (2002), represent an effective

pedagogical tool for fostering meaningful and transferable learning, especially within the context of school-based physical education. These styles guide and support the educational process through physical and sport-related activities.

In particular, studies employing the guided discovery, inclusion, reciprocal, and problem-solving styles—whether used individually or in combination—showed positive effects on active and reflective participation, decision-making autonomy, enjoyment, and self-efficacy. These styles supported processes of self-regulation and motor awareness. In fact, each teaching style not only facilitates the delivery of motor tasks but also promotes cognitive and social functions that are essential and interrelated within the educational process mediated by physical activity and sport.

The results demonstrate that production-oriented approaches are significantly more effective than traditional reproduction styles, such as the command style, especially when implemented through structured and extended interventions. Teaching interventions lasting more than eight weeks, with a frequency of at least two sessions per week, appear to be necessary prerequisites for achieving measurable improvements—not only in motor competencies, but also in motivational, emotional, and metacognitive domains.

Furthermore, the variety and quality of the assessment tools used in the reviewed studies—such as the TGMD-2, MOBAK, and 3JS for motor performance, and self-report instruments for assessing motivation, self-efficacy, emotional intelligence, and satisfaction—confirm the importance of adopting a multidimensional perspective on motor learning. This perspective allows for the activation of cross-domain effects stemming from didactic practices.

The reviewed studies also suggest that: a. Physical activity requires educational mediation; b. The educational value of physical education lies not only in enhancing motor performance but also in activating cognitive processes, encouraging reflection, fostering socialization, and supporting emotional regulation.
Learner-centered teaching styles, especially in non-linear and variable environments and contexts, appear consistent with a vision of learning as a situated, complex, and multidimensional process.

Study Limitations

Despite its contributions, this review has the following limitations:

a) It examined only results obtained in school settings;
b) Studies conducted in high school physical education were not included;
c) Longitudinal studies on the medium- and long-term effects of different teaching styles were excluded;

d) Didactic interventions based on adapted physical activity or adapted physical education were not analyzed;
e) The review included only open access articles.

Conclusions

Teaching motor competencies requires deep pedagogical and methodological awareness. Teaching styles should be understood as intentional and flexible communication strategies capable of creating meaningful, inclusive, and motivating learning environments—not as mere techniques or rigid organizational formats to be applied mechanically.

Each style is "activated" through the teacher's communication, the organizational strategies employed, the use of equipment within learning spaces, and the level of student engagement.

Mastery of the Spectrum of Teaching Styles, combined with the ability to read the context and value diversity, enables the promotion of students' holistic development, turning motor experiences into genuine educational opportunities.

In light of these findings, it is necessary to re-orient university curricula and teacher training programs toward the conscious and flexible use of the Spectrum of Teaching Styles, and toward the intentional, progressive, and inclusive design of learning pathways that integrate motor and cognitive content.

Future research should further explore the long-term impact of these approaches, particularly in terms of sustained participation in physical activity and the development of meaningful and sustainable physical literacy.

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Health-promoting Universities in Italy: Exploring physical activity, lifestyles, and well-being in higher education

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Abstract: The present research aims to describe preliminary results of "Universities Promoting Health" study, across 15 University Sports Centers (USC) in Italy during 2022–2023. The study aimed to promote physical activities beyond traditional sports and to evaluate the physical activity levels and fitness of university students not regularly engaged in sports. A total of 1,065 students participated (597 males, 468 females; average age ~22 years). The activities offered included expressive movement, yoga, Pilates, trekking, parkour, aerobic gymnastics, cardio fitness, and walking groups. These programs were designed to encourage daily movement and expand the educational offerings of the centers. Participants included both students already enrolled in USC activities and sedentary students. The effectiveness of these interventions was assessed at two different time points (t0 vs. t1) to evaluate improvements in physical activity and health. The results provided preliminary and essential information for the various centers to design, implement, and evaluate interventions and new types of activities to be offered to university students, in addition to the traditional specific sports courses. This aligns with various studies suggesting the necessity of regular and systematic monitoring of health indicators, physical activity levels, and motor development across different age groups. The collected data highlighted, across all centers, the need to continue, expand, and further develop the initiatives undertaken so far, aimed at promoting a culture of daily physical activity first, followed by sports practice. The findings reveal physical activity levels that, regardless of gender differences, do not fully meet WHO Recommendations and Guidelines. The project offers valuable insights into the benefits of structured physical activity in university settings, highlighting the need for a socio-cultural approach to health promotion, encouraging daily physical activity as a foundation, and supporting future policies by educational and health institutions aimed at combating sedentary behavior and fostering lifelong healthy habits.

Keywords: Physical activity, healthy lifestyles, physical fitness, health-promoting universities.

Introduction

Numerous studies and research highlight that physical activity is an effective contributor to health promotion and the prevention of various chronic diseases, which are now widespread among populations in different countries around the world and across all age groups (Gillis et al., 2013). The recommended amount, type, and intensity of physical activity depend on an individual's age and daily habits. Moreover, engaging in regular physical activity through structured programs tailored to individual needs is essential for improving motor skills and fostering motivation toward a physically active lifestyle (Lang et al., 2023). This report presents the findings of a preliminary study conducted by CUSI in 13 University Sports Centers (USC) in Italy during 2022-2023. The study aimed to propose different types of motor activities in various locations and to analyze the levels of physical activity and physical fitness of university students who do not systematically practice sports.

Methods

The project involved 1,065 university students (597 males, aged 21.84 ± 2.54, and 468 females, aged 22.03 ± 2.88), from 13 USC centers. These students participated in motor activities that were not specifically sports-related but aimed at promoting daily physical activity. These activities expanded the existing educational offerings already available at the respective centers. The sample was selected including both students who regularly participating in USC activities (already enrolled), and students who were not engaged in USC activities (sedentary or not enrolled in USC).

In the different locations where the study took place, a range of motor activities was introduced to broaden the educational offerings. These included: Expressive Movement and Dramatic Interpretation, Outdoor Activities (i.e., Trekking, Parkour, etc.) Yoga, Pilates, Aerobic Gymnastics, Cardio Fitness, structured and unstructured game-based activities, and organized group activities such as Walking Groups. The effectiveness of these interventions on the physical activity levels of Italian university students was evaluated over two time periods (comparing t0 vs. t1) to assess the resulting positive effects on health and quality of life.

Results and Discussion

The results provided preliminary and essential information for the various centers to design, implement, and evaluate interventions and new types of activities to be offered to university students, in addition to the traditional specific sports courses. This aligns with various studies suggesting the necessity of regular and systematic monitoring of health indicators, physical activity levels, and motor development across different age groups.

The collected data highlighted, across all centers, the need to continue, expand, and further develop the initiatives undertaken so far, aimed at promoting a culture of daily physical activity first, followed by sports practice. The findings reveal physical activity levels that, regardless of gender differences, do not fully meet WHO Recommendations and Guidelines. This calls for a socio-cultural interpretation of the topic concerning health promotion through physical activity and sports, as well as the prevention of sedentary behavior.

Conclusion

The study conducted, in addition to serving as a preliminary analysis of university students' daily physical activities and the related development of physical fitness factors, can contribute to raising awareness of the benefits of structured physical activity for the overall growth of the individual. Furthermore, it can interact with initiatives and activities promoted by other institutions that are also committed to health promotion.

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Leisure experience preferences, consumption styles and life satisfaction of the recreation

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Abstract: This study aimed to examine the relationship between purchasing styles, experience preferences, and life satisfaction among participants engaged in recreational activities. The research was structured using descriptive and correlational survey models within a quantitative approach. The sample included 216 recreation participants (120 men and 96 women) who were selected through convenience sampling and who took part voluntarily. Recreation Experience Preference Scale, Recreational Product Purchasing Style Scale, Satisfaction with Life Scale, and a personal information form prepared by the researchers. Regression analyses showed that life satisfaction and experience preferences significantly predicted purchasing behaviour. Together, these variables explained 22.9% of the variance in purchasing behaviour ($R^2 = .229$). The results indicated that life satisfaction was the strongest predictor of purchasing behaviour ($\beta = 0.405$, $p < .001$). These results highlighted a significant relationship between psychological well-being and recreational consumption behaviour, providing important insights for professionals working in sport and recreation marketing. However, given the cross-sectional design and limited sample size of this study, it was suggested that further research using more comprehensive and longitudinal methods is needed to confirm and expand upon these results.

Keywords: Purchasing, life satisfaction, recreation, experience preference.

Introduction

Individuals' recreational experience preferences are shaped by various personal factors such as interests, personality traits, and the structural barriers they encounter. Participants tend to purchase products and services that align with the nature of the recreational activities they engage in. These purchases not only facilitate participation but also serve as an important factor that directly influences individuals' recreational motivations (Hans et al., 2022). Recreational purchasing behaviour varies depending on the type of activity performed and plays a critical role in shaping consumer behaviour. Therefore, it is of great importance to examine how individuals' experience preferences regarding leisure activities and the purchasing styles they develop in line with these preferences affect life satisfaction from a multidimensional perspective.

Participation in leisure activities influences not only how individuals spend their free time but also their overall quality of life and consumption habits (Yin et al., 2024). In particular, sports and recreational activities associated with healthy lifestyles contribute to a reduction in unhealthy consumption behaviours, such as smoking and alcohol use, while enhancing physical and mental well-being (Hans et al., 2022). Such activities guide individuals toward more conscious and sustainable consumption practices, thereby laying the groundwork for positive changes in consumption patterns.

On the other hand, leisure activities also influence economic behaviour; in particular, individuals with high disposable income are observed to participate more intensively in recreational activities (Silva et al., 2017; Ouyang, 2023). This situation shapes both the frequency of participation and individuals' consumption patterns. Within the framework of the concept of the 'leisure economy,' it is emphasised that leisure time has a dual structure that simultaneously promotes consumption and is financed through consumption (Ouyang, 2023). This structure underscores the need for a more in-depth examination of the relationship between individuals' economic conditions and their recreational participation.

