motricidade

ORIGINAL ARTICLE

https://doi.org/10.6063/motricidade.39516

The Benefits of Ultimate and Disc Sports for Physical and Social Development in Portuguese Schools

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ABSTRACT

Training in Ultimate and disc sports started in Portugal in 2005. The aim of the study is to find out to what extent Physical Education teachers already know and recognise the value and potential of disc sports and ultimate, and what contribution this can make to achieving the predetermined learning outcomes in pupils. This analytical study used a cross-sectional survey design to investigate the perceived importance of disc sports among 450 physical education teachers. Approximately 54.0% of Physical Education teachers use Ultimate because they think it is a different sport, 48.7% because pupils like it and 40.3% because it is self-refereed. The results show that 92.3% of Physical Education teachers believe that disc sports improve pupils' motor skills. This study highlights the potential of disc sports to enhance Physical Education. The findings suggest the potential for widespread implementation of disc sports in different educational settings and countries.

KEYWORDS: pedagogy; sports; curriculum; spirit of the game; ethics.

INTRODUCTION

Physical Education (PE) has been a vital component of the Portuguese education system for over 50 years, with 6,568 PE teachers employed in public schools as of 2021 (Instituto Nacional de Estatística, 2024). Despite its long-standing role, significant global challenges in PE persist. For example, only one in three secondary school students worldwide meets the recommended 180 minutes of physical education per week, as noted in UNESCO's Global Status Report on Quality Physical Education (UNESCO, 2024). Furthermore, a substantial number of students with disabilities lack access to PE (UNESCO, 2024). In response to these challenges, international bodies like the WHO and the Olympic Movement emphasise the importance of increasing physical activity in schools to combat childhood obesity and promote overall well-being (Carl et al., 2023; International Olympic Committee [IOC], 2021; Jakobsson, 2014; Marivoet al., 2016; Pate et al., 2011). In Portugal, since 2005, there has

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Conflict of interests: nothing to declare. Funding: This work was supported by the Portuguese Foundation for Science and Technology, I.P., under Grant Number: UID/CED/04748/2023. Life Quality Research Centre (LQRC), Santarém, Portugal.
Received: 11th December 2024. Accepted: 8th April 2025.

been an increasing focus on expanding certified PE teacher training programs, enabling teachers to integrate a variety of sports into their curricula, including disc sports, to foster students' motor skills, academic success, and citizenship (Amoroso et al., 2019 Okely et al., 2001).

Disc sports, particularly Ultimate, provide unique opportunities within PE, aligning well with the goals of promoting physical literacy (PL) and social inclusion (Carolo et al., 2023). Ultimate is notable for emphasising fundamental motor skills, gender equality, self-regulation, and social cooperation through its unique Spirit of the Game (SOTG) scoring system (Amoroso et al., 2024; Knutson & McAndrew, 2016; Lubans et al., 2010) Unlike traditional team sports, Ultimate features self-refereeing, which encourages players to take responsibility for their actions, fostering communication and cooperation (Amoroso et al., 2024; Griggs, 2011a; Robbins, 2004, 2012). Moreover, Ultimate stands out for balancing competitive and cooperative elements, both essential for teamwork and sportsmanship—key pillars of a holistic PE experience (Nguyen, 2017). These distinctive features make Ultimate particularly relevant to modern PE curricula, especially as it encourages self-discipline, fair play, and moral responsibility (Crocket, 2015; Griggs, 2011b).

Despite the potential benefits of Ultimate and other disc sports, these activities remain underrepresented in the Portuguese PE curriculum. Current research highlights a gap in the understanding and integration of disc sports by PE teachers in Portugal, especially regarding how these sports can contribute to key learning outcomes for students. Thegoal of this study is to bridge this gap by investigating how PE teachers perceive the value of Ultimate and other disc sports, and how these sports can enhance student motor skills, teamwork, and overall educational outcomes (Amoroso et al., 2020, 2021). This research aims to inform curriculum development and teacher training initiatives, ultimately promoting the integration of disc sports into PE programs. Specifically, the study will address the following questions:

- Do physical education teachers teach disc sports in their classes?
- What is the importance of teaching disc sports in physical education?
- What techniques and manipulative skills are most challenging for students to execute?
- How do disc sports contribute to the development of students' motor skills?

