PROFILING SPORTSMANSHIP ATTITUDES IN PHYSICAL EDUCATION STUDENTS USING CLUSTER ANALYSIS

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ABSTRACT
Background: Sportsmanship represents a core moral and ethical dimension of sport, reflecting respect for rules, opponents, and fair play. Understanding the structure of sportsmanship attitudes among future Physical Education and Sports teachers is crucial for improving professional preparation and promoting ethical conduct in sport.
Objective: This study aimed to identify distinct clusters of sportsmanship attitudes among students at the National Sports Academy "Vassil Levski" to inform pedagogical approaches in Physical Education and Sports training.
Methods: A total of 134 students (83 men and 51 women) participated in the study. Sportsmanship was assessed using the Bulgarian-adapted Multidimensional Sportspersonship Orientation Scale (MSOS). Descriptive statistics, the Mann-Whitney U-test, and hierarchical cluster analysis based on Manhattan distance and the Complete Linkage Method were applied.
Results: Both male and female students demonstrated high levels of sportsmanship, particularly regarding commitment to participation, respect for rules, and positive attitudes toward sport. Cluster analysis identified three distinct profiles among male students and four among females, revealing variations in respect toward rules, opponents, and social conventions.
Conclusion: The findings confirm well-developed sportsmanship attitudes among future Physical Education and Sports teachers and highlight the value of cluster analysis for identifying subgroup differences. These insights can support the design of targeted educational programs that strengthen moral reasoning, respect, and integrity in teacher training and sports education.

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INTRODUCTION

Sport is a multifaceted social phenomenon integrating physical, mental, and intellectual qualities while shaping athletes' moral and ethical standards (Burgueño & Medina-Casaubón, 2020). Sportsmanship reflects fair play and ethical behavior (Mileva & Zhelyazkova-Koynova, 2010; Bednář, 2023). Fair play, grounded in rationality, extends beyond rule compliance – it encompasses respect for the game and opponents, as well as accepting victory or defeat with dignity (Prodanov, 2005; Dominique & Sempé, 2011). Following moral principles and competition rules guides athletes, coaches, referees, and spectators, demonstrating respect and commitment (Vallerand et al., 1996). Thus, sportsmanship has evolved from a behavioral norm to a mindset (Burgueño & Medina-Casaubón, 2020; Marinov, 2024). Incorporating fair play dilemmas and problem-solving activities effectively improves sportsmanship (Gibbons & Ebbeck, 1997). Such methods strengthen teamwork and motivation (Gil-Madrona et al., 2016). Integrating physical education with values such as cooperation and integrity is central to pedagogy. Teachers play a key role in fostering sportsmanship during sports and games, so their training must cultivate these values to pass on to students (Bolter et al., 2025; Marinov, 2024). This reflects the growing view that school education should promote sportsmanship as a vital part of Physical Education and Sports curricula (Siedentop, 2002; Kirk, 2013).

Despite these contributions, relatively few studies have focused on the structural patterns and latent profiles of sportsmanship attitudes among students in sports education. Hence, this study addresses that gap by applying cluster analysis to identify subgroups of students with similar sportsmanship deficits for deriving pedagogical insights and fostering targeted moral and ethical competencies in their professional training.

Aim and objectives

The primary aim of this study is to analyze the structure and variability of sportsmanship attitudes among students from the National Sports Academy "Vassil Levski" using advanced statistical methods. The research seeks to identify latent subgroups within the student population and to derive pedagogical implications for enhancing moral and ethical development in Physical Education and Sports training. To achieve this aim, the following specific objectives were formulated:

1. To establish the theoretical and methodological framework for assessing sportsmanship attitudes among Physical Education and Sports students.
2. To conduct an empirical study using the Bulgarian adaptation of the Multidimensional Sportspersonship Orientation Scale (MSOS).
3. To apply statistical and cluster analysis methods to identify latent attitude profiles and gender-related differences in sportsmanship dimensions.
4. To formulate conclusions and propose educational recommendations for fostering ethical behavior, respect, and fairness in sports and professional teaching contexts.