Another important factor that affects individuals' engagement in leisure activities is the social dimension. Participation in social activities enhances collective well-being and particularly fosters environmentally responsible consumption habits. Indeed, it is shown that individuals who engage in activities such as wildlife recreation are more inclined to adopt nature conservation behaviours (Cooper et al., 2015). This relationship between recreational preferences and sustainability awareness provides valuable insights into how perceptions of environmental and social responsibility are shaped within the context of leisure time.

Moreover, these relationships vary across demographic variables. Individuals with higher income and education levels tend to exhibit more diverse recreational preferences and consequently develop distinct consumption patterns (Silva et al., 2017; Tabarsa et al., 2013). In contrast, low-income individuals have more limited opportunities both in terms of participation in recreational activities and consumption behaviours (Monisola, 2019). This situation highlights how socioeconomic inequalities are reflected in individuals' use of leisure time and their overall life satisfaction, thereby constituting a significant area of interest for social policy development.

Recreational Experience Preference

Individual characteristics, environmental conditions, and socio-economic backgrounds are key factors that shape recreational experience preferences. Understanding these preferences is essential for enhancing user satisfaction and ensuring the sustainable management of natural resources. Well-planned parks, walking trails, and other open-space recreational resources, in particular, contribute positively to public health and support principles of

environmental sustainability (Mišovičová et al., 2023).

Research shows that recreational preferences have a heterogeneous and multi-dimensional structure. Basic sociodemographic variables such as age, income, and education level significantly influence individuals' tendencies toward and participation in outdoor activities (Juutinen et al., 2016). Moreover, there is a strong relationship between the frequency of visits to specific natural areas and the preference for these areas, indicating that user behaviour is linked to spatial loyalty (Grammatikopoulou et al., 2012).

Psychological factors also play an important role in shaping individual preferences. In particular, personal tendencies such as the pursuit of excitement increase interest in recreational activities that involve more adventure and provide a sense of personal achievement. This highlights the growing demand for nature-based, high-stimulus experiences (Malchrowicz-Mośko & Rozmiarek, 2018).

In addition, individuals' travel behaviours clearly reflect the value they attach to recreational areas. In this context, the travel cost method is recognised as an effective and widely used tool for analysing preferences based on factors such as accessibility and enjoyment derived from the experience (Utomo et al., 2020; Leh et al., 2018).

Recreational Purchasing Style

Recreational activities are classified into organised and unorganised forms, and this distinction stands out as an important factor in understanding individuals' spending behaviour (Sych et al., 2023). Organised activities, such as guided tours, structured programmes, and events that encourage social interaction, increase experience sharing among individuals and, as a result, lead to higher levels of purchasing tendencies (Dalbudak et al., 2021). In contrast, unstructured or free types of recreation are preferred more in line with individual enjoyment and autonomy needs, showing that participation is shaped by internal motivation. This aligns with Self-Determination Theory, which highlights individuals' perceptions of autonomy and competence (Flood, 2014).

Individual spending behaviour varies not only according to the type of activity but also depending on socio-economic factors. Different needs and expectations across age groups shape preferences for recreational areas and, consequently, influence spending patterns (Kruszyńska & Poczta, 2020). Technological developments also significantly transform how individuals access and experience recreational activities. Digital platforms facilitate access to activities and increase user satisfaction and interaction levels (Chen & Hung, 2015). However, it is noted that when digital experiences do not meet user expectations, technological applications can become barriers to participation (Park, 2018).

In conclusion, recreational spending behaviour is shaped by the type of activity, individual demographic characteristics, environmental conditions, and the multi-layered impact of digitalisation. A comprehensive analysis of this complex structure both enables the development of strategies to enhance user satisfaction and contributes to maximising the economic potential of the recreation sector.

Factors Affecting Recreational Purchasing

Recreational purchasing behaviours are shaped by the interaction of individual, social, cultural, environmental, and economic factors. This multi-dimensional structure provides important insights for businesses seeking to develop strategies aimed at enhancing consumer satisfaction. At the individual level, personal preferences and psychological motivations play a decisive role. In particular, individuals' attachment to specific places is considered a functional indicator for understanding recreational preferences (Smith & Moore, 2012). This shows how personal tendencies dynamically combine with social influences to jointly shape consumer behaviour (Pohan & Soedarsa, 2024).

Cultural factors profoundly impact consumer behaviour. Social values and norms, especially through social media, can transform individuals' purchasing intentions and promote the reproduction of new cultural codes in digital environments (Tarigan et al., 2019; Badari & Kei, 2022). This transformation becomes more pronounced under the influence of cross-cultural interactions and digitalisation.

Environmental factors are directly related to user satisfaction through the accessibility and environmental quality of recreational areas. Growing environmental awareness increases interest in eco-friendly recreational choices, and preferences shaped by environmental consciousness significantly influence individual behaviours (Kurniawan et al., 2024; Mancini et al., 2018). These factors stand out as key elements that reshape both individuals' environmental sensitivity and their consumption habits.

In conclusion, participation in and purchasing related to recreational activities are shaped by the interplay of individual, cultural, environmental, and economic factors. At the individual level, personal preferences and psychological motivations are among the main determinants of participation, while social interaction and environmental factors also play a substantial role in this process. Furthermore, cultural values and social norms, through digital media, transform individuals' purchasing intentions, whereas environmental awareness increases the tendency toward eco-friendly recreational preferences. A deeper understanding of recreational purchasing behaviour enables businesses to make strategic decisions, develop services that enhance user satisfaction, and design policies that promote environmental sustainability. Effectively analysing these multi-dimensional structures contributes to strategies that support both individual life satisfaction and sectoral growth.

Methods

Research Model

This research was designed using descriptive and relational survey models, which fall under the umbrella of quantitative research approaches. The descriptive survey model aims to systematically and accurately depict the characteristics of a population or phenomenon as it naturally occurs, while the relational survey model is used to examine the relationships between two or more variables without manipulating them. These models are particularly useful for identifying patterns and associations within a given sample (Creswell, 2014).

Research Group

The research group consisted of 216 individuals who engaged in recreational activities, purchased related products, and voluntarily participated in the study. Of these participants, 69 were excluded from the data set because they did not meet the criterion of participating in recreational activities.

Data Collection Tools

The data collection tools used in the study were a personal information form prepared by the researchers, Recreation Experience Preference Scale, Recreation Product Purchasing Style Scale, and the Satisfaction with Life Scale.

Personal Information Form: In this section, participants were asked to report their age, gender, whether they engaged in recreational activities, the types of recreational activities they participated in, the number of years they had been engaging in these activities, and whether they purchased recreational products.

Recreation Experience Preference Scale: The Recreation Experience Preference Scale (REPS), which was modified by Manfredo et al. (1996) to measure individuals' reasons for participating in recreational activities, was adapted to Turkish culture by Ayar et al. (2023). The measurement tool consisted of 20 items and seven subscales: Nature, Physical Fitness, Physical Rest, Solitude, Escape from Crowds, Escape from Physical Stress, and Spending Time with Family. It had a 5-point Likert-type structure.

Recreational Product Purchasing Style Scale: The Recreation Product Purchase Style Scale, which was developed by Şimşek and Hastürk (2019) to determine the purchasing styles of individuals who bought recreational products, consisted of 22 items and six sub-dimensions: Unplanned, Adventurous, Opportunistic, Social, Relaxing, and Compulsive. It had a 5-point Likert-type structure.

Satisfaction with Life: Based on the measurement tool developed by Larsen and Griffin (1985), Dağlı and Baysal (2016) re-evaluated the psychometric properties of the scale. The data collection tool had a 5-point Likert-type structure and consisted of 5 items.

Data Analysis

The SPSS 26 statistical package program was used in the analysis. The normality of the data was assessed by examining skewness and kurtosis values. According to the criteria proposed by Mallery and George (2010), values within the ±2 range indicated an acceptable level of normal distribution. Based on these results, for data that showed a normal distribution, regression and correlation analyses were conducted using parametric methods.

Table 1. Results of reliability analysis for measurement tools used in the study

Scales	Sub-dimensions	Reliability (α) Coefficients for the Current Study
Recreation Experience Preference Scale	Nature	.941
	Physical Fitness	.900
	Physical Rest	.864
	Solitude	.729
	Escape from Crowds	.809
	Escape from Physical Stress	.930
	Spending Time with Family	.907
REPS Total		.925
Satisfaction with Life Scale Total		.855
Recreational Product Purchase Style Scale	Unplanned	.883
	Adventurous	.878
	Opportunistic	.899
	Social	.908
	Relaxing	.906
	Compulsive	.792
RPPSS Total		.951

Table 1 presented the Cronbach's Alpha reliability coefficients for the internal consistency of the measurement tools used in the study. An α coefficient above .70 for each scale indicated that the measurements were reliable. This demonstrated that the data collection tools were acceptable in terms of internal consistency and met the minimum threshold recommended for reliability in social science research (Hair et al., 2014).

Table 2. Correlation analysis results between satisfaction with life scale, recreation product purchase style scale and recreational experience preference scale

		Satisfaction with Life scale	Recreation Experience Preference Scale
Recreation Product Purchase Style Scale	r	,458**	,292**
	p	0,000	0,000
Satisfaction with Life Scale	r	1	,352**
	p		0,000

A positive and weak correlation was found between the total score of the Recreation Experience Preference Scale ($r = 0.352$, $p < .001$) and both the total score of the Satisfaction with life and the total score of the Recreation Product Purchasing Style Scale ($r = 0.292$, $p < .001$). This suggested that as individuals' recreational experience preferences increased, their life satisfaction also increased. Additionally, it could be stated that individuals with higher recreational experience preferences exhibited a greater tendency to purchase recreational products.