Through these objectives, this study seeks to provide a comprehensive understanding of the current implementation of disc sports in PE classrooms and identify areas where further action is needed to enhance the role of these sports in Portugal's educational system.

METHODS

Study design

The present work can be classified as an observational, cross-sectional and comparative study (Ranganathan, 2019). These are studies that analyse the relationship between variables by examining the differences that exist between two or more groups of individuals in more than one different context.

Participants and Settings

This descriptive study involved 454 Portuguese physical education teachers.

Data collection

Data was collected through an online survey distributed to PE teachers in Portugal between September and October 2023. The dissemination occurred in three stages: first, the National Council of Associations of Physical Education and Sports Professionals (CNAPEF) invited its members to participate; second, the school sports federation, Desporto Escolar, expanded the outreach; and finally, email invitations were sent to the personal contacts of the main researcher. The sample size (n = 454) was based on convenience sampling, reflecting the number of PE teachers who voluntarily responded to the survey. Although not randomly selected, this sample offers valuable insights into the perceptions of a diverse group of teachers across various regions. To ensure data security and privacy, the database was removed from the original server and securely stored on the first author's password-protected computer.

Instruments

The questionnaire was systematically designed with four distinct sections to comprehensively capture PE teachers' demographic information, training background, teaching practices, and perceptions of disc sports. The structured nature of the instrument, including specific questions about training duration, teaching implementation, and skill difficulty, ensures relevance to the study's objectives. Additionally, the use of a 5-point Likert scale to assess the perceived importance of teaching disc sports provides a quantifiable measure of attitudes. While the methodology does not explicitly mention a validation process, the questionnaire's alignment with established research constructs and its focus on key variables contribute to its reliability.

Future studies could strengthen this aspect by incorporating expert validation, pre-testing, or pilot testing to further confirm the instrument's robustness.

Statistical analyses

Means and standard deviations were calculated for all continuous quantitative variables. For the inferential analysis, normality (Kolmogorov-Smirnov) was tested. Given the fact that all variables showed an abnormal distribution, a Spearman correlation was conducted for the "importance of teaching disc sports in PE classes", "age" and "years of experience". A Kruskal-Wallis test was applied to compare the "importance of teaching disc sports in PE classes" between groups of PE teachers with different training hours in disc sports and according to the region of the country. It was also applied for comparing PE teachers' opinions on the "importance of teaching disc sports in PE classes", "years of experience" and "age" between different response groups. To compare the "importance of teaching disc sports in PE classes" between PE teachers who teach and do not teach disc sports in their classes, a Mann-Whitney test was used. The significance level for rejecting the null hypothesis was set at 5% for all tests. The data were analysed using IBM SPSS Statistics (Version 28).

