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THE PSYCHOLOGICAL IMPACT OF EARLY SELECTION ON CHILDREN IN WRESTLING

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Abstract

Early talent selection in wrestling, though often necessary for high-performance development, poses significant psychological risks when not tailored to children's emotional and maturational stages. This study investigates the mental and emotional consequences of early selection practices, especially in athletes aged 6 to 10. Drawing from self-determination theory and the Developmental Model of Sport Participation, the paper highlights how rigid, performance-based selection can lead to stress, anxiety, identity foreclosure, and sport dropout—particularly among early-maturing girls. Case studies from ACS Pătru Academy and CS Petrolul Ploiești illustrate the real-world impact of early puberty, with findings emphasizing the importance of psychological readiness, gender-sensitive coaching, and biological-age-informed criteria. The paper proposes a child-centered, ethically grounded approach to selection, integrating physical assessments with emotional monitoring and parental guidance. Recommendations include avoiding labeling, adjusting expectations based on pubertal timing, and promoting long-term engagement over short-term success. Ultimately, early selection should serve not as a filter for exclusion, but as a structured opportunity to support each child's holistic development in sport.

Keywords: *early selection, wrestling, psychological development, early puberty, gender-sensitive coaching, youth sport, emotional safety*

INTRODUCTION

Early selection plays a crucial role in shaping athletic trajectories, particularly in physically demanding sports such as wrestling. However, identifying talent at a young age—typically between 6 and 10 years—can have profound psychological implications if the process is not tailored to the emotional and developmental stage of the child. Children participating in competitive selection events may experience stress, anxiety, and performance-related pressure, especially if they are rejected. These experiences can result in decreased self-esteem, early dropout from sport, and a negative relationship with physical activity. For this reason, early selection methodologies must be child-centered and psychologically informed.

Theoretical Foundations: Early Selection and Psychological Development

Scientific literature highlights both the opportunities and risks associated with early talent identification in sport. On the one hand, structured and age-appropriate training in early childhood can enhance motor skill acquisition, physical literacy, and social competencies such as teamwork and discipline. On the other hand, when the selection process emphasizes performance over development, the psychological costs can be substantial.

According to Wiersma (2000), "youth sport specialization and selection at an early age can expose children to burnout, social isolation, and anxiety," particularly when success is framed as the only desirable outcome. The author warns that early labeling of children as "talented" or "untalented" can affect self-perception and lead to early disengagement from physical activity.

Similarly, Gould and Carson (2008) argue that "exposure to high-performance environments at an early age can limit the development of broader life skills and increase dropout rates in sport" (p. 62). These environments often lack room for failure, experimentation, or emotional expression—key components in child development.

Furthermore, self-determination theory (Deci & Ryan, 2000) suggests that the basic psychological needs of competence, autonomy, and relatedness must be met to sustain intrinsic motivation. In selection processes that are highly controlling or outcome-focused, children may feel a lack of control over their experiences, leading to anxiety or even aversion toward sport.

In the context of wrestling—a sport with strong cultural associations with physical dominance and toughness—the risk of identity foreclosure is particularly high. Children selected at an early age may define their entire identity around their athletic role, often at the expense of other social or academic interests. According to Brewer et al. (1993), "over-identification with the athletic role can result in emotional distress when performance declines or when exclusion occurs."

Côté and Vierimaa (2014) propose a Developmental Model of Sport Participation (DMSP), which identifies three distinct phases: sampling years (6–12), specializing years (13–15), and investment years (16+). The sampling phase is characterized by deliberate play, enjoyment, and multi-sport exposure—factors that contribute to

psychological resilience and long-term sport engagement. Bypassing this stage through early, rigid selection may result in:

- Overtraining and early injuries;
- Anxiety linked to adult-like expectations;
- Reduced adaptability due to limited sport experiences;
- Loss of enjoyment, which undermines sustained participation.

Finally, early selection often lacks adequate consideration for individual variability in psychological maturity, emotional regulation, and social development. Girls and boys develop at different paces—not only biologically but also in terms of self-concept and coping mechanisms. Ignoring these differences in favor of uniform, performance-based selection criteria can alienate young athletes and distort the purpose of early sport involvement.

In summary, while early selection can be a gateway to performance pathways, it should be approached cautiously and ethically, with developmental appropriateness and psychological well-being at its core.

Gender Differences and Early Biological Maturation

In recent years, researchers have documented a marked trend toward earlier biological maturation in girls, with menarche often occurring as early as 8 to 10 years of age (Herman-Giddens et al., 2012). This acceleration in pubertal onset is attributed to a range of environmental, genetic, and lifestyle factors, including improved nutrition, increased exposure to endocrine disruptors, and rising obesity rates (Biro & Deardorff, 2013).

This physiological shift has significant implications for participation in physically and psychologically demanding sports—especially in wrestling, a discipline traditionally associated with strength, endurance, and full-body contact. For young female athletes, early puberty introduces a complex intersection of biological, emotional, and social changes, which can directly influence their readiness for performance-oriented selection environments.

The onset of puberty typically brings about:

- Rapid changes in body composition, including fat distribution and breast development;
- Mood fluctuations, irritability, and increased emotional sensitivity due to hormonal changes;
- Growing self-consciousness about body image, particularly in mixed-gender training environments;
- Greater psychosocial stress, especially when competing with later-maturing or biologically immature peers.

In wrestling, where physical confrontation and body exposure are integral to the sport, girls experiencing early puberty may feel alienated, embarrassed, or overwhelmed, particularly when expected to perform under pressure or when compared against male peers or older adolescents. This can lead to avoidance behaviors, loss of motivation, and ultimately, sport dropout.

As Coakley (2011) notes, "early maturing girls tend to drop out of sport at higher rates, particularly in disciplines where body image and physical confrontation are central" (p. 119). These observations are consistent with findings by Slater and Tiggemann (2011), who highlight that body dissatisfaction and pubertal timing are strong predictors of withdrawal from competitive sport in adolescent girls.

Implications for Coaches and Selection Committees

To ensure equity and psychological safety in early selection, it is crucial to distinguish between chronological and biological age. Girls who enter puberty earlier than their peers may not be psychologically or emotionally prepared for the same training intensity, competition exposure, or public evaluation. Selection processes that do not account for **pubertal status** risk excluding girls based on transient or misunderstood developmental stages.

Moreover, young girls undergoing pubertal changes may benefit from:

- **Modified physical testing**, with emphasis on control, technique, and coordination rather than brute strength;
- **Gender-sensitive coaching**, which acknowledges bodily changes without reinforcing shame or discomfort;

- **Safe spaces for emotional expression**, mentorship, and the normalization of puberty within the sport context;
- **Education for parents and staff**, aimed at recognizing signs of emotional withdrawal or increased vulnerability.

Criterion	**Boys (ages 6–10)**	**Girls (ages 6–10)**
Biological age consideration	Correlated with motor skill development	Correlated with onset of puberty and emotional readiness
Strength testing	Gradual increase, motivational feedback	Reduced intensity, skill-focused, no public ranking
Psychological assessment	Focus on autonomy, confidence, cooperation	Emphasis on affective state, social comfort, and body awareness
Family involvement	Encourage realistic expectations	Include discussions on puberty and emotional transitions
Coach's role	Behavior modeling, structured discipline	Provide empathetic guidance, normalize physical and emotional changes

Practical Implementation in Early Selection: Insights from ACS Pătru Academy and CS Petrolul Ploiești

At ACS Pătru Academy Ploiești and CS Petrolul Ploiești, a functional and multidimensional selection methodology was piloted to evaluate young athletes aged 6 to 10. The battery included standardized assessments of physical fitness—such as balance, coordination, agility, grip strength, and explosive power—as well as behavioral observations targeting emotional regulation, adaptability, and peer interaction.