Furthermore, a positive and moderately significant relationship was observed between the total score of the Satisfaction with life and the total score of the Recreation Product Purchasing Style Scale ($r = 0.458$, $p < .001$). This indicated that individuals with higher life satisfaction were more likely to purchase recreational products. The positive correlation values showed that these variables tended to increase together. Previous studies similarly demonstrated that life satisfaction is a determinant of consumption preferences (Hudders et al., 2013). It has also been emphasised that experience-based spending enhances life satisfaction, and the tendency to engage in such spending is linked to overall life satisfaction (Nicolao et al., 2009; Van Boven & Gilovich, 2003).

Table 3. Predictive effect of recreation experience preference and satisfaction with life on recreational products purchase style

Model	Unstd. Coefficients		Std. Coefficients	t	p	Correlations			Collinearity Statistics		Durbin-Watson
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF	
(Constant)	1,156	0,306		3,773	0,000						
Recreation experience preference	0,176	0,076	0,149	2,320	0,021	0,292	0,157	0,140	0,876	1,142	2,017
Satisfaction with life	0,391	0,062	0,405	6,300	0,000	0,458	0,396	0,379	0,876	1,142	
R=.478, R^2=.229											
F=31,607, p=.000											

The total scores of the Recreation Experience Preference Scale and the Satisfaction with life variables showed a positive and moderately significant relationship with the total score of the Recreation Product Purchasing Style Scale, which was the dependent variable ($R = .478$, $R^2 = .229$, $p < .05$). The independent variables together explained approximately 22.9% of the variance in the total score of the Recreation Product Purchasing Style Scale. The Life Satisfaction variable emerged as a strong predictor of the total score on this scale ($\beta = 0.405$, $p < .001$), indicating that as life satisfaction increased, recreational product purchasing behaviour also increased significantly. The Recreation Experience Preference variable was also found to be a significant predictor ($\beta = 0.149$, $p = .021$), although its effect was lower than that of life satisfaction.

High values of the Variance Inflation Factor (VIF) are interpreted as an indication of multicollinearity. According to Montgomery et al. (2012), a VIF value greater than 5 signals a multicollinearity problem. The VIF value (1.142) observed in this study indicated that there was no issue of multicollinearity.

The Durbin-Watson statistic was used to test for autocorrelation, where a value between 0 and 4 is acceptable, and a range between 1.5 and 2.5 indicates the absence of autocorrelation. In this study, the Durbin-Watson coefficient (2.017) confirmed that there was no autocorrelation problem in the model.

Discussion

This study examined the effects of recreational experience preferences (total score on the Recreation Experience Preference Scale) and life satisfaction (total score on the Life Satisfaction Scale) on recreational product purchasing behavior (total score on the Recreation Products Purchasing Style Scale). The correlation analysis revealed a positive and weakly significant relationship ($r = 0.352$, $p < .001$) between the total scores of the Recreation Experience Preference Scale and the Life Satisfaction Scale. This finding indicated that an increase in individuals' recreational experience preferences also increased their life satisfaction. Similarly, Darrat (2011) reported that individuals with higher life satisfaction tended to spend more on entertainment and hedonic consumption, thereby enhancing their overall quality of life. In addition, Badawy (2023) and Gupta and Verma (2019) demonstrated that self-awareness and intrinsic motivation reduced impulsive purchases and encouraged more conscious consumption, which in turn strengthened life satisfaction.

The positive relationship found between recreational experience preferences and recreational product purchasing behavior ($r = 0.292$, $p < .001$) suggested that participation in leisure activities influenced individuals' consumption tendencies. This result was consistent with Iso-Ahola's (1980) classical perspective on leisure motivation and the pursuit of satisfaction. Furthermore, Gitau et al. (2023) showed that participation in outdoor

recreational activities in the United States not only promoted individual well-being but also significantly boosted local economies through spending on equipment and travel.

The stronger relationship observed between life satisfaction and recreational product purchasing behavior ($r = 0.458$, $p < .001$) revealed that individuals with higher life satisfaction were more willing to purchase such products. Sirgy et al. (2011) emphasized that life satisfaction was a key factor directly affecting consumer behavior and highlighted the link between psychological well-being and consumption. Similarly, Chen (2023) found that life satisfaction was associated with greater economic rationality and more effective resource allocation.

Regression analysis demonstrated that life satisfaction and recreational experience preferences together explained 22.9% of the variance in recreational product purchasing behavior ($R^2 = .229$), and the overall model was statistically significant ($F = 31.607$, $p < .001$). Notably, life satisfaction emerged as a stronger predictor ($\beta = 0.405$, $p < .001$), indicating that life satisfaction was not solely an internal sense of contentment but was also reinforced by external consumption behaviors. Nicolao et al. (2009) and Van Boven and Gilovich (2003) supported this finding by showing that experience-based expenditures generated greater life satisfaction than material possessions.

However, the cross-sectional design of this study limited the ability to draw direct conclusions about causal relationships. Kim and Hipp (2021) pointed out that cross-sectional studies were weak in identifying causal pathways due to methodological issues such as endogeneity, while Nasharudin and Rui (2024) argued that common method variance could heighten measurement biases. Additionally, Maturlu (2024) emphasized that cross-sectional designs were particularly unsuitable for testing mediation effects because they did not allow for examining temporal sequences. Therefore, future longitudinal studies are expected to better elucidate the relationships among these variables over time.

The findings of this study also provided strategic insights for organizations operating in sports and recreation marketing. Bąk and Szczecińska (2020) highlighted that marketing strategies tailored to different age groups could enhance economic returns, whereas Khanh (2022) suggested that social marketing approaches focused on environmental responsibility could boost participation and support sustainability. Park et al. (2021) drew attention to the influence of green marketing strategies on consumer perceptions and behavioral intentions, noting that campaigns emphasizing environmental awareness might also be critical for promoting recreational products.

In conclusion, this research revealed that life satisfaction and recreational experience preferences significantly influenced individuals' recreational product purchasing behavior, with life satisfaction being identified as a particularly strong predictor. A more comprehensive exploration of this multidimensional structure could contribute to

developing strategies aimed at enhancing user satisfaction and fostering sectoral growth.

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Preservation of national values for future generations: The importance of Azerbaijani national wrestling in physical education

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Abstract: Physical education (PE) is important for maintaining students' physical and psychological health. It is important to note that preserving and promoting national culture and sports traditions should also be a focus in the educational process. The sports taught within the PE curriculum in schools vary based on the standards and policies of each country's education system. Teenagers in some countries, most notably in Azerbaijan, have been observed to lack adequate knowledge of and interest in national sports. This study analysed the role of national wrestling in PE in schools and its possible contributions to students' overall development. As part of the study, the narrative literature review method was used to determine the importance of implementing national wrestling elements into PE and to identify its potential benefits. The results obtained from the literature analysis indicate that integrating national sports into school programs positively influences students' physical, psychological, and social development. In addition to improving students' physical abilities, Azerbaijani national wrestling (gulash) helps them develop self-control, accountability, and teamwork. This sport is also important for transmitting cultural heritage and maintaining national identity. Experiences from other countries show that integrating national sports into the curriculum reduces stress and depression levels, improves social interactions, increases motivation and interest in sports. Therefore, it would be beneficial to include national sports, particularly gulash, in Azerbaijani schools' curricula. As a result of the study, it can be concluded that integration of national wrestling into the PE curriculum may positively influence students' development of athletic abilities, preservation of national values, and their transmission to future generations. Nevertheless, it has been noted that there is a lack of scientific research on this subject. Future research should consider adopting experimental approaches and developing methods to facilitate broader integration of national sports into schools' curricula.

Keywords: Physical education, gulash, national sports, national values

Introduction

The purpose of physical education (PE) is to help students improve their motor skills, physical health, and social skills. PE is crucial to the social, psychological, and physical

growth of schools. Throughout the educational process, students are developing at a young age, improving their memory and attention spans, and strengthening social relations with each other (Mosston & Ashworth, 2008). PE programs vary within countries depending on the norms and regulations of the educational system. However, there are some sports whose elements are used in PE classes in many countries around the world. In Azerbaijan, the PE curriculum includes sports such as gymnastics, athletics, football, volleyball, basketball, and swimming. Additionally, national sports, cycling, badminton, and self-defense techniques are independent training activities (carried out by students without PE teachers' supervision) (Fatullayev et al., 2018; Huseynov, 2016; Huseynov et al., 2018).

National sports education not only promotes a healthy lifestyle but also strengthens national identity among young people. For example, Azerbaijani national wrestling, known as gulash, with its deep historical roots, represents an important element of the country's cultural heritage (Guliyev, 2003). In this context, national sports education plays a crucial role in fostering the understanding of national values (Deng et al., 2024) as well as contributing to the development of students' physical skills (Mosston & Ashworth, 2008).

Revitalising traditional sports is of great importance for preserving cultural heritage and strengthening social cohesion. Integrating these sports into educational policies contributes to the formation of a more inclusive and balanced society (Setiawan et al., 2024). In line with this, the inclusion of traditional ethnic sports in physical education not only preserves and transmits cultural heritage but also enriches students' understanding of their national identity and encourages active participation in physical activities (An & Nie, 2023).

The inclusion of traditional ethnic sports in physical education helps preserve and transmit cultural heritage while enriching students' understanding of their national identity. Additionally, it motivates students to participate in physical activities.

Many countries incorporate national sports into school curricula, aiming to preserve and promote sports culture. (Bowles & O'Sullivan, 2012; Kimura et al., 2022; Li, 2014; Pavlyutina et al., 2024; Zhang & Fang, 2022(Yogi et al., 2022).