METHODOLOGY

Using the Bulgarian-adapted version of the psychological questionnaire Multidimensional Sportspersonship Orientation Scale (MSOS), developed by Vallerand, Briere, Blanchard and Provencher (Vallerand et al., 1997), respect toward sportsmanship and unsportsmanlike behavior were measured among a total of 134 students (83 male and 51 female) from the faculties of "Sport" and "Pedagogy" in the National Sports Academy "Vassil Levski". All participants gave informed consent after being notified that their anonymized data would be used solely for scientific research purposes. The questionnaire includes 25 items, grouped into the following five subscales: 1. Respect for the rules and social conventions; 2. Respect for the opponent and officials; 3. Respect for one's full commitment to sports participation; 4. Respect for the opponent, concern for their mental and physical health; 5. Negative approach toward the practice of sport (Georgiev, Fenerova, 2014). All individuals' subscale total scores were rescaled in the interval [1, 5] for the sake of comparability within the items' 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

$$S_i = \frac{S_{raw}}{n_i} = \frac{S_{raw}}{5} \qquad (1)$$

where $S_{i_{raw}}$, S_i – *raw* and scaled score values, related to Subscale *i*;
n_i – number of items used for estimating the score for Subscale *i* (5 items per subscale).

Because Subscale 5 is scored in the opposite direction to the others, its values were reversed to make comparisons unidirectional (i.e., a larger score indicates a more desirable state regarding sportsmanship level). To align this factor with the others, its direction was reversed using the following transformation, which derives the reversed value of the raw score to the total subscale score of 5:

$$S_{5\ Reversed} = 5 - (S_5 - 1) = 6 - S_5 \qquad (2)$$

It should be specified that the term (S_5 – 1) represents the score's distance from the smallest possible value on the 5-point Likert scale (i.e., 1), while subtracting it from the largest value on the Likert scale (i.e., 5) reverses that scale. This way, higher values indicate a more positive orientation toward sportsmanship. The results were statistically processed using descriptive statistics and hypothesis testing through the Mann-Whitney U-test (Gigova, 2019).

Data analysis also included Hierarchical cluster analysis, which was based on the Manhattan distance, due to its improved capability to reflect differences across multiple scales. It is based on the sum of the absolute differences between score values and can be considered meaningful in the context of the study. Additionally, the Complete Linkage Method was applied to achieve a more pronounced separation between agglomerate groups, resulting in more interpretable clusters. For visual representation, dendrograms and beeswarm plots were employed to illustrate individual data group-level agglomeration and their trends in sportsmanship.

All computations associated with the applied methods were performed using Python 3.12.3 (Python Software Foundation, n.d.), employing standard statistical and data science libraries (Pandas, n.d.; Scikit-learn, n.d.; Scipy, n.d.). All graphical representations were generated using Matplotlib (Matplotlib, n.d.) and Seaborn (Seaborn, n.d.).

RESULTS

Both male and female students demonstrated a well-developed understanding of sportsmanship, with generally high scores across all subscales except Subscale 5 (Negative approach toward the practice of sport), which, due to its reversed nature, indicated a highly positive attitude. The Mann-Whitney U-test ($p > .05$) revealed no significant gender differences across the five main factors, as shown in Table 1.

Table 1. *Sportsmanship structure among the surveyed students (male and female)*

Factors of Sportsmanship	Male		Female		*d*	M-W U-test *p*-value
	Mean	*SD*	*Mean*	*SD*		
1. Respect for the rules and social conventions (S1)	4.53	0.49	4.53	0.34	0.00	.530
2. Respect for the opponent and officials (S2)	4.08	0.56	4.22	0.59	0.14	.099
3. Respect for one's full commitment to sports participation (S3)	4.73	0.27	4.72	0.29	0.00	.979
4. Respect for the opponent, concern for their mental and physical health (S4)	3.54	0.61	3.55	0.44	0.01	.761
5. Positive approach toward the practice of sport (S5 Reversed)	4.85	0.20	4.85	0.21	0.01	.868

Overall, the results confirm strong positive attitudes toward sportsmanship in both groups, with the highest scores in positive approach toward sport, respect for rules and social conventions and commitment to participation. These findings suggest that students' sportsmanship is primarily driven by respect for the activity and its rules, while respect toward opponents and officials is comparatively less emphasized.

To gain deeper insight into intragroup characteristics of the surveyed male and female students, a hierarchical cluster analysis was applied. The students were grouped based on the similarity of their scores across the five main factors of sportsmanship. Based on the results, three major clusters were identified for the male students and four clusters for their female peers. Table 2 presents the characteristics of each cluster.