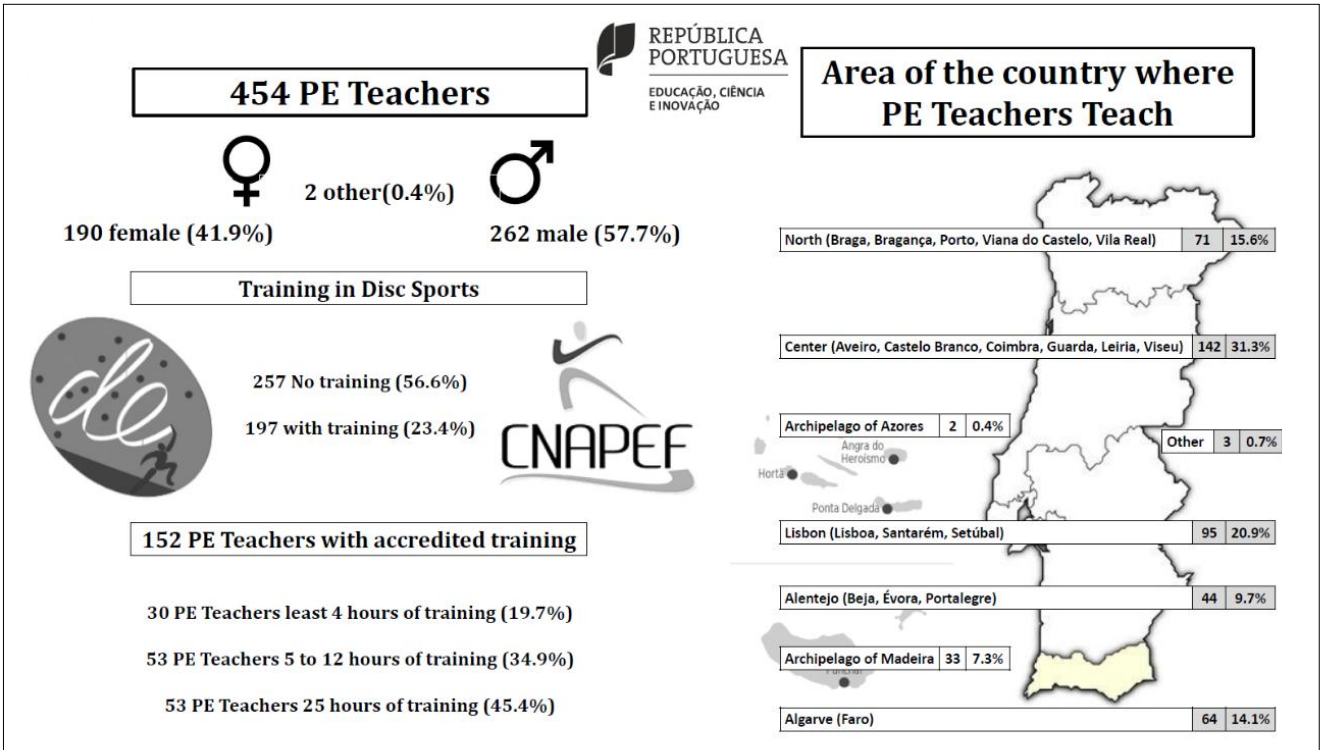
RESULTS

Figure 1 presents the demographic data about the participants [n = 454, mean age 49.21 ± 7.02 years; 57.7% (262) males and 41.9% (190) females], the local region where they teach and the number of PE teachers with experience in disc sports. The present study involved PE teachers nationwide.

Considering the total sample, 65.6% (298) of all PE teachers reported having previous experience with this sport. However, only 43.4% (197) of all PE teachers indicated having undergone some training in Disc Sports.

To better understand the perspective of PE teachers regarding teaching disc sports in their classes, Table 1 displays the correlation between teachers' age, years of experience teaching PE and their self-perceived importance of teaching disc sports in PE classes. Results show the expected positive and strong correlation between age and years of experience in teaching PE (r = 0.89, p < .001), and the absence of any correlation with the self-perceived importance of teaching disc sports in PE classes (p > .05). It also demonstrates that years of experience teaching PE are not correlated to the self-perceived importance of teaching disc sports in PE classes.

In order to understand how the amount of previous training could be associated with, once again, the self-perceived importance of teaching disc sports in PE classes, a



PE: physical education.

Figure 1. Demographic data.

Kruskal-Wallis test was applied (Table 2). No statistical differences were observed between all groups ($p > .05$), showing that the amount of time previously spent on specific training had no association with the self-perceived importance of teaching disc sports in PE classes.

Table 3 presents the self-perceived importance of teaching disc sports in physical education classes, categorised by the different Portuguese regions where teachers are employed. Consistent with previous findings, the data indicate that geographical regions have no significant association with the self-perceived importance of teaching disc sports in PE classes ($p > .05$).

Despite the results shown above and considering the information in Table 4, only 41.9% of all PE teachers teach disc sports in their classes. Curiously, when results for the importance of teaching disc sports in PE classes are compared between groups, those who teach disc sports and those who do not, statistically significant differences are confirmed ($p < .01$). PE teachers who teach disc sports in their classes tend to rate its importance higher.

Considering only PE teachers who implemented disc sports in their classes, the most identified characteristics and motives for doing so are demonstrated in Table 5.

Table 1. Correlation between physical education teachers' age, years of experience, and the importance of teaching disc sports in physical education classes.

			Years of experience	Importance of teaching disc sports in PE classes
Spearman's rho	Age	Correlation Coefficient	0.886*	–0.065
		Significance (2-tailed)	0.000	0.169
		N	448	448
	Years of experience	Correlation Coefficient	-	–0.067
		Significance (2-tailed)	-	0.155
		N	-	454

*Correlation is significant at the 0.01 level (2-tailed).
PE: physical education.