In the first years of the independence of Azerbaijan, gulash was included in the school program within the PE framework, but was replaced by other sports when the education system switched to the Bologna system. This change has led to a significant decline in knowledge and awareness of national sports among the younger generation. As a result, in modern times, there is no knowledge of gulash and other national sports among students and youth. This situation makes it necessary to re-enter gulash into the PE curriculum in schools. It should be noted that the National Wrestling is currently taught only in the Azerbaijan Sports Academy in the country.

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The topic of research has relevance that can draw attention to both Azerbaijan and international education. Study outcomes may contribute to the broader integration of gulash and other national sports into school curricula and to the development of youth who are healthy and imbued with national values, contributing to future generations.

Methods

In this study, the role of Azerbaijani national wrestling (gulash) in physical education classes and its physical, psychological, and social effects on students were evaluated using the narrative literature review method. A systematic protocol was not followed during the research process; instead, national and international academic sources related to different country examples and contexts were examined, and the information obtained was classified according to physical, psychological, and socio-cultural dimensions and presented through a descriptive approach. During the literature review process, both electronic databases (Scopus, Web of Science, Google Scholar, ResearchGate, etc.) and printed sources obtained through library searches—unavailable in electronic environments—were utilised. In addition, official physical education textbooks prepared for different grade levels in Azerbaijani schools were also included in the study. The study also identified general trends in the literature regarding the place of national sports in the education programs of various countries and interpreted them in relation to the current context in Azerbaijan.

Results

Physical education in Azerbaijan

PE aims to improve a healthy lifestyle, promote sports habits, and ensure the proper physical development of students. The teaching of PE in Azerbaijani schools is conducted according to designated hours at different educational levels. At the primary education level (Grades I-IV), PE lessons focus on providing students with basic physical training and developing their motor skills. At the general secondary education level (Grades V-IX), these lessons are structured to enhance planned motor development, movement culture, and moral-willpower qualities. At the full secondary education level (Grades X-XI), PE lessons aim to improve students' technical and tactical skills in various sports. Across all three

educational levels, PE lessons are allocated 2 hours per week, amounting to an annual workload of 64 hours (Huseynov et al., 2013; Order of the Minister of Science and Education of the Republic of Azerbaijan on Approval of the Curricula of General Education Institutions for the 2024-2025 Academic Year | Ministry of Science and Education of the Republic of Azerbaijan, 2024).

The PE curriculum provides students with opportunities to enhance their motor skills and physical fitness through sports games and individual training activities. The sports taught in schools are different. Athletics (escape, jumping, throws), football, basketball, volleyball, handball, swimming, gymnastics and combat sports (self-defense) are the basis of these classes. Each sport serves the development of certain physical abilities. Physical education classes consist of different stages. The series of actions and warming exercises are performed at the beginning of the lesson. The technical elements of the selected sports in the main part are taught. At the end of this process, muscle fatigue is prevented through restorative actions. In addition, students are given special tasks for independent classes that they can develop physical preparations in extra-curricular times (Fatullayev et al., 2018; E. Guliyev et al., 2020; Huseynov, 2016; Huseynov et al., 2018).

Azerbaijani Gulash

Gulash has very ancient roots. The history of wrestling is measured in thousands of years and is estimated to be at least 3,000 years old. Depictions of wrestling can even be seen in the Gobustan petroglyphs, dating back to the 4th–3rd millennia BCE. The history of national wrestling in the literature is divided into four eras:

1. From the oldest time to the middle of the 19th century
2. 1870-1920
3. 1920-1990
4. From 1990 to the present (Guliyev, 2003)

This sport was part of the national cultural heritage, and it was traditionally featured in celebrations and festivals. Gulash matches take place on a circular carpet with a 9-meter diameter. Wrestlers wear special capri-style trousers (shalvar) and wrestling shoes. The trousers are designed with buta symbols, which carry a philosophical meaning, representing the struggle and unity of opposites.

The meeting of wrestlers is accompanied by Jangi music. Before the match, wrestlers perform a mandatory 1-minute warm-up on the mat. These actions are known as mutlak harakatlar, meaning 'mandatory actions'. The match itself lasts 4 minutes (previously, it continued until one wrestler pinned the other’s shoulders to the ground). The primary objective is to pin the opponent’s shoulders, securing victory. If a wrestler gains an 8-point advantage, they are declared the winner. Techniques executed while standing are worth 4

points. If neither wrestler scores or if the match remains tied by the second minute, the referee announces 'shalvartutma' (trouser grip). At this stage, wrestlers must hold each other's trousers by the waistband and cuffs. Immediately after the referee's whistle, both competitors attempt to execute a technique. If the match still ends in a tie, victory is awarded to the wrestler who performed the mandatory movements more effectively. Many of the techniques in gulash are similar to those in modern freestyle wrestling. However, in gulash, many techniques involve gripping the trousers. Some of these techniques were included into the technical arsenal of freestyle wrestling in the 1950s. It is related with the international participation of Azerbaijani wrestlers in freestyle wrestling competitions (Guliyev, 2003; Gurbanov et al., 2016).

The role of sports in protecting national values

Sports play a diversified role in maintaining and promoting national values. It has been an expression of national pride and identity throughout history. Sports are a powerful tool for state building, national identity and strengthening cultural heritage, to show a nation's independence and self-esteem. For example, the Tokyo Olympic Games, which were held in 1964, contributed to the post-war reconstruction and showed the power of the national unity of sports (Cha, 2016). In Slovenia, it also helped to form and strengthen the country as a new state (Topič & Coakley, 2010).

National sports are important in the protection of cultural heritage and promoting national values. For example, Azerbaijani and Gagauz national wrestling are not only maintaining the historical and cultural significance of themselves, but also enhancing the feelings of national honor, social justice and patriotism. Promotion and development of national sports contribute to unity and solidarity by connecting people to their national and ethnic roots (Constantinova & Bulgar, 2021; Guliyev, 2003; Türkmen & Şener, 2020).

Sports provide a unique model to understand social values and ethics. It helps people shape the correct and incorrect concepts, instills the values such as justice, respect and honesty (Simon, 2018). Sports also play an important role in the promotion of public associations and patriotism. It is a tool to improve national and patriotic values, to form social and cultural ties (Chaeroni et al., 2024).

Physical and psychological impacts of gulash elements

PE classes in Azerbaijan are one of the important subjects supporting the physical and psychological development of students. Regular physical education helps to improve physical training and general health. Studies show that students engaged in regular physical activity demonstrate better physical health indicators, such as improved motor skills and physical fitness levels (Knaus et al., 2020; Sirojova, 2024).

Although sources on the effects of gulash elements on children's physical and psychological qualities are limited, researches on other wrestling styles are available in the literature. Wrestling training has developed various physical training parameters, including strength, endurance and speed. This turns wrestling into a suitable means of sports-oriented PE for students. One study found that freestyle wrestling exercises were seen to significantly increase students' physical activity, physical readiness and development of schoolchildren. (Umarov et al., 2024). Another study examined the effects of basic judo training on the static and dynamic balance of children aged 11–15. The study involved 50 students, divided into experimental and control groups. The experimental group participated in 8 weeks of judo training. Before and after the training, both groups underwent balance, vertical jump, flexibility, and grip strength tests. After a comparative analysis of the obtained results, it was observed that the physical qualities of students who participated in judo training improved significantly (Kılıch, 2018). Other studies in the literature confirm similar results (Chaabene et al., 2017; Makarova et al., 2024; Stamenković et al., 2022; Vorozheikin et al., 2024).

Of course, PE teachers must be very careful during lessons and ensure children's safety. This is because the execution of technical moves in the sport may result in injuries. Additionally, since wrestling involves physical contact, there is a risk of skin infections among athletes (Stover & Peterson, 2023).

The psychological effects of wrestling on school-aged children can be negative as well as positive. These effects mostly depend on the approach of the training environment, coaches and individual features of the child. The physical and psychological effects of wrestling on school-aged children were examined in one of the studies. The research results showed that wrestling increases self-esteem in children, strengthens emotional tolerance and has a positive effect on the development of social skills. At the same time, in some cases, wrestling was associated with increased aggression levels and social adaptation difficulties. Children who experienced shyness and difficulty adapting to school exhibited higher levels of aggression. Properly managed training programs can reduce psychological risks, but emotional regulation and psychological support are also essential. In conclusion, while wrestling is beneficial both physically and psychologically, improper management may lead to some negative effects (Bernthal & Medway, 2005).

Another study examined the effects of 8 weeks of regular wrestling training on depression levels in children aged 11–14. The research findings showed a significant decrease in depression levels among children participating in wrestling training (Yarımkaya et al., 2017).

The psychological effects of wrestling on school-aged athletes mostly focus on developing emotional resilience, self-confidence, and mental stability. This sport strengthens an athlete's character, improves emotional control in challenging situations, and provides

stress resistance during competitions. Particularly, psychological preparation is crucial for wrestlers' success in competitions and helps maintain emotional stability (Gurbanov et al., 2016).

Gulash training has unique psychological aspects. Here, athletes develop a sense of connection to national values in addition to technical skills. While learning wrestling techniques, athletes undergo both physical and psychological preparation. It helps them integrate better into social environments and build healthier relationships within a group. Psychologically, gulash promotes endurance, discipline and mental stability, contributing to success not only in sports but also in other areas of life (Gurbanov et al., 2016).

Discussion

The main objective of this study is to investigate the significance of integrating gulash into PE lessons. However, research on the teaching of gulash in Azerbaijan remains limited. Therefore, this paper examines the physical, psychological, and social benefits of integrating national sports into school curricula in various countries, analysing existing practices and their outcomes.