Table 2. *Sportsmanship clusters among the surveyed male students*

Student clusters	S1		S2		S3		S4		S5 (Reversed)	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Cluster 1 (41 students)	4.67	0.38	4.20	0.56	4.76	0.23	4.04	0.38	4.89	0.20
Cluster 2 (5 students	3.40	0.73	3.40	0.45	4.48	0.30	2.96	0.36	4.92	0.11
Cluster 3 (37 students)	4.52	0.34	4.03	0.51	4.72	0.30	3.06	0.31	4.81	0.19

Despite the differences in the structure of sportsmanship among the identified clusters, the summarized analysis of the study's indicators shows that students have developed an overall positive attitude toward sportsmanship. A visual representation of the identified clusters of male students is shown in Figure 1.

The interpretation of the results yielded by the applied methods and visualizations reveals the following key characteristics for the identified male clusters:

- *Cluster 1* – Students with a high level of sportsmanship, with a stronger respect expressed toward the opponent and concern for their physical and mental well-being;
- *Cluster 2* – Students with a relatively lower level of sportsmanship compared to the general group, less pronounced respect for established rules and norms, as well as weaker respect toward opponents and officials;
- *Cluster 3* – Students with a high level of sportsmanship, comparable to that of the overall group of surveyed students.

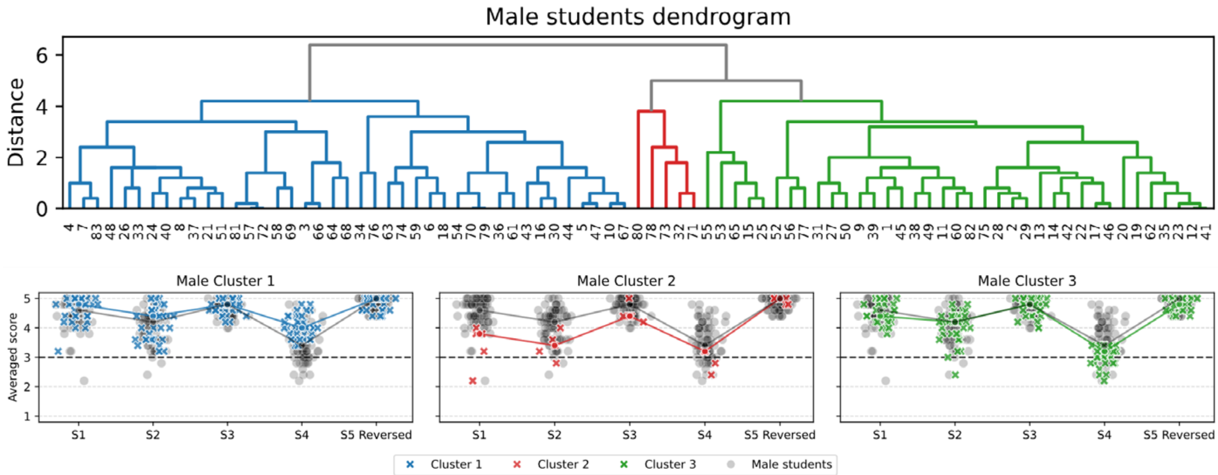

Figure 1. *Sportsmanship structure among the identified subgroups of male students*

A similar approach was used to analyze the structure of sportsmanship among the surveyed female students. In general, the female students showed a positive attitude, which defines the adequacy and strength of their sportsmanship (Table 3).

Table 3. *Sportsmanship structure among the surveyed female students*

Student clusters	S1		S2		S3		S4		S5 (Reversed)	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Cluster 1 (9 students)	4.36	0.28	3.20	0.44	4.84	0.19	3.36	0.33	4.78	0.21
Cluster 2 (19 students)	4.65	0.27	4.66	0.23	4.59	0.34	3.54	0.34	4.84	0.22
Cluster 3 (12 students)	4.25	0.21	4.30	0.18	4.87	0.13	3.23	0.32	4.90	0.20
Cluster 4 (11 students)	4.76	0.36	4.20	0.39	4.69	0.30	4.09	0.29	4.85	0.20

The observed high subscale scores serve as an indicator of good discipline and a sufficient level of understanding regarding the meaning behind the behavioral requirements and rules of conduct, which determine a positive sportsmanship attitude. Once more, similar to the male group, engagement with opponents and other participants are relatively less emphasized. The interpretation of the clusters for the female group is as follows:

- *Cluster 1* – Female students with a relatively lower level of sportsmanship compared to the overall student group, demonstrating less respect toward opponents and other participants in sports activities.
- *Cluster 2* – Female students with a level of sportsmanship similar to that of the overall group of female students. This cluster includes students who have a stronger respect for established rules and norms within their social environment.
- *Cluster 3* – Female students with a level of sportsmanship similar to that of the general group of female students.
- *Cluster 4* – Female students with a level of sportsmanship similar to that of the overall group of female students. This cluster includes students who have a stronger respect toward established rules and norms in their social environment, as well as a concern for the physical and mental well-being of their opponents.