In addition to the physical and technical dimensions, particular attention was given to psychological readiness and biological maturity, with a focus on identifying indicators of early puberty, emotional distress, or behavioral withdrawal, especially among young girls.

Real-World Case Observations: Early Puberty and Emotional Impact

During the evaluation process, two female athletes—aged 8 and 9—presented clear signs of early biological maturation, both having experienced menarche before the age of 10. While these children were chronologically similar to their peers, their emotional worlds were dramatically different. One of the girls had begun menstruating at age 8—a stage at which many children are still immersed in symbolic play, imagination games, and attachment to toys.

This biological milestone, though natural, introduced confusion, embarrassment, and emotional instability. At such a young age, neither the girls nor their families were fully prepared for the physical and psychological changes that accompanied puberty. In both cases:

The athletes displayed reduced engagement in training, sometimes withdrawing from group activities without articulating a clear reason.They exhibited increased sensitivity to correction, particularly during strength testing or matches with older girls.Verbal and non-verbal cues suggested body discomfort, particularly when changing clothes or engaging in contact exercises.

These cases underscored the need for a flexible, human-centered selection methodology, where sport performance is not assessed in isolation, but as part of a larger developmental context.

The following practices were implemented to support these girls:

- ✓ Private, respectful conversations with the child and parent, offering reassurance and psychoeducation about puberty and sport participation;
- ✓ Reduced testing pressure and restructured drills to emphasize movement quality over competitive outcomes;
- ✓ Pairing with empathetic older teammates for modeling behavior and boosting confidence;
- ✓ Ongoing emotional monitoring, with the coaching staff providing space for breaks, check-ins, or modifications in training intensity.

Findings and Methodological Implications

These cases revealed that early puberty in young female athletes should not be treated merely as a physiological event, but as a transformative emotional process that can

shape a child's entire relationship with sport. Emotional safety, predictability, and empathy are non-negotiable pillars when working with early-maturing girls in high-intensity environments like wrestling.

When appropriately supported, both girls remained active in the sport and later reported positive emotional outcomes, including improved self-confidence, stronger peer connections, and a growing identification with the athlete role—not defined by performance, but by perseverance and self-respect.

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Conclusions and Recommendations

The psychological impact of early selection in wrestling is both significant and multifaceted. While identifying athletic potential from a young age is important for building competitive pathways, such efforts must be grounded in an ethically responsible and developmentally appropriate framework. In particular, young athletes—especially girls experiencing early puberty—require careful, individualized support to prevent emotional overload and identity disturbance.

Early selection should never come at the cost of a child's psychological well-being. The process must do more than measure physical abilities; it should also cultivate confidence, emotional regulation, and a healthy relationship with sport. For early-maturing girls, wrestling can be both empowering and intimidating. Without appropriate interventions, these athletes may associate sport with anxiety, discomfort, or exclusion.

Therefore, a future-proof selection system must:

- Integrate psychological safeguards at every stage of the selection process;
- Recognize biological variability as a factor—not a flaw;
- Provide empathy-driven coaching, especially in moments of emotional vulnerability;
- Encourage a long-term vision of development that honors effort, growth, and resilience over short-term performance metrics.

As Côté and Vierimaa (2014) affirm, "an environment that supports autonomy, competence, and relatedness is essential not only for athlete performance, but also for long-term psychological well-being and social inclusion."

Wrestling coaches, educators, and sport institutions have both a responsibility and an opportunity: to redefine early selection not as a filter for exclusion, but as a gateway for supportive development, where every child—regardless of maturation stage—feels seen, safe, and inspired to grow.

Recommendations include:

- Child-centered methodologies.
- Basic psychological training for coaches.
- Avoidance of labeling.
- Biological-age-based adjustments.
- Promotion of long-term development over short-term performance.

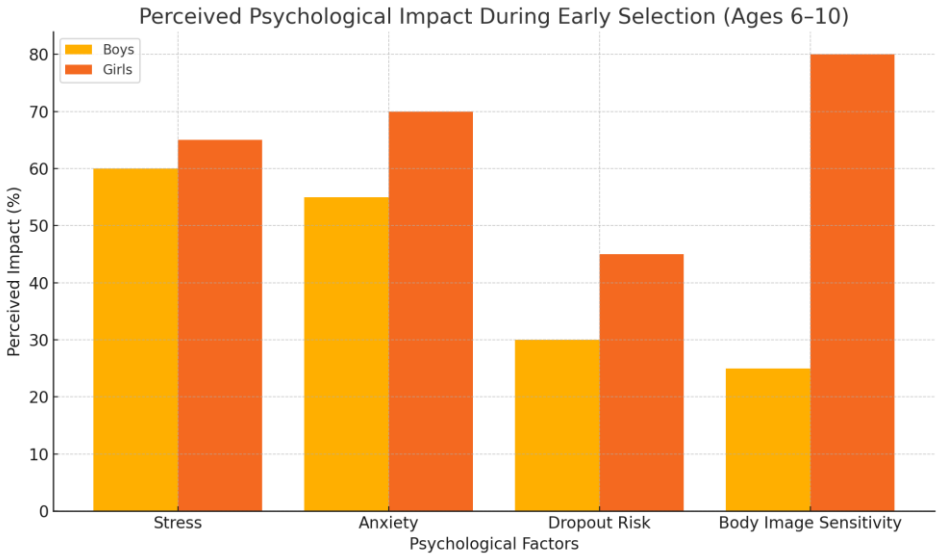

Figure 1. Psychological Impact by Gender During Early Selection (Ages 6–10)

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PRACTICAL IMPLEMENTATION AND VALIDATION OF A FUNCTIONAL TESTING MODEL FOR EARLY TALENT SELECTION IN WRESTLING

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Abstract

Effective early talent identification in wrestling requires evidence-based tools that go beyond isolated motor tests and consider the complex interplay between physical, psychological, and sport-specific skills (Côté & Vierimaa, 2014; Malina, 2010). This study aimed to implement and validate a multidimensional testing model for children aged 6 to 10, with the purpose of supporting the early selection process in wrestling. The proposed battery included general motor assessments—such as coordination, balance, flexibility, and strength endurance—as well as wrestling-specific imitation exercises adapted from the initial technical-tactical curriculum for beginners (Bompa & Buzzichelli, 2018).

The methodology was applied to two training groups (N = 36) from CS Petrolul Ploiești and ACS Pătru Academy Ploiești over a six-month intervention period. Standardized testing was conducted at the beginning and end of the cycle. Statistical analyses (Pearson correlations, t-tests) revealed significant relationships between initial motor indicators (especially dynamic balance and coordination) and subsequent performance in wrestling-specific drills (Rădulescu, 2016; Wiersma, 2000). The testing model also proved effective in highlighting individual developmental profiles, facilitating personalized coaching interventions.