To preserve cultural heritage and transmit it to future generations, national sports should be included in physical education programs around the world. Every nation has its traditional sports, and their inclusion in curricula promotes cultural identity and physical development (An & Nie, 2023; Deng et al., 2024). Many nations have implemented measures to guarantee that these sports are passed down to future generations by integrating them into official schooling. For example, in Japan, it has been mandatory to teach judo elements in schools since 2012. Studies show that it has a positive effect on the development of physical skills and interest in sports (Kimura et al., 2022; Yogi et al., 2022). According to a study done in Kazakhstan and Russia, incorporating national sports into physical education improved students' motivation and physical fitness in both nations (Romanova et al., 2021).

The research in colleges reveals that combat sports and team games have a positive impact on students' psychological health and decision-making skills. For example, studies have shown that teaching taekwondo and other martial arts in PE curricula lowers stress levels and improves cognitive abilities. (Zhang & Fang, 2022).

According to a study done in Irish schools, integrating national sports into school curricula improves social cohesion. Specifically, the teaching of Gaelic games not only strengthens ties between schools and local communities but also helps to express cultural identity (Bowles & O'Sullivan, 2012). In this context, the inclusion of national sports in Azerbaijani schools could be an effective tool for promoting national identity and patriotism.

Another study examined the influence of national sports on students' character development in PE. Findings indicate that these sports play an important role in the transmission of historical and cultural values while also improving students' social skills. The study points out the importance of national sports in school curricula, highlighting their positive effects on students' physical, social, and moral development. One of the critical factors in the educational process is ensuring that PE teachers possess sufficient methodological knowledge (Hananingsih et al., 2024).

Thus, the integration of national sports into PE is a key factor in students' physical, social, and moral development. However, successful implementation requires teacher training, well-structured curricula, and scientifically grounded methodological approaches.

Conclusions And Suggestions

This study focuses on the importance of integrating gulash into PE. The results obtained from the literature review indicate that incorporating national sports into school curricula positively impacts students' physical, psychological, and social development. Gulash not only increases physical skills but also helps students develop discipline, responsibility, and teamwork. Additionally, this sport plays an important role in preserving national identity and conveying cultural heritage.

The experience of different countries shows that the education of national sports in schools increases the motivation of students, raises their interest in sports and develops their communication skills. Additionally, it increases the psychological well-being, reduces the level of stress and depression. In this regard, it is beneficial to restore the teaching of national sports in Azerbaijan, especially gulash, in schools. However, there is a need for extensive and in-depth experimental research in this field. Based on the study, the following recommendations are proposed:

•Exploring the teaching of national wrestling using modern sports technologies and methods, with the application of interactive and practical approaches;
•Examining the teaching of national sports and gulash at all educational levels (primary, general secondary, and full secondary education);
•Increasing the integration of gulash into the PE curriculum;
•Organizing competitions, seminars, and awareness-raising events in schools to increase students' interest in national sports, including national wrestling;
•Conducting extensive and in-depth experimental research on the topic.

The implementation of these measures could have a major impact on maintaining national sports traditions, promoting young people's physical and mental development, and improving the efficiency of the educational system as a whole.

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Mega sporting events and their socio-environmental sustainability legacy: A critical review of the olympics and the FIFA world cup

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Abstract: This review paper critically examines the socio-environmental sustainability legacy of mega sporting events with a particular focus on the Olympic Games and the FIFA World Cup. While these events are often promoted as catalysts for economic development, they also have profound and long-term social and environmental implications for host cities and nations. The existing literature presents both optimistic perspectives and critical reflections on the alignment of such events with sustainable development principles. The main objective of this study was to analyze the sustainability legacy of mega sporting events through dimensions such as social inclusion, urban transformation, environmental awareness, resource efficiency and climate change mitigation. Special attention is given to recent sustainability frameworks adopted by the International Olympic Committee (IOC) and FIFA along with their practical implementations. This review is based on peer-reviewed articles, official reports and documents published by international institutions (e.g., IOC Sustainability Strategy, 2021; FIFA Climate Strategy, 2022). The findings highlight the significant potential of mega sporting events to contribute to sustainable legacies yet emphasize that realizing this potential depends on inclusive policy design, active public engagement and transparent monitoring mechanisms.

Keywords: Mega sporting events, sustainability legacy, social and environmental impact, olympic games, FIFA World Cup

Introduction

Mega sporting events are multidimensional phenomena that go far beyond merely being athletic competitions as they trigger economic, social and environmental transformations in host cities (Hall, 2012). Although events such as the Olympic Games and the FIFA World Cup are held over a short period of time they possess the potential to produce long-lasting impacts through infrastructure projects, media visibility and social policies. However, questions about how this potential is managed and to what extent it aligns with sustainable development principles have gained increasing importance (Gratton & Preuss, 2008; Grix, 2016). Therefore it is essential to systematically analyze these impacts from a sustainability

perspective.

The aim of this study was to evaluate the contribution of mega sporting events to environmental sustainability, social integration, urban transformation, environmental awareness and combating climate change in a multidimensional manner. Additionally, it critically examines the practical implications of the contemporary sustainability strategies adopted by organizations such as the IOC and FIFA. The theoretical foundations of this study are structured under the following sections.

Theoretical Framework and Literature Review

Definition and Scope of Socio-Environmental Sustainability

Sustainability is a holistic concept that requires a balanced approach to environmental, social and economic dimensions. In this context, socio-environmental sustainability is defined as an approach aimed at protecting natural resources while also enhancing the well-being of individuals and communities (Morelli, 2011; U.S. Department of Energy, 2020).

Social sustainability encompasses the long-term integrity of society and individuals' access to fundamental rights. Littig and Griebler (2005) argue that defining social sustainability is challenging as normative and political boundaries tend to blur. Morelli (2011) conceptualizes social sustainability as including the following principles:

•Equal access to key services
•Intergenerational equity
•Respect for cultural diversity
•Civic participation
•Sense of community and local organization
•Advocacy for socially responsive policies

On the other hand environmental sustainability aims to preserve ecosystem integrity for future generations by fostering productive harmony between humans and nature (Morelli, 2011). Moldan et al. (2012) emphasize that environmental sustainability should be based on principles such as recycling, efficient use of natural resources, long-term thinking, respect for biodiversity and effective governance.

Relationship Between Sustainability and Sports Events

In recent years sports events have been evaluated not only for their performance outcomes but also for their social, economic and environmental impacts. This shift has brought the reflections of sustainability into the realm of sports.

•Ünal & Bağcı (2017) highlight the environmental impacts of sports events such as carbon emissions, waste production, energy consumption and argue for their integration into sustainability plans.
•Tekin (2021) notes that while some stadiums in Turkey's Süper Lig utilize solar and wind energy and employ rainwater harvesting systems. These practices fall short of meeting comprehensive sustainability principles.
•Balcı & Koçak (2014) underscore the importance of designing sports and recreational areas in harmony with the ecological environment.

Mega Sporting Events: Conceptual Framework and Impacts

Mega events are multidimensional projects that go beyond sporting success aiming to foster economic development, image building and long-term societal transformation in host cities (Gratton & Preuss, 2008; Grix, 2016). Ritchie & Yangzhou (1987) and Marris (1987) describe these events as catalysts that enhance tourism appeal and leave lasting effects on host cities.

Their impacts are observed in the following areas:

•Socio-economic impacts: Income distribution, employment, social equity
•Environmental impacts: Infrastructure transformation, resource use, energy consumption
•Cultural impacts: Collective memory, cultural heritage, urban identity

Past examples illustrate this diversity. The 1964 Tokyo Olympics contributed to Japan's economic recovery, while the 2000 Sydney and 2004 Athens Olympics were criticized for high debt and consumption costs (Sartori, 2017).

Key Dimensions of the Sustainability Legacy

Environmental Sustainability and Resource Use

Events such as the Olympics and the FIFA World Cup generate environmental pressures through infrastructure construction, transportation investments and temporary mega-facilities. Their most pronounced environmental footprints include carbon emissions, water and energy consumption (Ünal & Bağcı, 2017).

The IOC's 2021 Sustainability Strategy prioritizes carbon neutrality, renewable energy use and the development of green transportation systems. Similarly FIFA's 2022 Climate Strategy emphasizes carbon offsetting, green building certification and energy efficiency.Nevertheless Hall (2012) and Sartori (2017) argue that these policies often remain at a technical level without driving systemic transformation.

Social Integration and Urban Transformation

The social impacts of mega events are complex. New housing, transportation infrastructure and public space transformations can foster social integration. However they may also lead to the displacement of low-income groups, rising housing prices and temporary employment (Kurudirek, 2024; IOC; Tekin, 2021).

Such outcomes pose significant risks for social sustainability as transformations that fail to generate lasting prosperity and equity can exacerbate social divisions over time (Hall, 2012).

Sustainability Governance and Policy Design

Mega events are shaped not only by physical infrastructure but also by institutional sustainability policies. Although the IOC and FIFA sustainability documents promote environmentally conscious principles, a lack of implementation oversight remains a major criticism (Özer, 2013).

Yılmaz & Yücel (2022) noted that international initiatives like the UN Millennium Development Goals had been implemented superficially in some countries also in Turkiye as well. Local community participation had often been lacking compared to institutional commitment.

However there are positive examples too. In Turkiye, companies have increasingly adopted strategies such as green production, energy efficiency and recycling while initiatives like A Greener Festival reward environmentally-friendly practices in the events sector (Tunç, 2019; Aydın & Yıldırım, 2020).

Methods

This study employed a qualitative research design utilizing document-based review and descriptive content analysis to assess the socio-environmental sustainability legacy of mega sporting events like the Olympics and the FIFA World Cup.