Table 2. Number of hours of training and the importance of teaching disc sports in physical education classes.

Training hours	*N*	Mean	Standard deviation	Minimum	Maximum	*p*-value
< 4 hours	30	3.53	0.7	2	5	.244
5 to 12 hours	53	3.74	0.8	2	5	
≥ 25 hours	69	3.80	0.8	2	5	

Table 3. The importance of teaching disc sports in physical education classes according to the region of the country.

Portuguese regions	*N*	Mean	Standard deviation	Minimum	Maximum	*p*-value
North (Braga; Bragança; Porto; Viana do Castelo; Vila Real)	71	3.49	0.8	2	5	.333
Centre (Aveiro; Castelo Branco; Coimbra; Guarda; Leiria; Viseu)	142	3.54	0.8	1	5	
Lisbon (Lisboa; Santarém; Setúbal)	95	3.38	0.7	2	5	
Alentejo (Beja; Évora; Portalegre)	44	3.23	1.0	1	5	
Algarve (Faro)	64	3.47	0.8	2	5	
Madeira Archipelago	33	3.67	0.9	1	5	
Azores Archipelago	2	3.5	2.1	2	5	
Other	3	3.67	0.6	3	4	
Total	454	3.47	0.8	1	5	-

We argue that it also tends to support students in meeting their basic psychological needs for autonomy, competence and relatedness in order to facilitate self-determination and support academic motivation and achievement (Geary et al., 2023; Ryan & Deci, 2000). About 54.0% of PE teachers does it because they consider it to be a different sport, 48.7% because students like it, 40.3% because the SOTG and Self-refereeing are important in the self-regulation of children and young people, followed by its importance for the harmonious development it promotes, with 31.9%, because it promotes gender equality (27.2%) and because it is a cheap sport (8.4%).

On the other hand, for teachers who do not implement disc sports in their classes (n = 264), the most common reason given was that they did not have any type or training (13%), followed by "because it is not part of the programme" (2.4%), "lack of infrastructure" (2.0%), "lack of experience and/or interest" (1.6%) and "lack of authorisation from the sports group and/or school board" (0.4%). PE teachers who had experience of teaching disc sports in their classes were also asked which disc throwing technique was the most difficult to learn. (Table 6), Moreover, the answers clearly demonstrated that Forehand/Sidearm is, in fact, the most difficult to learn (67.4%). At the same time, with respect to general manipulative gross motor skills (Throw/Grab), opinions are more similar between skills, although Throwing gets a higher result (42.6%).

About the PE teacher's opinion about disc sports improving pupils' motor skills (Table 7), results show 92.3% saying "yes", 7.5% "maybe", and only 0.2% said "no". Between these three groups, the one that rates the "importance of teaching disc sports in PE classes" higher is the one that says "yes" (p < .001).

DISCUSSION

The study aimed to assess PE teachers' knowledge and recognition of the value of disc sports and ultimate, as well as their potential contributions to student learning outcomes. The sample included 454 PE teachers from across Portugal (mean age = 49.21 ± 7.02 years, 57.7% male), of which 65.6% had prior experience with disc sports, but only 43.4% had

Table 4. The number of teachers who teach disc sports in their physical education classes and the given importance of disc sports in physical education classes.

Disc sports' importance in physical education classes					
		N	Mean	Stardard deviation	*p*-value
Teaches disc sports	Yes	190 (41%)	3.74	0.7	.007
	No	264 (58.2%)	3.48	0.7	

Table 5. Motives for approaching disc sports in their classes.

Motives for approaching disc sports in their classes	%
Because it is a different sport	54.0
Because the students like it	48.7
Because the spirit of the game and self-refereeing are important in the self-regulation of children and young people	40.3
Because it is important for the harmonious development of children and young people	31.9
Because it promotes gender equality	27.2
Because it is a cheap sport	8.4

Table 6. Technique with greater difficulty in execution at the learning level.

Disc Throwing technique	*N*	%	General Manipulative Motor Skill	*N*	%
Backhand	18	9.5	Throw	81	42.6
Forehand/Sidearm	128	67.4	Grabb	60	31.6
Both	39	20.5	Both	46	24.2
None	5	2.6	Does not know	3	1.6

Table 7. Physical education teachers' opinions about disc sports improving students' motor skills, divided by the given "importance of teaching disc sports in physical education classes", "years of experience" and "age".