The results support the model's reliability and predictive validity, suggesting its potential utility in grassroots programs focused on early engagement and long-term athlete development (LTAD). Additionally, the structured approach helps prevent premature specialization by identifying adaptable potential rather than immediate performance outcomes (Gould & Carson, 2008). The study concludes that a validated, multidimensional selection battery can contribute to higher retention and more sustainable talent development in wrestling.

Key Words: *early selection, functional testing, wrestling, talent identification, motor coordination, child athletes.*

INTRODUCTION

In the field of youth wrestling, early talent identification has become a strategic priority for sports federations and coaches aiming to develop high-performance athletes from an early age. However, the traditional approaches to selection, often based solely on anthropometric or strength-related indicators, are increasingly criticized for their limited predictive validity and for promoting early specialization without sufficient regard for long-term development or psychosocial well-being (Malina, 2010; Côté & Vierimaa, 2014).

Recent studies have emphasized the need for a more comprehensive, child-centered approach that integrates multiple performance dimensions—physical, coordinative, psychological, and sport-specific—when evaluating young athletes (Gould & Carson, 2008; Bompa & Buzzichelli, 2018). This perspective aligns with the Long-Term Athlete Development (LTAD) model, which encourages progressive, developmentally appropriate training and delayed specialization to maximize athletic potential and reduce dropout risk (Bailey et al., 2010).

In combat sports such as wrestling, early motor learning plays a critical role in the acquisition of technical and tactical skills. Coordination, balance, reaction time, and adaptability are foundational abilities that can significantly influence a child's capacity to assimilate sport-specific content (Rădulescu, 2016). As such, talent selection strategies should not only measure physical fitness but also assess functional motor behaviors and sport imitation capacities that mirror wrestling performance contexts.

The present study builds upon this multidimensional perspective and proposes a functional testing model tailored to early-age wrestling. The aim is to validate the model's applicability in real training environments and to evaluate its effectiveness in identifying children with potential for long-term development in wrestling. Through a six-month longitudinal implementation in two grassroots clubs, this research seeks to provide scientific evidence for a more reliable, practical, and ethically sound methodology for early talent selection.

Theoretical Background

Talent identification in sport has evolved significantly over the past decades, shifting from models focused on short-term performance to approaches that consider the dynamic, long-term development of the athlete (Abbott & Collins, 2004). This shift is particularly relevant in sports such as wrestling, where early engagement is common, but the risk of dropout or burnout due to premature specialization remains high (Wiersma, 2000).

The Developmental Model of Sport Participation (DMSP) proposed by Côté and Vierimaa (2014) advocates for early sampling of diverse motor experiences, followed by gradual specialization. In this context, early selection should emphasize the potential for development, not just current performance. According to Malina (2010), indicators such as coordination, balance, and movement quality are better predictors of sport success in childhood than raw strength or anthropometry.

In wrestling, performance is determined by a complex integration of motor, cognitive, and emotional components. Bompa and Buzzichelli (2018) argue that early training must match both the biological maturity and psychological readiness of the child. Techniques such as wrestling-specific motor imitation, multilateral development, and basic motor coordination contribute to the foundation upon which later specialization can be built.

Rădulescu (2016) supports the use of multidimensional testing batteries, which allow for a more accurate and ethical approach to selection by offering a complete profile of the young athlete. This type of functional assessment not only identifies motor potential but also informs the coach's intervention strategy, adapting workloads and content to the child's developmental stage.

Building on these theoretical foundations, the current study proposes and tests a practical model of early selection that aligns with pedagogical and developmental principles. By applying this model in real training contexts, we aim to validate its utility in guiding selection decisions that support both talent identification and long-term athlete retention.

MATERIALS AND METHODS

Participants

The study was conducted with a sample of **36 children (24 boys and 12 girls)**, aged between **6 and 10 years** (M = 8.1, SD = 1.2), all enrolled in initiation-level wrestling programs. Participants were recruited from two Romanian sports clubs: **CS Petrolul Ploiești** and **ACS Pătru Academy Ploiești**, where they trained twice weekly under the guidance of licensed wrestling coaches. Written informed consent was obtained from the parents or legal guardians of all participants, in accordance with ethical standards for research involving minors (World Medical Association, 2013).

Testing Battery

A **functional testing battery** was developed to assess general and specific motor capacities relevant to wrestling. The battery included:

- **Coordination**: Jumping from side to side over a line for 15 seconds
- **Balance**: Static balance test (flamingo test)
- **Flexibility**: Sit and reach test
- **Strength endurance**: Sit-ups (30 seconds) and push-ups (30 seconds)
- **Speed**: 10-meter sprint
- **Wrestling-specific imitation**: Execution of fundamental wrestling movements (stance, penetration step, defense posture) rated on a qualitative scale (1–5) adapted from technical manuals (FRL, 2020)

Tests were administered at **two time points**: the beginning (T1) and end (T2) of the six-month training period.

Procedure

Testing was conducted in club facilities by the same evaluators to ensure inter-rater reliability. Children performed the tasks individually, under standardized conditions, with verbal encouragement. For each test, the best result from two trials was recorded.

Data Analysis

Descriptive statistics were calculated for all variables. **Pearson correlation coefficients** were used to assess relationships between general motor indicators and performance in wrestling-specific tasks. **Paired t-tests** were applied to examine improvements from T1

to T2. Statistical significance was set at $p < .05$. Analyses were performed using **IBM SPSS Statistics v27**.