Literature Selection and Data Sources

The literature review was conducted using key concepts such as sustainability, mega sports events, environmental impact, social legacy and governance. The selection criteria for sources included:
•Academic articles published between 2014–2024
•Official strategy documents by international sports organizations like the IOC and FIFA
•Sustainability policies and indicators from institutions such as the UN, OECD and the

European Commission
•Relevant national reports and peer-reviewed Turkish studies

Data Analysis Process

The collected documents and publications were systematically analyzed using descriptive content analysis. The content was categorized under thematic headings:

•Environmental sustainability practices (e.g., carbon emissions, energy use)
•Social impacts and integration
•Urban transformation and infrastructure legacy
•Institutional governance and sustainability policies

Each document was coded within the framework of these main themes to provide a balanced synthesis of positive impacts and critical evaluations.

Research Limitations

This study does not rely on primary data collection but on secondary and open-access sources. Furthermore, the limited availability of Turkish-language sources necessitated greater reliance on English-language literature for some analyses.

Findings and Evaluation

This section discusses the socio-environmental sustainability legacy of mega sporting events (specifically the Olympic Games and FIFA World Cup) in the contexts of environmental impact, social integration, economic sustainability and governance policies, supported by institutional strategies and implementation examples.

The Socio-Environmental Sustainability Legacy of the Olympics

Environmental Impacts

The Olympics often entail large-scale infrastructure investments, transportation systems and temporary facilities which place significant pressure on the environment. These include damage to green spaces, increased energy and water consumption and similar consequences. The IOC's 2021 Sustainability Strategy prioritizes measures such as calculating carbon footprints, using renewable energy and developing eco-friendly transportation (IOC, 2021). However Kurudirek (2024) argues that such technical solutions often fall short of preserving ecosystem integrity.

Social Impacts

While the Olympics can create temporary jobs, improve social infrastructure and increase local participation in sports they may also lead to the displacement of low-income groups, rising housing costs and diminished social justice (Kurudirek, 2024; IOC). Thus, the Olympic legacy is ambivalent from a social sustainability perspective.

Economic and Cultural Impacts

In the short term, the Olympics can stimulate economic activity, boost tourism and modernize city infrastructure. However long-term issues such as underutilized facilities, debt burdens and inefficient public spending remain points of contention (Hall, 2012). Culturally they promote intercultural exchange and enhance the host country's visibility.

The Socio-Environmental Sustainability Legacy of the FIFA World Cup

Environmental Impacts

FIFA's 2022 World Cup Sustainability Strategy included measures for reducing carbon emissions, green building certification, energy efficiency and climate offsetting. Qatar 2022 claimed to be the first carbon-neutral World Cup (FIFA, 2022). Nonetheless experts have expressed doubts about the feasibility and transparency of these claims.

Social and Economic Impacts

While the World Cup generates short-term economic vitality in tourism, services, retail and media sectors, it often fails to sustain long-term employment. Moreover the harsh working conditions of migrant workers particularly during Qatar 2022 have been documented as serious human rights violations. The Turkish Football Federation (TFF) has adopted social responsibility policies under UEFA to support societal participation and mitigate such issues (TFF, 2024).

Sustainability Policies and Governance Practices

International Policy Approaches

Global organizations consider sustainable development in economic, social, and environmental dimensions. The UN's Sustainable Development Goals (SDGs) target poverty reduction, climate action, and reducing inequalities, while organizations like the OECD and European Commission guide countries based on sustainability indicators (Özer, 2013).

Implementation Challenges and Effectiveness

Yılmaz & Yücel (2022) argue that setting goals alone is insufficient; transparent monitoring mechanisms are critical. Lack of funding, poor inter-agency coordination, and limited community participation hinder the success of such policies.

Good Practices and Strategic Recommendations

In Turkiye, some private sector actors contribute to sustainability through green production, recycling and energy efficiency. Furthermore, award systems like A Greener Festival promote eco-friendly practices in the events industry (Tunç, 2019; Aydın & Yıldırım, 2020).

Discussion

This review highlights the potential of mega sporting events to create a sustainability legacy. However realizing this potential depends on translating institutional strategies into practice, ensuring transparent implementation and fostering community participation.

Critical Evaluation:

•Sustainability efforts often remain symbolic and fail to drive systemic transformation.
•Local communities have insufficient influence in decision-making and benefits are unevenly distributed.
•A lack of effective monitoring and feedback mechanisms weakens the impact of policies.

Conclusion and Recommendations

Mega sporting events hold considerable potential to contribute to sustainable development goals. To realize this potential the following strategic steps are recommended:

•Participatory Governance: Ensure community involvement from the planning stage onward.
•Transparent Monitoring: Conduct pre- and post-event impact assessments through independent audits and publish results.
•Enduring Social Benefits: Design urban transformation projects with a focus on social justice and avoid displacing vulnerable groups.
•Environmental Transformation: Institutionalize policies for reducing carbon emissions, implementing green infrastructure, and promoting renewable energy.

In conclusion, leaving a sustainable legacy is not merely a matter of intent but requires well-designed policies, inclusive practices and continuous oversight.

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The effect of the implementation of Hellison model on primary school

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Abstract: The purpose of teaching is to promote social change by fostering students' personal and social development through innovative educational practices. This research aims to improve students' undesirable behaviors and examine the effect of teaching strategies on the development of responsibility based on the Hellison model (Teaching Personal and Social Responsibility-TPSR). Participants included 24 sixth-grade students (14 girls, 10 boys)—the six-month intervention involved two weekly Physical Education sessions focusing on cooperation and self-awareness. The Personal and Social Responsibility Questionnaire (PSRQ) consisted of 14 questions on a 6-point Likert scale (1 = strongly agree, 6 = strongly disagree). Six questions assessed social responsibility, while eight questions assessed personal responsibility. The averages for both dimensions were calculated for each student in the initial and final questionnaires, as well as the differences between them. Results from the Wilcoxon Signed Rank Test showed statistically significant improvements: for social responsibility ($Z = 22.50$, $p = .006$) and personal responsibility ($Z = 30.00$, $p = .002$). Median scores improved from 2.00 to 1.58 for social responsibility and from 2.00 to 1.63 for personal responsibility. These findings indicate a substantial change in students' values and self-awareness, enhancing their perception of responsibility at both individual and collective levels. The intervention helped students recognize the complexity of responsibility in social situations. Overall, the study confirms the effectiveness of TPSR-based interventions in fostering the moral and social development of elementary school students.

Keywords: Personal and Social Responsibility, Physical Education, Hellison model.

Introduction

Nowadays, teachers of all levels observe an increase in undesirable student behaviors both

in the classroom and in school in general. Undesirable behavior is considered behavior that bothers the student himself and the people he interacts with, causing unpleasant feelings in him and in the people around him, such as violence, aggression, intimidation, bullying, etc. (Kalantzi-Azizi, 1985; McNeil et al., 1991). Arbuckle and Little (2004) indicate that teachers usually define undesirable behavior as behavior that hinders the teaching and learning processes. For this reason, one of the greatest needs facing the educational community is the implementation of programs that, on the one hand, will focus on understanding the nature and causes of undesirable student behavior and, on the other hand, will provide guidance on preventing and/or successfully dealing with it.

It is important to carry out such programs because teachers can achieve behavioral change in students, strengthening positive behaviors, and revising negative behaviors. School is a social institution and perhaps the most important one to bring about this change (Kazak and Koyuncu, 2021). Acquiring desirable behaviors, preventing or reducing undesirable behaviors are vital and ensure the efficiency and effectiveness of education. Knowledge of undesirable behaviors and their effects can help reduce problematic behaviors that may occur in the classroom, as well as contribute to the development of teachers, with the knowledge and application of the Hellison model, to address these behaviors (Kazak and Koyuncu, 2021). Finally, it is very important that all teachers are constantly informed and trained in order to acquire new teaching strategies. The TPSR model is a very useful tool that will help teachers develop students' responsibility, in order to improve or even eliminate undesirable behaviors and thus students develop life skills, which will help them have a better life as future citizens, who will respect their fellow human beings and will show their solidarity in practice. Finally, in recent years in the field of social sciences and humanities in Greece, not many studies have been carried out related to the development of individual and social responsibility of primary school students and the participation of school teachers through participatory action research. Specifically, it is reported that two studies were implemented, mainly in the Physical Education lesson (Koutelidas et. al., 2022; Mylosis and Patsouri, 2005). The review of these studies shows that the programs that have taken place in Greece are limited and focus on activities that concern only the subject of physical education and their conclusions have not been generalized to other teaching subjects.

Such programs of partnership and transfer of values within and through the teaching subjects of a school could support teachers in improving or even changing the behavior of students, reinforcing positive behaviors, as well as revising negative behaviors, resulting in students developing life skills, which will help them have a better life. The fundamental goal of interventions of this type is the transfer of benefits and values within the community, elements that will promote the work and well-being of all (Escarti et al., 2012).

The purpose of the study is to promote the development of personal and social responsibility, positive behavior among students, while evaluating the effectiveness of the

Teaching Personal and Social Responsibility (TPSR) model.

Finally, the research question of this study is: "What will be the impact of this program on the individual and social responsibility of students?"

Materials and Methods

This research was conducted within the framework of quantitative research, applying convenience sampling, which is based on access to individuals who are readily available and willing to participate in the research (Taherdoost, 2016). This method offers significant advantages in terms of immediate and easy access to a large number of participants, low cost, and rapid data collection. However, despite the advantages of convenience and speed, convenience sampling may limit the generalizability of the results, as the sample is not necessarily representative of the entire population. An additional disadvantage of this method is the possibility of bias, as participants may have certain common characteristics that affect their perceptions (Etikan and Bala, 2017).

Model of the Research

The research model is a quasi-experimental design, one of the quantitative research methods.