Variables	Disc sports improve students' motor skills	*N*	Mean	Standard deviation	*p*-value
Importance of teaching disc sports in PE classes	Yes	419 (92.3%)	3.54	0.7	< .001
	No	1 (0.2%)	2.00	-	
	Maybe	34 (7.5%)	2.59	1.0	
	Total	454 (100%)	3.47	0.8	-
Years of experience	Yes	419 (92.3%)	23.41	7.8	.094
	No	1 (0.2%)	6.00	-	
	Maybe	34 (7.5%)	25.03	8.5	
	Total	454 (100%)	23.49	7.9	-
Age	Yes	413 (92.2%)	49.09	6.9	.139
	No	1 (0.2%)	43.50	-	
	Maybe	34 (7.6%)	50.83	8.0	
	Total	448 (100%)	49.21	7.0	-

When the same analysis was made for years of experience and age, no significant statistical differences were found ($p > .05$).
PE: physical education.

received formal training. Despite years of teaching experience showing a strong correlation with age ($r = 0.89, p < .001$), there was no significant correlation between experience and the perceived importance of teaching disc sports, emphasising what seems to be a consensus on the teachers' very positive assessment of the educational value of this sport. In other words, this sport is viewed by all PE professionals as an essential component to be integrated into the PE curriculum, regardless of the teacher's experience or age.

Additionally, prior training and geographic location had no significant influence on teachers' perception of its importance ($p > .05$), as it would be easy to understand why some activities might not be well regarded, given local preferences and customs. This is not the case here. Notably, only 41.9% of PE teachers incorporated disc sports into their classes, with those who did so assigning significantly greater importance to them ($p < .01$). This is quite interesting, since just the fact that you are a teacher who deals with this content in your classes seems to have a positive influence on the perception of its importance, and what may also contribute to this opinion are some of the reasons that led them to implement this modality in their classes. The primary reasons included their uniqueness (54.0%), student interest (48.7%), and their role in self-regulation (40.3%). Conversely, non-adoption was mainly attributed to a lack of training (13%). Considering this situation, it will be essential to continue the existing training in these matters for those teachers who have not yet received it, in order to mitigate the factor that conditions the implementation of disc sports in the classroom, given that the majority recognise its importance.

Regarding skill acquisition, the Forehand/Sidearm throw was identified as the most difficult to master (67.4%). It is not universally true that a backhand throw is inherently "easier" than a forehand throw. Both have their own complexities, and which one feels more natural can vary from person to person. However, some factors contribute to why many beginners find the backhand throw more accessible. Natural body mechanics - the backhand motion often aligns more closely with natural throwing patterns, and many people find the rotation and arm movement required for a backhand to feel more intuitive. Also, the backhand throw utilises more of the larger muscle groups in the back and torso, which can generate power more easily for some, and due to familiarity/transfer mechanisms, the backhand motion is similar to other common actions, like swinging a door open. This familiarity can make it easier to grasp the basic technique. Simpler wrist action - compared to the forehand, the backhand typically involves a less complex wrist motion. This can make it easier for beginners to control the direction and spin of the throw. However, it is important to note that forehand throw requires a more precise and controlled wrist motion, which can take time to master. It also utilises different muscle groups, which may feel less natural to some and will always depend on individual factors, such as body mechanics, coordination, and prior experience.

Importantly, 92.3% of PE teachers believed disc sports improved students' motor skills, with this group rating its

importance in PE significantly higher ($p < .001$). However, age and experience had, once again, no significant effect on this perception ($p > .05$). This is reflected in resources and initiatives aimed at teachers, and may be explained by the fact that disc sports, particularly Ultimate Frisbee and Disc Golf, engage a wide range of motor skills, including hand-eye coordination (catching and throwing require precise coordination), gross motor skills (running, jumping, and pivoting are essential movements), fine motor skills (gripping and manipulating the disc refine dexterity), spatial awareness (understanding disc trajectory and positioning enhances spatial reasoning) and balance and agility (quick changes in direction and maintaining balance are crucial (Kim, 2024).