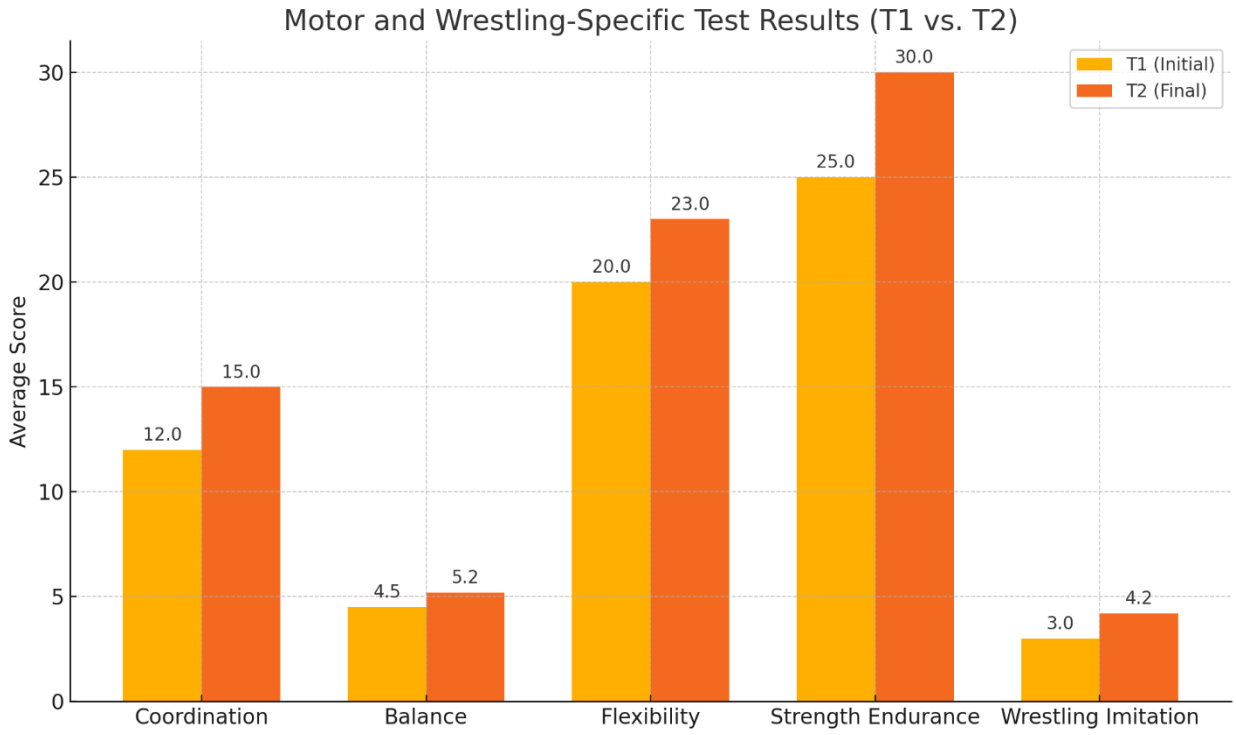

Figure1. Motor and wrestling-specific test results

Test	T1 Mean Score	T2 Mean Score	Improvement
Coordination (reps/15s)	12	15	3
Balance (avg score)	4.5	5.2	0.7
Flexibility (cm)	20	23	3
Strength Endurance (reps/30s)	25	30	5
Wrestling Imitation (1-5)	3	4.2	1.2

RESULTS

The analysis of motor and wrestling-specific performance indicators revealed consistent improvements across all measured domains after the six-month training period.

As shown in Table 1, the most notable progress was observed in strength endurance, with an average increase of 5 repetitions in 30 seconds, followed by coordination, which

improved by 3 repetitions in the side-to-side jump test. Similarly, flexibility improved by 3 cm on average, while balance scores increased moderately from 4.5 to 5.2 on a 6-point scale. The wrestling-specific imitation task, evaluated qualitatively, registered an improvement of 1.2 points (from 3.0 to 4.2), indicating enhanced technique execution and body control.

These results are further illustrated in Figure 1, which presents a side-by-side comparison of T1 and T2 mean scores. The graphical representation highlights the overall upward trend, suggesting that the functional testing battery is sensitive to change and can effectively monitor progress in young athletes.

Pearson correlation analysis indicated significant positive relationships ($p < .05$) between initial coordination and strength scores and the final performance in wrestling imitation tasks. This suggests that these general motor skills are reliable predictors of adaptation to sport-specific content—supporting findings from previous literature (Rădulescu, 2016; Malina, 2010).

The statistical differences between T1 and T2 were also confirmed by paired-sample t-tests, which showed significant improvement across all variables ($p < .05$), with effect sizes ranging from medium to large (Cohen's $d = 0.52–0.91$).

These findings validate the practical utility of the proposed testing model in early talent selection and support its use as a longitudinal tracking tool for physical and technical development in children practicing wrestling

DISCUSSION

The results of this study confirm the relevance and applicability of a multidimensional functional testing model for early talent selection in wrestling. The improvements observed across all motor and sport-specific variables demonstrate not only the trainability of children aged 6–10 years, but also the sensitivity of the testing battery to capture developmental progress over time.

One of the most significant findings was the strong association between initial coordination and balance scores and the later performance in wrestling imitation tasks, supporting the view that neuromotor development is a foundational component of sport-specific skill acquisition (Rădulescu, 2016; Bompa & Buzzichelli, 2018). These results are consistent with Malina's (2010) claim that coordination and movement quality are more informative than raw strength or body dimensions in the prepubescent stage of athlete development.

Moreover, the observed improvements align with the principles of Long-Term Athlete Development (LTAD), which emphasize multilateral training in early years, followed by gradual sport-specific adaptation (Bailey et al., 2010; Côté & Vierimaa, 2014). By including both general and specific indicators, the proposed model avoids the limitations of early specialization and provides a broader perspective on a child's athletic potential.

The model also enables coaches to individualize the training process based on functional baselines. For instance, children with lower initial balance or strength scores can receive targeted interventions, improving their chances of remaining engaged and successful in the sport. This approach aligns with Gould and Carson's (2008) view that effective youth coaching must balance performance development with psychosocial well-being and retention.

In practical terms, the testing battery can serve both as a selection filter and as a monitoring tool, helping clubs and federations design transparent and evidence-based selection policies. Its implementation requires minimal equipment, making it accessible for grassroots programs and sports schools alike.

However, some limitations must be acknowledged. The sample size was relatively small, and the observation period—though longitudinal—was limited to six months. Future research should aim to replicate the model across diverse contexts and track its predictive validity over longer developmental stages.

CONCLUSIONS

This study provides empirical evidence supporting the use of a multidimensional functional testing battery as a reliable and practical tool for early talent selection in wrestling. The model demonstrated strong applicability in real training environments, capturing meaningful improvements in general motor skills and wrestling-specific imitation performance among children aged 6 to 10.

Key findings highlight the predictive value of coordination, balance, and strength endurance in determining early adaptability to wrestling tasks. The statistically significant progress observed over the six-month training period supports the model's sensitivity to physical and technical development, making it suitable for both selection and monitoring purposes.

From a practical standpoint, the model equips coaches and sports clubs with a structured framework to guide selection decisions, personalize training, and promote long-term athletic development while minimizing the risks associated with early specialization.

Further research is recommended to validate the model across broader populations and to explore its predictive value over extended developmental stages, including competition performance and athlete retention.

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INVESTIGATING THE RELATIONSHIPS BETWEEN PERSONALITY TRAITS, MOTIVATION AND INNOVATION: EVIDENCE FROM PUBLIC SPORT SECTOR MANAGERS IN TÜRKIYE

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Abstract

From the perspective of the new public management approach, the administrative structure of public institutions and the individual characteristics of their managers play a significant role in developing effective and innovative management processes. In this context, this study aims to examine the relationships between personality traits, basic motivation sources, and innovative behaviours of Middle and Top-level managers working in the central and provincial organizations affiliated with the Ministry of Youth and Sports of the Republic of Türkiye. The study was conducted using a relational survey model, and the sample consisted of 345 managers selected through a simple random sampling method. Data collection instruments included Short Form of the Five-Factor Personality Scale, Basic Motivation Sources Scale, and the Innovative Behaviour Scale. In the analysis of the data, Student's t-test and Pearson correlation coefficient were employed. The findings revealed statistically significant, yet low to moderate correlations between managers' innovative behaviours, basic motivation sources, and personality traits. The effectiveness of public administration is closely associated with the presence of well-qualified managerial personnel. In Türkiye, there is a prevailing belief that public work will somehow run itself, regardless of individual competence or managerial effort. This mindset undermines the importance of human capital. Abandoning this passive and institutionalized approach and instead emphasizing the value of managers' personality traits, motivational sources, and innovative behaviors can contribute significantly to enhancing organizational success, motivation, innovation capacity, and long-term sustainability in the public sector.