Population and Sample / Study Group

The participants are 24 students (14 girls, 10 boys) of the 6th grade from the 6th Primary School of Maroussi in Greece. The 6th-grade students were selected because they are completing primary education, and it is important to check their individual and social responsibility before they start secondary education.

Data Collection Tools

The Personal and Social Responsibility Questionnaire-PSRQ by Li, Wright, Rukavina, and Pickering (2008) was given by the teacher, Physical Education (PE), to the students who had declared their participation in the research, to determine their level of responsibility.

The questionnaire consists of 14 questions that assess the four levels of Hellison's model (effort, self-direction, respect, and concern for others) (Hellison, 1985, 2011), namely 4 questions for effort, 3 for self-direction, 3 for respect, and 4 for support for others. A 6-point Likert-type scale was used, ranging from "Strongly Disagree" (=1) to "Strongly Agree" (=6). Only one question had a reverse scale scoring direction (e.g. "I do not set any goals"), which was recoded in the statistical analyses. It has been used and weighted in

several studies abroad (Agbuga et al., 2015; Hsu et al., 2014; Martins et al., 2015) and in Greece (Agiasotelis et al., 2017, Korovilla, 2021).

Analysis of Data

The statistical analysis tool: Statistical Package for Social Sciences 22. (SPSS 22.) was used for the evaluation. A t-test of dependent variables was performed to determine if there was a change in students' personal and social responsibility, and an ANOVA analysis of repeated measures was performed to determine a change in the implementation of teaching strategies oriented towards the development of student responsibility (Field, 2016). Both social and personal responsibility scores showed a statistically significant improvement, indicating the success of the TPSR model. The difference between the initial and final measurement was evaluated based on the distribution of the Kolmogorov-Smirnov Test. The Wilcoxon Test was used due to the absence of a normal distribution of the data. The dependent variables are personal and social responsibility, and the independent variable is the measurement time before and after the intervention.

Ethics of Research

This research proposal was approved by the Research Ethics-Bioethics Committee of the School of Physical Education and Sports (protocol number 1531/17-05-2023). Before administering the questionnaire to the students, their parents were given a relevant consent statement, which referred to the purpose of the research. The Personal and Social Responsibility Questionnaire-PSRQ by Li, Wright, Rukavina, and Pickering (2008), which was given to the students, is weighted and ensures the validity and reliability of the research. The scale used is the translated version of the questionnaire. A reverse translation process was followed. Initially, it was translated from English to Greek. Then, a second expert translated the questionnaire from Greek to English, and a comparison of the translations of the questions followed.

Results

The results of this study showed that students demonstrated increased responsibility, better social understanding, and internalized values. These findings indicate a substantial change in students' values and self-awareness, enhancing their perception of responsibility at both the individual and collective levels. The intervention helped students recognize the complexity of responsibility in social situations. These results are also consistent with the findings of other recent studies, such as Gordon (2020) and Wright et al. (2021).

Both personal and social responsibility scores showed statistically significant improvement, indicating the TPSR model's success. Results from the Wilcoxon signed-rank test showed statistically significant improvements. Score improved from 2.00 to 1.63 for personal

responsibility. Results from the Wilcoxon signed-rank test showed statistically significant improvements. Score improved from 2.00 to 1.58 for social responsibility (Table 1).

Table 1. Personal and Social Responsibility

	Statistics			
	Social Responsibility initial	Social Responsibility final	Personal Responsibility initial	Personal Responsibility final
N	24	2492	24	24
Missing	0	0	0	0
Median	2,0000	1,5833	2,0000	1,6250

Z = 30.00, p = .002 Social Responsibility
Z = 22.50, p =.006 Personal Responsibility

Discussion and Conclusion, Suggestions

The TPSR (Hellison, 1985, 2011) model proved to be an effective method in primary education, especially through physical education as a means of values education. Overall, the study confirms the effectiveness of TPSR-based interventions in enhancing the moral and social development of primary school students.

TPSR can be integrated into broader educational policies and across all subjects, with teacher training being essential for successful implementation. The Physical Education teacher can also collaborate with general education teachers so that the positive effects of developing responsibility can be achieved in other subjects as well (Walton-Fisette and Sutherland, 2020; Wright et al., 2021).

Finally, the present study is limited to sixth-grade students of primary school, specifically in the Physical Education subject. Another limitation is that the teacher PE serves in Primary Education. Therefore, the findings should be interpreted within the context of this specific age group and subject, taking into account the cognitive, physical, and emotional characteristics of this developmental stage.

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Positional Demands of Small-Sided Games: Impacts on External Load in Professional Footballers

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Abstract: Monitoring training load is an effective method used to meet the training and match demands of football players. Small-sided games encompass the physiological and technical requirements similar to match play. The aim of this study is to investigate the effect of positional differences on external load in small-sided games. A total of 24 players (9 defenders, 9 midfielders, 6 forwards) playing in the Turkish Professional Super League participated in the study. The small-sided game format consisted of 4 vs 4 players on a 30×20 m pitch, played in 4 sets of 4 minutes. As external load variables, acceleration + deceleration (Acc+Dec), high metabolic load distance (m), player load, maximal velocity (km/h), meterage per minute, and player load per minute values were calculated. ANOVA test was used to compare the differences between groups. As a result of the analysis, it was found that external loads in small-sided games did not differ according to playing positions. The lack of difference in the results obtained may be associated with the development of players in line with the game model that teams aim to implement. The fast and dynamic nature of football may have contributed to the reduction of differences between positions and the similarity of physiological characteristics across all positions.

Keywords: External load, small-sided games, football players.

Introduction

Monitoring and quantifying training loads is essential for optimizing athletic performance. Effective load management not only facilitates the evaluation of performance but also plays a critical role in reducing the risk of injury or illness resulting from overtraining (Bourdon et al., 2017). External load refers to the physical work performed by an athlete, measured independently of their internal physiological responses or characteristics (Wallace et al., 2009). The systematic tracking and analysis of this load provide valuable information for coaching staff, enabling them to monitor changes in physical fitness, assess the effectiveness of training and competition strategies (Reina et al., 2022), and define individual workload thresholds. This data forms a solid basis for the appropriate

periodization of training programs (Coutts et al., 2004). In elite soccer, match-related loads have been monitored for several years (Howle et al., 2019). Enhancing performance—the primary objective of sports training—is often achieved by manipulating physical training loads (e.g., volume and intensity) (Manzi et al., 2010; Halson, 2014).

Small-sided games (SSGs) have become a widely used training method in professional football due to their ability to simultaneously target technical, tactical, and physical components of performance (Hill-Haas et al., 2011). These modified formats replicate match-specific demands within a controlled environment, making them an effective tool for managing external load. However, the physical demands imposed by SSGs can vary considerably depending on players' positions (Dellal et al., 2011). For instance, wide midfielders and fullbacks tend to cover greater distances at high speeds, while central players may experience higher rates of accelerations and decelerations (Casamichana & Castellano, 2010). Therefore, understanding the positional demands during SSGs is crucial for individualized training load prescription, ensuring that players are exposed to stimuli that reflect their match roles (Gaudino et al., 2014). Such insights support the development of more precise and position-specific training strategies, contributing to optimal performance and reduced injury risk.

While previous research has extensively examined external load and training demands in football, limited attention has been paid to how small-sided games (SSGs) affect players with different positional roles in a professional context. Given that physical and physiological responses during SSGs vary depending on playing position, a one-size-fits-all training approach may result in suboptimal adaptations or disproportionate workloads among players. This study provides a novel contribution by specifically analyzing the positional external load demands during SSGs among professional footballers, thus addressing a gap in the literature.

The aim of this study is to investigate how small-sided games influence external load metrics across different playing positions in professional football. By quantifying and comparing these demands, the study seeks to offer practical insights for coaches and performance staff to better individualize training sessions, optimize physical performance, and minimize injury risk.

Method

The study was conducted using a standardized small-sided game (SSG) format involving 4 vs. 4 players on a 30 × 20 m pitch. Each session consisted of four sets, with each set lasting 4 minutes and separated by standardized recovery intervals. External load variables were monitored using GPS-based tracking devices (e.g., 10 Hz), and the following metrics were collected: total distance covered (m), combined acceleration and deceleration efforts (Acc + Dcc), high metabolic load distance (HMLD, m), player load, maximal velocity (km/h),

meterage per minute, player load per minute, and acceleration-deceleration efforts per minute. All measurements were recorded during each set to assess the physical demands of SSGs according to player positions.

Result

Table 1. Comparison of External Loads According to Playing Positions

		n	Mean	SD	F	p
Total distance	Defense	9	1367.89	131.01	0.304	0.741
	Midfield	9	1326.67	148.31		
	Forward	6	1323.50	87.73		
(Acceleration + Deceleration)	Defense	9	66.22	22.20	0.590	0.563
	Midfield	9	76.89	29.63		
	Forward	6	83.33	43.06		
High metabolic load distance (m)	Defense	9	149.56	40.38	0.104	0.902
	Midfield	9	155.33	42.28		
	Forward	6	146.00	36.85		
Player Load	Defense	9	153.11	57.94	0.270	0.766
	Midfield	9	146.22	29.80		
	Forward	6	137.33	13.46		
Maximal velocity (km/h)	Defense	9	21.33	1.94	1.186	0.325
	Midfield	9	21.22	1.56		
	Forward	6	20.00	1.79		
Meterage per minute	Defense	9	82.88	7.90	0.370	0.695
	Midfield	9	80.64	8.14		
	Forward	6	79.72	5.28		
Player load per minute	Defense	9	8.10	1.00	0.034	0.967
	Midfield	9	8.29	2.40		
	Forward	6	8.28	0.82		
Acc+Dcc Per minute	Defense	9	1.84	0.30	0.684	0.515
	Midfield	9	2.06	0.65		
	Forward	6	2.23	0.94		

Discussion

The present study revealed that external loads in small-sided games (SSGs) did not differ significantly according to playing positions. This finding contributes a novel perspective to the existing literature, as most previous research has either focused on internal load measures or examined external load distributions in contexts such as full matches or

training periods rather than SSGs.