The visual representation of the derived clusters is shown in Figure 2.

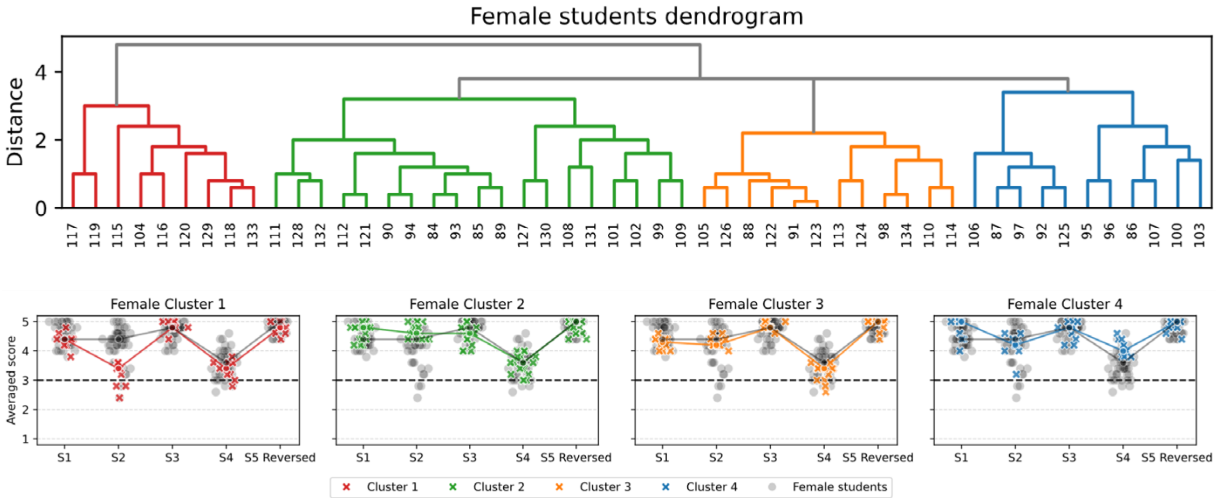

Figure 2. *Sportsmanship structure among the identified subgroups of female students*

Hence, it can be stated that the Hierarchical cluster analysis revealed clear subgroups within both male and female students, distinguished by varying patterns of sportsmanship across the traditionally analyzed five factors (subscales).

DISCUSSION AND FUTURE WORK

The results extend prior research on sportsmanship, which typically reports group averages without examining within-group differences. The identification of subgroups with lower respect for rules and opponents suggests that even among well-prepared students, some may require additional pedagogical attention. This supports earlier calls to explicitly teach fair play and respect in teacher training (Bolter et al., 2025). At the same time, the dominance of positively oriented clusters reinforces theories linking professional preparation with moral and ethical development in sport education. The identified student profiles have practical implications for physical education curricula. Recognizing groups with weaker orientations toward rules, commitment, or respect allows for differentiated instruction. For instance, students who show lower respect for their opponents may benefit from case-based dilemmas or cooperative learning, which strengthen moral reasoning and team spirit. Thus, cluster analysis not only reveals attitudinal patterns but also guides tailored pedagogical strategies.
Some limitations should also be noted. The sample came from a single institution (the National Sports Academy "Vassil Levski"), limiting generalizability. Self-reported data may involve social desirability bias, and the small size of some clusters (e.g., male Cluster 2, n=5) weakens statistical comparisons. Nonetheless, such clusters should be retained for targeted support, given their lower levels of sportsmanship. Future studies should include more diverse and cross-institutional samples, and explore cultural variations. Longitudinal designs would further clarify whether sportsmanship profiles remain stable or evolve during the early stages of professional development.

CONCLUSION

In general, the surveyed male and female students (future Physical Education and Sports teachers) have developed an equally adequate level of sportsmanship, which is likely a result of their common background. They demonstrate a strong, positive attitude toward training and competition, as well as adherence to established rules and norms within their social environment. However, it should be pointed out that to a certain extent, they show relatively less respect toward opponents and officials.
Grouping students into semi-homogeneous clusters based on the similarity of their sportsmanship factors scores enables a more detailed analysis and aids in optimizing training methods. This approach allows for identifying specific groups of students with certain deficits regarding different aspects of sportsmanship level. Ultimately, such insights aim to contribute to the development of more effective educational strategies that foster both athletic performance and ethical conduct.

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