Key-words: *Innovative behavior, Manager, Motivation, Personality, Public administration, Sports services.*

INTRODUCTION

The term "public" is derived from the French concept service public and the German term "öffentliche Anstalt". It was first introduced into Turkish as hidemat-ı umumiye and later evolved into the terms "amme hizmeti" and "kamusal hizmet" (Derbil, 1950). However, the most widely adopted term has become "kamu hizmeti" (public service). The concept of "public" refers to all individuals living within a specific country, encompassing entities that belong to citizens and are accessible to everyone (Özer et al., 2015). Public administration, on the other hand, is a dynamic structure developed to maintain social order and to deliver public services efficiently (Shafritz et al., 2017). It stands out as a key domain through which the state interacts with its citizens in the production and provision of services related to the public. However, this structure commonly known as traditional public administration gradually lost its effectiveness and failed to meet public expectations, leading to the search for alternative approaches in public service delivery (Boztepe, 2018). In this context, the concept of New Public Management (NPM), which emerged in the 1980s (Hood, 1991), or the entrepreneurial state (Weiss, 1995), sought to enhance the efficiency and effectiveness of public services by promoting decentralization, privatization, and market-based mechanisms within the public sector (Osborne, 2006; Pollitt & Bouckaert, 2017).

Within the New Public Management (NPM) framework, managers play a vital role in ensuring institutional effectiveness and sustainability. A key distinguishing factor of managers is the degree of authority they hold, which commonly defines their classification into Top, Middle, and Lower levels, although this typology may vary across institutions and countries (Dinçer, 2023; Rüzgar & Kurt, 2013). Top-level managers shape strategic direction by defining mission, vision, and goals, as suggested by Top Echelons Theory, which posits that organizations reflect the characteristics of their top leaders (Hambrick & Mason, 1984; Dursun & Köseoğlu, 2016). Conceptual skills are central at this level (Koç & Topaloğlu, 2012). Middle-level managers bridge strategic and operational domains, contributing to problem analysis, idea generation, and communication with senior leadership (Floyd & Wooldridge, 1997; Chen et al., 2015; Mustafa et al., 2022). They also gather and synthesize institutional knowledge to support strategic decision-making (Campos et al., 2017; Mustafa et al., 2016). Lower-

level managers, often holding roles such as supervisor or chief, focus on the practical execution of tasks, relying primarily on technical skills (Rüzgar & Kurt, 2013). The coordination among these managerial levels supports organizational coherence and performance (Ozan & Yolcu, 2022).

In contemporary public administration, assigning qualified individuals to managerial roles is essential for enhancing institutional effectiveness and fostering innovation. Research shows that job performance is closely linked to both personality traits and motivation, and that alignment between job characteristics and individual traits can enhance motivation (Virgana, 2020). Although numerous studies have examined personality (Saha & Sharma, 2019), motivation (Stone, 2010), and innovation separately, there is still a limited body of research that explores the interrelation of these variables particularly within public sector settings (Dufault et al., 2023; Suseno et al., 2019).

Traditional organizational models in public administration characterized by rigid hierarchies, centralized control, and unidirectional communication have been widely criticized for their inability to deliver efficient and high-quality services (Golembiewski & Vigoda, 2000). Moussa et al. (2018) highlight several structural and managerial obstacles to innovation, including limited long-term planning, underdeveloped incentive mechanisms, a prevailing culture of risk aversion, inadequate change management practices, and the persistence of outdated and inefficient programs. Moreover, cultural and organizational dynamics frequently hinder the effective integration of technology into public service delivery. These limitations continue to affect public institutions globally, underscoring the ongoing relevance of debates surrounding efficiency and innovation in the public sector (Satı, 2019; Polat & Akçakaya, 2023; Çiçek & Ökten, 2024).

Innovation is essential for enhancing the effectiveness and service quality of public institutions in today's complex environments (De Vries et al., 2016). Research highlights several factors influencing innovative behaviour, including individual competencies (AlQemzi, 2020), cognitive abilities (De Jong & Den Hartog, 2007), motivation, organizational culture (Mutonyi et al., 2020), personality traits (Abou-Shouk et al., 2022), job design (De Jong & Den Hartog, 2007), and leadership (Pundt,

2015). However, focusing on these factors in isolation may overlook the multifaceted nature of innovative behaviour. As Niu (2014) notes, personality traits often interact with other individual and contextual variables. Moreover, demographic and professional variables—such as age, tenure, experience, and gender—also significantly shape innovative tendencies (Hammond et al., 2011; Ng & Feldman, 2013; Cropley & Cropley, 2017; Woods et al., 2018).

The sports sector, which constitutes a significant field of work and service in many countries, holds similar importance within Turkey. Particularly under the influence of the New Public Management (NPM) paradigm, the transformation and development experienced by public institutions and organizations providing sports services have become critical topics warranting scientific investigation. The Ministry of Youth and Sports of the Republic of Türkiye (GSB), along with its central and provincial organizations, represents one of the largest economic and structural domains in the management and administration of sports. In this respect, the Ministry's managerial staff plays a key role in shaping and operationalizing public administration processes within the sports sector, thereby positioning the institution as a significant actor in the broader sphere of public governance. The growing importance of the characteristics of middle- and top-level managers especially those occupying critical positions in decision-making and innovation processes within the managerial structures of these organizations has become increasingly evident. In this regard, investigating the middle- and top-level managers serving within the central and provincial organizations affiliated with the GSB is significant in terms of contributing to the literature on New Public Management. Based on this context, the aim of the present study is to examine the relationship between the personality traits, basic motivation sources, and innovative behaviors of Middle and Top-level managers working in the institutions and organizations of the GSB

METHOD

Research Model and Sample

This study was conducted within the framework of the quantitative research paradigm, using the relational survey model, one of the descriptive research designs. The study population consists of managers working in public institutions and organizations that

provide sports services. The sample comprises 345 managers who were randomly selected from among Middle and Top-level administrators serving in the central and provincial organizations of the GSB during the 2022–2023 period and who voluntarily agreed to participate in the study.

Table 1. Distribution of the managerial sample by gender and managerial position

Gender	**n**	**%**
Female	87	25,2
Male	258	74,8
Total	345	100,0
Managerial Position	**n**	**%**
Middle-level	221	64,1
Top-level	124	35,9
Total	345	100,0

Note. n: Number of Mangers

Table 1 shows that among the 345 managers selected through the random sampling method, 87 (25.2%) are female and 258 (74.8%) are male; additionally, 221 (64.1%) are Middle-level managers, while 124 (35.9%) are Top-level managers.

Table 2. Distribution of managerial levels by institutional positions of managers in GSB and its central and provincial organizations

Institutional Position		**n**	**%**
A	Middle-Level	199	57,7
B	Middle-Level	22	6,4
Total		221	64,1
C	Top-Level	73	21,2
D	Top-Level	13	3,8
E	Top-Level	22	6,4
F	Top-Level	16	4,6
Total		124	35,9

Note. n: Number of Managers; A: Branch Manager; B: Youth Center Manager; C: District Director; D: Director of Sports Services; E: Director of Youth and Dormitory Services; F: Provincial Directors and Deputy Directors, Department Heads and Deputy Department Heads

Table 2 presents the distribution of managerial levels based on institutional positions. While branch managers (57.7%) and youth center managers (6.4%) represent Middle-level management, district directors (21.2%), directors of sports services (3.8%), directors of youth and dormitory services (6.4%), as well as provincial directors, deputy directors, department heads, and deputy department heads (4.6%) represent Top-level management. Öztürk (2019) notes that there is no consensus in the literature regarding the definition of Top-level managers, and that the classification of these managerial levels may vary depending on institutional structure. Therefore, in this study, relevant literature (Kılıçkaya, 2000; Gökçe & Şahin, 2003; Öztürk, 2019) was first reviewed to determine which institutional positions correspond to which management levels. Based on this review, and taking into account the specific organizational structure of the institution, the researcher developed a taxonomy for classification purposes.