For example, one study examining amateur soccer players using the 1-4-3-3 formation found no positional differences in internal load indices during official matches but did not investigate external loads during SSGs (Michaildis, et al., 2024). Similarly, research exploring the relationship between area per player (ApP) and GPS-derived external load metrics in elite youth players reported associations between ApP and various locomotor activities. However, it did not address how these loads may vary by playing position during SSGs (de Dios-Álvarez, 2025). Another study investigating internal and external loads in different SSG formats reported variations in total distance and external load metrics; however, it did not evaluate these metrics across different playing positions (Clemente, et al., 2017). Additionally, although some studies have identified positional differences in external loads over full competitive seasons—such as higher sprint distances for full-backs compared to central defenders—these findings pertain to standard match play rather than SSG contexts (Petrov et al., 2022).

The current study fills an important gap by providing empirical evidence that, within the constraints of SSG formats, external load metrics may not differ significantly among playing positions. This could be attributed to the nature of SSGs, where space, player density, and game dynamics potentially homogenize physical demands across positions. These findings have practical implications for coaches and practitioners in designing position-neutral SSGs for training purposes, especially when the goal is to provide uniform physical stimuli irrespective of players' tactical roles.

Conclusion

This study aimed to examine the differences in external load parameters among professional football players occupying different positions during small-sided games (SSGs). The findings revealed no statistically significant differences between positions in terms of total distance, acceleration + deceleration, high metabolic load distance, player load, maximal velocity, meterage per minute, player load per minute, or acceleration-deceleration efforts per minute. These results suggest that the nature of SSGs imposes similar physical demands on all players, regardless of their usual tactical roles. Due to the constrained space and high-intensity format of SSGs—characterized by frequent directional changes, short sprints, and continuous engagement—players are exposed to uniform movement patterns and workloads. Consequently, even positions traditionally associated with lower intensity during full matches (e.g., central defenders) are required to perform at higher intensities in SSGs. These findings highlight the value of SSGs in promoting a generalized physical stimulus across all positions, making them a useful tool for enhancing team-wide fitness in a balanced and efficient manner.

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The Effect of Soccer-Specific Training on Functional Movement Screen Scores in Male Adolescents

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Abstract: The Functional Movement Screen (FMS) is a movement-competency-based assessment tool used to evaluate the quality of fundamental movement patterns. Given soccer's dynamic nature and diverse movement demands, assessing the impact of soccer-specific training on FMS scores is crucial for enhancing movement quality, particularly during critical stages of motor development. This study aimed to investigate the effect of a 12-week soccer-specific training program on FMS scores in adolescent soccer players. Twenty-one adolescents (aged 12–13 years) with no prior structured soccer training participated in the study. The program, conducted twice weekly over 12 weeks, featured technical drills and small-sided games designed to simulate soccer demands. FMS assessments were conducted before and after the training period, and pre- and post-test scores were compared using paired samples t-tests. The results revealed significant improvements in all FMS components, including the deep squat, hurdle step, in-line lunge, shoulder mobility, active straight leg raise, trunk stability push-up, and rotary stability ($p < 0.05$). These improvements are likely attributed to the training program's emphasis on multidirectional movement, agility, single-leg balance, and coordination between the upper and lower extremities, as seen in tasks such as passing, shooting, and dribbling. In conclusion, regular participation in soccer-specific training may positively impact movement quality in adolescents, as reflected by improved FMS scores. These findings support the integration of sport-specific training into youth athletic development programs to enhance functional movement efficiency.

Keywords: FMS, adolescent, football players

Introduction

FMS is used in sports as a screening tool to develop exercise programs focused on injury prevention, rehabilitation, and performance enhancement (Moran et al., 2016).

Kiesel et al. (2007) were the first to examine the predictive ability of FMS for injuries in American football players. Subsequently, the use of FMS spread to a variety of sports, and athletes with a composite FMS score of ≤14 points have generally been classified as being at high risk of injury. However, systematic reviews have yielded conflicting results regarding this cutoff point (Moran et al., 2017). As shown by a growing number of publications involving recreational (Agresta et al., 2014), collegiate (Bardenett et al., 2015), and Olympic (Li et al., 2015) athletes from different sports disciplines, FMS™ has also attracted great interest from researchers.

The Functional Movement Screen (FMS) utilizes a standardized scoring system ranging from 0 to 3 for each of the seven movement tests, with a maximum total score of 21. The scoring is conducted by a trained examiner based on specific performance criteria. A lower score indicates functional limitations or asymmetries that may require corrective intervention. Notably, a composite FMS score of 14 or less has been associated with an increased risk of injury, particularly in athletic populations (Kiesel et al., 2007). Each test is performed three times to ensure consistency and accuracy in scoring. FMS consists of seven fundamental movements used to test body asymmetry and assess mobility and stability. These tests are: Deep Squat, Hurdle Step, In-line Lunge, Shoulder Mobility, Active Straight Leg Raise, Trunk Stability Push-Up, Rotary Stability (Cook et al., 2014).

The Functional Movement Screen (FMS) test yields significant results across various age groups. This study aims to explore the impact of football training on FMS scores in adolescents with no prior sports experience. By examining the effects of structured football training, the study seeks to determine how such an intervention may influence movement patterns and functional performance in this population.

Method

Participants

The study included twenty-one adolescent participants (12–13 years old) who had no prior experience in structured soccer training. Prior to participation, the subjects provided informed consent, and ethical approval was obtained from the relevant institutional review board.

Study Design

This study employed a pre-test/post-test design to examine the effect of a 12-week soccer-specific training program on the Functional Movement Screen (FMS) scores. The training program was conducted twice per week for 12 weeks, with each session lasting approximately 60 minutes.

Training Program

The soccer-specific training program was designed to simulate the physical and technical demands of soccer. It consisted of technical drills (e.g., dribbling, passing, and shooting) and small-sided games aimed at improving movement patterns, coordination, and soccer-specific skills. The sessions were structured to progressively increase in intensity and complexity over the course of the 12 weeks.

FMS Assessment

The FMS was used to assess participants' movement patterns before and after the training program. The assessment included the seven standard FMS tests: Deep Squat, Hurdle Step, In-line Lunge, Shoulder Mobility, Active Straight Leg Raise, Trunk Stability Push-Up, and Rotary Stability (Cook et al., 2014). Each test was scored on a scale of 0 to 3, and the total composite score was calculated.

Data Analysis

Pre- and post-test FMS scores were compared using paired samples t-tests to determine whether the 12-week soccer training program resulted in significant changes in movement patterns. Statistical significance was set at $p < 0.05$.

Results

Table 1. Comparison of Pre-test and Post-test Scores in Adolescents

		n	Mean	SD	t	p
Deep Squat	Pre test	21	1.75	0.64	-2.932	0.009
	Post test		2.20	0.62		
Hurdle Step	Pre test		2.15	0.67	-3.269	0.004
	Post test		2.75	0.44		
In-line Lunge	Pre test		1.75	0.55	-5.107	<0.001
	Post test		2.65	0.49		
Shoulder Mobility	Pre test		1.75	0.55	-5.667	<0.001
	Post test		2.60	0.50		
Active Straight Leg Raise	Pre test		1.65	0.49	-6.282	<0.001
	Post test		2.55	0.51		
Trunk Stability Push-Up	Pre test		2.00	0.56	-5.252	<0.001
	Post test		2.75	0.44		

Rotary Stability	Pre test		2.05	0.60	-3.943	0.001
	Post test		2.65	0.49		
Total score	Pre test		13.30	1.34	-7.036	<0.001
	Post test		18.15	2.76		

According to the results of the paired samples t-test, there is a significant difference in the post-test scores ($p < 0.05$).

Discussion

Functional Movement Screen (FMS) testing can effectively improve movement patterns in adolescent athletes, enhancing their physical performance and reducing the risk of sports injuries. While previous studies suggest that regular participation in any structured physical training, including soccer, may lead to improved FMS scores, this study specifically demonstrates the impact of soccer-specific training on adolescents' FMS outcomes. Our findings indicate that a 12-week soccer training program resulted in significant improvements in FMS scores, suggesting that soccer-specific training can enhance movement quality and reduce injury risks in adolescents. Although earlier research did not directly examine the effect of soccer-specific training on FMS scores, it emphasized the importance of early motor skill development, noting that higher levels of fundamental motor skills in early childhood correlate with better technical proficiency in football during adolescence (Subhan & Widodo Suripto, 2024). Additionally, while previous studies have emphasized the role of fundamental motor skills (FMS) in the acquisition of soccer-specific skills, our study suggests that regular participation in soccer training may be an effective intervention for improving FMS scores, thereby laying the foundation for more complex movement skills (Kokstejn et al., 2019). Furthermore, although a study by Vernetta-Santana et al. (2019) focused on movement quality in 12- and 13-year-olds and found that both sexes demonstrated acceptable movement quality, our study provides new evidence that soccer-specific training can significantly enhance movement patterns in this age group.

Conclusion

This study highlights the positive impact of a 12-week soccer-specific training program on the movement quality of adolescents, as measured by the Functional Movement Screen (FMS). The significant improvements in FMS scores suggest that regular participation in soccer training can enhance fundamental movement patterns, which are essential for both injury prevention and performance enhancement. These findings support the idea that early engagement in structured sports training, such as soccer, may help develop essential motor skills that contribute to better overall movement proficiency. Given the growing body of evidence on the importance of fundamental movement skills in youth sports, future research should continue to explore the long-term effects of sport-specific training on motor development and injury prevention in adolescents.

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