These overall findings highlight the need for further training and curriculum integration to maximise the benefits of disc sports in PE. Regardless of teachers' experience and age, the 454 respondents in this study represented only 7% of PE teachers in Portugal. The sample size in this study, comprising 452 teachers with and without training in disc sports, falls slightly below the recommended threshold of 10% for populations of 5,000 (Lachin, 2014). The deficiencies in the sample can be attributed to a low response rate (only 7% of PE teachers participated, below the recommended 10%), lack of awareness (only 7.5% knew physical activity recommendations for children, indicating limited emphasis on health promotion), and limited exposure to disc sports (as they are not widely integrated into the curriculum, reducing teachers' familiarity and confidence in participating). These factors may have impacted engagement and the generalizability of the findings. While this presents a limitation, the findings offer valuable insights into the perspectives and practices of PE teachers. One striking result is that despite PE teachers' crucial role in promoting healthy lifestyle habits, only 7.5% of respondents were aware of the health recommendations for physical activity (PA) in children and adolescents (Marques et al., 2023). Given that a primary goal of health-related PE is to encourage lifelong PA (Pate et al., 2011), this gap raises concerns about teachers' preparedness to integrate health promotion into their curricula. While various health-related programs and interventions, such as FITescola®, have been developed to assess and improve students' physical fitness (Mota et al., 2018), the extent to which these are effectively implemented remains unclear. The findings also indicate that introducing disc sports into the school PE curriculum could contribute positively to students' motor development. Research suggests that professional experience in the field—rather than formal education—has a stronger influence on teachers' awareness of the need for social justice in PE (Hill et al., 2022). Responsibility-based PE has been identified as a strategy to enhance student motivation and instil core values (Pozo et al., 2016). The integration of new sports, such as ultimate frisbee, aligns with this approach, fostering engagement while improving skills across psychomotor (e.g., cardiovascular endurance, agility, speed, throwing and catching techniques), cognitive (e.g., rules, strategy, problem-solving), and affective (e.g., teamwork, self-direction, sportsmanship) domains. Teachers' receptiveness to curriculum innovations was closely linked to their perception of practical solutions to challenges in their teaching context (Parker et al., 2021). Effective interventions often rely on accessible resources and familiar equipment, such as jump ropes, exercise bands, bean bags, and sports balls (Harris et al., 1997; Naylor et al., 2008; Riley et al., 2017; Vazou et al., 2020). However, the introduction of disc sports presents a new challenge, as object-control skills, such as throwing, catching, and striking with a disc, differ from those in traditional ball-based sports (Haywood & Getchell, 2021). Students who struggle with fundamental motor skills (e.g., running, jumping, throwing) in childhood face limited opportunities to engage in physical activity later in life (Stodden et al., 2008). A key difficulty observed in this study was the forehand throw, highlighting the need for a biomechanical analysis to better prepare PE professionals for teaching disc sports (Koyanagi & Ohgi, 2010). Effective teacher education should emphasise both pedagogical and content knowledge, empowering teachers to drive educational change (Ruiz de Alegría et al., 2024). Research in PE is considerably less prevalent than in the broader field of sports. Considering that personal and social development constitutes a core objective of physical education globally, expanding research in this area is particularly important (Opstoel et al., 2019; Pill & Stolz, 2017; Schulenkorf, 2012).

A limitation of this study is the need for a more comprehensive understanding of the potential of disc sports in PE, irrespective of the specific sport played. Further research should explore how different disc sports can be effectively integrated into the curriculum. A longitudinal study following PE teachers over several years would enable in-depth analysis, including teacher interviews, to evaluate the long-term impact of disc sports on student engagement, skill development, and overall effectiveness of the PE program.

CONCLUSIONS

This study highlights the strong consensus among PE teachers regarding the educational value of disc sports, particularly Ultimate Frisbee, regardless of their age, experience, or prior training. However, despite recognising its benefits such as improving motor skills and promoting self-regulation

41.9% of teachers actively incorporated disc sports into their curriculum. A key barrier was the lack of formal training, emphasising the need for targeted professional development. Additionally, the difficulty in mastering the forehand throw underscores the importance of refining instructional strategies for teaching disc-related skills.

To enhance implementation, PE programs should integrate structured training in disc sports while ensuring accessibility to resources. Future research should explore long-term impacts on student engagement and skill development through longitudinal studies, providing deeper insights into the role of disc sports in PE curricula.

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