Data Collection Tools

In this study, the survey method was employed as the primary data collection technique. Data were collected from managers who voluntarily agreed to participate in the study, using both Google Forms and printed questionnaires distributed in person. To measure the participants' personality traits, basic sources of motivation, and innovative behaviors, three different scales were utilized. These instruments were selected in accordance with the sub-problems of the research and were chosen based on their demonstrated validity and reliability. Each tool used in the study is well-established in the literature and was administered through Turkish-adapted versions of the original validated scales.

Big Five Inventory – Short Form (BFI-10):

To measure participants' personality structures, the "Big Five Inventory – 10-Item Short Form (BFI-10)", originally developed by Rammstedt and John (2007) and adapted into Turkish by Horzum et al. (2017), was employed. This scale is based on the Big Five Personality Traits theory and is a shortened version of the original 44-item BFI, designed for use in research contexts with time constraints. The scale consists of five dimensions: "Extraversion", "Agreeableness", "Conscientiousness", "Neuroticism"

and "Openness to Experience". Each dimension is represented by two items, making a total of 10 items. Participants respond to items using a 5-point Likert scale (1 = Never, 5 = Always). The Turkish adaptation of the scale has been reported to yield psychometrically acceptable values (Horzum et al., 2017). In the Turkish version, the internal consistency coefficients were reported as follows: α = .88 for Extraversion, α = .81 for Agreeableness, α = .90 for Conscientiousness, α = .85 for Neuroticism, and α = .84 for Openness to Experience.

Basic Motivational Sources Scale:

To determine the motivational tendencies of the managers, the *Basic Motivational Sources Scale* developed by Antalyalı and Bolat (2017) was utilized. The scale is based on McClelland's (1961) theory of learned needs, which identifies the needs for *Achievement*, *Affiliation*, and *Power*, as well as Cacioppo and Petty's (1982) concept of *Need for Cognition*. The scale consists of four subdimensions—*Need for Achievement*, *Need for Affiliation*, *Need for Power*, and *Need for Cognition* each comprising 6 items, making a total of 24 items. Participants rate the items on a 7-point Likert scale (1 = Does not describe me at all, 7 = Describes me perfectly). In the original development study, Cronbach's alpha reliability coefficients obtained from analyses conducted on different sample groups were reported as follows: Need for Achievement α = .78; Need for Affiliation α = .73; Need for Power α = .82; Need for Cognition α = .79 (Antalyalı & Bolat, 2017). The scale aims to measure individuals' internal motivation profiles at varying levels and to support appropriate task allocation in organizational contexts.

Innovative Work Behavior Scale:

To measure the level of innovative behavior exhibited by managers in the workplace, the *Innovative Work Behavior Scale*, originally developed by Lukes and Stephan (2017) and adapted into Turkish by Osman and Turan (2020), was employed. The scale is designed to assess individuals' tendencies and actions across the entire innovation process, from generating new ideas to implementing them. The scale includes 23 items and consists of seven subdimensions: *Idea Generation*, *Idea Search*, *Idea*

Communication, *Implementation Starting Activities*, *Involving Others*, *Overcoming Obstacles*, and *Innovative Outputs*. It uses a 5-point Likert-type rating system (1 = Strongly disagree, 5 = Strongly agree). In the Turkish adaptation study conducted by Osman and Turan (2020), the overall Cronbach's alpha reliability coefficient was reported as α = .93. The subdimension reliability coefficients were as follows: *Idea Generation* α = .81, *Idea Search*α = .77, *Idea Communication* α = .84, *Implementation Starting Activities* α = .79, *Involving Others* α = .79, *Overcoming Obstacles* α = .89, and *Innovative Outputs* α = .71. These findings indicate that the scale is valid and reliable for use with Turkish samples.

Note: Ethical approval for the study was obtained from the Ethics Committee of Social and Human Sciences at Ondokuz Mayıs University, under the decision number 2021-840, during the session dated 22.10.2021 (Session No: 10). Additionally, necessary permissions were secured from the relevant institutions for the administration of the questionnaire to the sample group. Prior to data collection, the researchers provided detailed explanations to the participating managers regarding the purpose and procedure of the study. The study was conducted in accordance with the principles outlined in the Helsinki Declaration.

Data Analysis

The data were processed using Microsoft Excel and the SPSS 25.0 statistical package program. To assess the internal consistency of participants' responses to the scale items, reliability coefficients (Cronbach's alpha) were calculated. The assumption of normality was tested using the Kolmogorov-Smirnov or Shapiro-Wilk test ($p>0.05$). In the study, Student's t-test was employed to determine whether the total and subdimension scores of the scales differed significantly based on the variables of gender and managerial position. To examine the relationships between total and subdimension scores of the scales, Pearson correlation coefficients were used. The research findings are presented as n (%), mean (M), and standard deviation (SD). Statistical significance was accepted at the level of $p < 0.05$.

RESULTS

Table 3. Internal consistency coefficients (Cronbach's Alpha) for the responses given by the managers to the items of the Big Five Personality Traits Scale, the Basic Motivation Sources Scale, and the Innovative Behavior Scale.

Scales and Subdimensions	α	**Evaluation**
Big Five Personality Traits Scale		
Extraversion	0.543	Low Reliability
Agreeableness	0.406	Low Reliability
Conscientiousness	0.451	Low Reliability
Neuroticism	0.724	Moderate Reliability
Openness to Experience	0.437	Low Reliability
Basic Motivation Sources Scale	0.837	High Reliability
Need for Achievement	0.642	Moderate Reliability
Need for Affiliation	0.687	Moderate Reliability
Need for Power	0.789	Moderate Reliability
Need for Cognition	0.766	Moderate Reliability
Innovative Behavior Scale	0.961	High Reliability
Idea Generation	0.875	High Reliability
Idea Seeking	0.877	High Reliability
Idea Communication	0.850	High Reliability
Initiation of Implementation Activities	0.869	High Reliability
Involving Others	0.808	High Reliability
Overcoming Obstacles	0.900	High Reliability
Innovative Outputs	0.734	Moderate Reliability

Note. α: Cronbach's Alpha

Based on the responses provided by the managers within the scope of the research, the internal consistency coefficients (Cronbach's Alpha) obtained for the Big Five Personality Traits Scale, the Basic Motivation Sources Scale, and the Innovative Behavior Scale indicated varying levels of reliability, ranging from low to high across the total scales and their subdimensions (Table 3).

Table 4. Personality traits of managers by gender

Dimension	**Gender**	**n**	$\bar{X}$	**S.D.**	**p**

Extraversion	Male	258	8.35	1.39	0,013*
	Female	87	7.89	1.76	

Note.*: p< 0.05; n: Number of Participants; X̄: Arithmetic Mean; S.D.: Standard Deviation

Based on the findings of the study, no statistically significant difference was found between managers' personality traits in terms of gender, except for extraversion (p>0.05). It was found that male managers exhibited significantly higher levels of extraversion compared to female managers (p=0.013; Table 4).

Table 5. Basic motivation sources of managers by gender

Scale and Subdimensions	**Gender**	**n**	**X̄**	**S.D.**	**p**
Basic Motivation Sources	Male	258	118.95	14.51	0,009*
	Female	87	114.09	16.12	
Need for Power	Male	258	26.88	5.55	<0,001*
	Female	87	24.15	6.28	
Need for Cognition	Male	258	29.68	5.22	0,005*
	Female	87	27.80	5.93	

Note.*: p< 0.05; n: Number of Participants; X̄: Arithmetic Mean; S.D.: Standard Deviation;

In terms of basic motivation sources, a statistically significant difference was found between male and female managers, except for the need for achievement and the need for affiliation (p<0.05). Specifically, male managers scored significantly higher than female managers in the overall motivation level, as well as in the need for power and need for cognition subdimensions (Table 5).

Table 6. Innovative behavior levels of managers by gender

Subdimensions	**Gender**	**n**	**X̄**	**S.D.**	**p**
Idea Generation	Male	258	5.50	2.34	<0,001*
	Female	87	6.57	2.47	
Idea Communication	Male	258	7.94	2.95	0,050*
	Female	87	8.62	2.32	

Note.*: p< 0.05; n: Number of Participants; X̄: Arithmetic Mean; S.D.: Standard Deviation

Regarding innovative behavior, statistically significant gender-based differences were found in the subdimensions of idea generation and idea communication ($p<0.05$). Female managers scored significantly higher than male managers in both dimensions ($p<0.001$ and $p=0.050$, respectively; Table 6). For the other subdimensions and total innovative behavior scores, no statistically significant differences were found ($p>0.05$).

Table 7. Personality traits of managers by managerial position

Dimensions	**Managerial Position**	**n**	**X̄**	**S.D.**	**p**
Extraversion	Mid-Level	221	8.11	1.57	0,042*
	Top-Level	124	8.45	1.36	
Neuroticism	Mid-Level	221	5.51	1.87	<0,001*
	Top-Level	124	4.54	1.62	

Note.*: $p< 0.05$; n: Number of Participants; X̄: Arithmetic Mean; S.D.: Standard Deviation

According to Table 7, statistically significant differences were found between mid-level and Top-level managers in the personality traits of extraversion and neuroticism ($p<0.05$). Top-level managers demonstrated significantly higher levels of extraversion ($p = 0.042$), while mid-level managers exhibited higher neuroticism scores, suggesting that Top managers tend to be more emotionally stable ($p<0.001$). For other personality dimensions, no significant differences were observed based on managerial position ($p>0.05$).

No statistically significant differences were found in the total and subdimension scores of basic motivation sources and innovative behavior among managers based on their positions (mid-level vs. Top-level) ($p>0.05$).

Table 8. Correlation between managers' personality traits and innovative behavior

		E	A	C	N	O
IB	r- value	0,211	0,178	0,217	-0,067	0,219
	p- value	<0,001*	0,001*	<0,001*	0,214	<0,001*
IG	r- value	0,246	0,177	0,165	-0,016	0,185
	p- value	<0,001*	0,001*	0,002*	0,764	0,001*
IS	r- value	0,127	0,253	0,151	-0,072	0,219

	p- value	0,018*	<0,001*	0,005*	0,184	<0,001*
IC	r- value	0,191	0,065	0,080	-0,049	0,107
	p- value	<0,001*	0,228	0,137	0,366	0,046*
II	r- value	0,198	0,235	0,167	-0,135	0,277
	p- value	<0,001*	<0,001*	0,002*	0,012*	<0,001*
IO	r- value	0,103	0,128	0,149	0,009	0,078
	p- value	0,056*	0,017*	0,005*	0,867	0,149
OO	r- value	0,183	0,109	0,305	-0,053	0,172
	p- value	0,001*	0,042*	<0,001*	0,327	0,001*
IOP	r- value	0,204	0,110	0,255	-0,083	0,274
	p- value	<0,001*	0,041*	<0,001*	0,124	<0,001*

Note.*: p< 0.05; E: Extraversion, A: Agreeableness, C: Conscientiousness, N: Neuroticism, O: Openness to Experience; IB: Innovative Behavior; IG: Idea Generation; IS: Idea Seeking; IC: Idea Communication; II: Initiation of Implementation; IO: Involving Others; OO: Overcoming Obstacles; IOP: Innovative Outputs; p: Significance level; r: Pearson correlation coefficient

As shown in Table 8, there was a low but statistically significant positive correlation between managers' personality traits and their innovative behavior, with the exception of neuroticism, which was not significantly associated (p> 0.05).

Table 9. Correlation between managers' innovative behavior and basic motivation sources

		BMR	ACH	AFF	POW	COG
IB	r- value	0,347	0,281	0,424	0,040	0,285
	p- value	<0,001*	<0,001*	<0,001*	0,454	<0,001*
IG	r- value	0,221	0,150	0,307	0,006	0,200
	p- value	<0,001*	0,005*	<0,001*	0,911	<0,001*
IS	r- value	0,260	0,197	0,337	-0,040	0,287
	p- value	<0,001*	<0,001*	<0,001*	0,454	<0,001*
IC	r- value	0,276	0,165	0,375	0,119	0,160
	p- value	<0,001*	0,002*	0,000*	0,027*	0,003*
II	r- value	0,306	0,280	0,392	0,004	0,236
	p- value	<0,001*	<0,001*	<0,001*	0,934	<0,001*
IO	r- value	0,238	0,210	0,355	-0,008	0,164
	p- value	<0,001*	<0,001*	<0,001*	0,883	0,002*

OO	r- value	0,372	0,356	0,389	0,036	0,312
	p- value	<0,001*	<0,001*	<0,001*	0,501	<0,001*
IOP	r- value	0,372	0,294	0,353	0,112	0,321
	p- value	<0,001*	<0,001*	<0,001*	0,037*	<0,001*

Note. *: p< 0.05; BMR: Basic Motivation Sources; IB: Innovative Behavior; IG: Idea Generation; IS: Idea Seeking; IC: Idea Communication; II: Initiation of Implementation; IO: Involving Others; OO: Overcoming Obstacles; IOP: Innovative Outputs; ACH: Need for Achievement; AFF: Need for Affiliation; POW: Need for Power; COG: Need for Cognition; p: Significance level; r: Pearson correlation coefficient

According to Table 9, a weak to moderate positive correlation was found between managers' innovative behavior and their basic motivation sources, with the exception of need for power, which did not yield a significant result (p> 0.05). Notably, the strongest correlation was observed between innovative behavior and the need for affiliation (r = 0.424), indicating that affiliation may be a key motivational factor in fostering innovative tendencies among managers.

DISCUSSION

In the present study, the BFI-10 (Soto & John, 2009) was employed to measure personality traits, primarily due to practical constraints such as participants' limited availability and demanding managerial responsibilities. Nonetheless, the internal consistency of the scale was generally low across dimensions, with only the neuroticism subscale demonstrating an acceptable level of reliability (see Table 3). This outcome aligns with prior research indicating that brief personality inventories, such as the BFI-10, may yield reduced reliability due to their two-item-per-dimension structure (Rammstedt & John, 2007; Soto et al., 2011). These findings underscore the recommendation that, where feasible, longer instruments such as the full BFI or NEO-PI-R should be preferred to enhance psychometric robustness.

In this study, gender-based differences in managers' personality traits, motivation sources, and innovative behaviors were examined. Among personality traits, only extraversion showed a significant difference, with male managers scoring higher (Table

4), although prior research presents mixed results (Rahmani & Lavasoni, 2012; Lehman et al., 2013; Polatcı & Sobacı, 2014; South et al., 2018; Soba et al., 2019). These inconsistencies may be explained by cultural norms and gender roles, as suggested by Social Role Theory (Eagly et al., 2000). In terms of motivation, male managers scored higher in need for power and need for cognition, while no significant gender differences were found in need for achievement and affiliation (Table 5). The variability observed in previous research findings (Andersen & Hansson, 2011; Schuh et al., 2014; Barutçu & Çöllü, 2020) is often explained through theoretical perspectives that emphasize the role of leadership expectations, evolutionary mechanisms shaping behavioral tendencies, and the shaping power of socio-cultural and organizational structures (Yukl, 2010; Diekman & Eagly, 2008; Waldman et al., 2012). Higher cognitive motivation in men may reflect stronger analytical and information-seeking tendencies (Cacioppo & Petty, 1982). Although total innovative behavior scores did not differ by gender, women scored higher in idea generation and communication (Table 6), aligning with research emphasizing women's strength in collaboration and communication (Lapuente & Suzuki, 2021). However, findings on gender and innovation remain inconclusive (DiTomaso & Farris, 1992; Fox & Schuhmann, 1999; Damanpour & Schneider, 2009; Yılmaz & Beşkaya, 2018).

In relation to managerial positions, statistically significant differences were observed exclusively in the personality dimensions of extraversion and neuroticism. Specifically, top-level managers demonstrated higher levels of extraversion and lower levels of neuroticism compared to their mid-level counterparts (Table 7). These findings are consistent with prior research indicating that individuals occupying senior executive roles tend to exhibit greater sociability and emotional stability (Furnham & Crump, 2015; Moutafi et al., 2007). The reciprocal relationship between personality traits and occupational roles has been widely associated with critical organizational outcomes such as leadership effectiveness, creativity, and career progression (Morgeson et al., 2005; Rothmann & Coetzer, 2003; Lee & Wu, 2011). Low levels of neuroticism, which reflect emotional resilience and stress tolerance, are often linked to greater leadership success, as such individuals are better equipped to manage pressure and uncertainty (Howard & Howard, 2001). Furthermore, extraverted individuals, characterized by

social confidence, emotional intelligence, and a generally optimistic disposition, are frequently perceived as more effective leaders due to their enhanced interpersonal and communication skills (Hogan, 2006).

In the present study, weak positive correlations were found between managers' extraversion, agreeableness, conscientiousness, and openness to experience and their innovative behaviors, while neuroticism was negatively associated only with the "initiation of implementation" subdimension (Table 8). These findings suggest that although the impact may be limited, positive personality traits can support innovative behavior, whereas higher levels of neuroticism may hinder participation in the innovation process. These results are in line with numerous studies in the literature. For example, Bozkurt et al. (2017) and Dangmei et al. (2020) emphasized the positive effects of openness to experience, conscientiousness, and extraversion on innovative behavior. Similarly, Olakitan (2011), Hsieh et al. (2011), and Abdullah et al. (2019) highlighted the significant impact of extraversion and openness to experience on innovative performance. However, not all findings are consistent. For instance, Woods et al. (2018) found no significant relationship between openness to experience, conscientiousness, and innovation, indicating that the personality–innovation link may vary across different contexts. Particularly, research findings related to neuroticism have shown more complex and inconsistent patterns in the literature. While studies by Fırın and Sevim (2022), Yılmaz (2019), and Ali (2019) reported no significant relationship between neuroticism and innovative behavior, Buijs (2022) suggested that individuals with high levels of neuroticism may be more sensitive to emotional uncertainty, which could lead to reduced motivation for engaging in innovative activities. On the other hand, some scholars argue that stress may enhance creative problem-solving in certain individuals, suggesting that the effects of neuroticism on innovation are multifaceted and should not be evaluated unidimensionally (Buijs, 2022). Overall, personality traits play an important role in shaping individuals' tendencies toward innovation. Traits such as extraversion, openness to experience, conscientiousness, and agreeableness may foster individuals who are open to new ideas, cooperative, and capable of systematic thinking. In contrast, high levels of neuroticism may limit one's willingness to take risks and engage in innovative processes.

In this study, low to moderate positive correlations were identified between managers' basic motivation sources and their innovative behaviors (Table 9). Among these, the need for affiliation demonstrated the strongest relationship with innovation, whereas needs for achievement, power, and cognition showed weaker associations. Notably, the need for power was significantly related only to idea communication and innovative outputs, but not to other subdimensions.

A review of the literature shows that motivation is often examined in relation to entrepreneurship—a concept closely linked to innovation and creativity (Edwards-Schachter et al., 2015; Eckhardt & Shane, 2003). Studies have consistently shown that basic motivational needs—achievement, power, affiliation, and cognition—are associated with entrepreneurial and innovative tendencies, though their effects vary (Hornaday & Bunker, 1970; Lachman, 1980; Ceylan & Demircan, 2002; Apospori et al., 2005; Özçoban & Özkul, 2018; Buijs, 2022). While achievement and power needs are generally positively related to innovation, the need for affiliation is often seen as less influential. However, this study found a moderate positive relationship between affiliation and innovative behavior, suggesting that socially supportive environments may enhance innovation. Given the complex and multidimensional nature of motivation, innovative behavior is best understood as the outcome of interacting psychological and contextual factors.

Limitations

Findings are also limited to managers working in Türkiye's public sports sector institutions.

CONCLUSIONS

The quality of public administration should be directly associated with the competence and qualifications of public personnel. The fulfillment of increasingly complex and expanding governmental functions depends on the selection of appropriately qualified managers. This implies that public affairs cannot be effectively conducted by individuals lacking the necessary qualifications. In Türkiye, there is a prevailing belief that public work will somehow run itself, regardless of individual competence or managerial effort. This mindset undermines the importance of human capital and

thereby hinders the delivery of high-quality public services. Consequently, abandoning this mentality is essential for enhancing the performance and service quality of public institutions.

PRACTICAL IMPLICATIONS

Based on the findings of this study, several theoretical and practical recommendations can be provided. The relationships among personality traits, basic motivation sources, and innovative behaviors represent a complex structure shaped not only by individual differences but also by multi-layered contextual factors such as organizational structure, cultural norms, institutional dynamics, societal roles, and prevailing socio-economic conditions. In this regard, future research should consider using larger and more representative samples that include individuals from various organizational cultures and management levels to enhance the generalizability and contextual relevance of the results.

Although the BFI-10 was employed as a time-efficient tool for measuring managers' personality traits, the low internal consistency observed in this study suggests a potential limitation in terms of measurement reliability. Therefore, when conditions permit, the use of more comprehensive and psychometrically robust personality inventories—such as the BFI-44 or NEO-PI-R—is recommended to obtain more scientifically sound data.

From a practical standpoint, personality traits, motivational sources, and innovative behaviors are key psychosocial components that directly affect organizational performance. Hence, managerial selection and evaluation processes should not rely solely on individual qualifications. Instead, the dynamic interaction of these factors should be taken into account through a holistic framework to improve management efficiency and institutional effectiveness.

One notable finding of the study is that an increase in managers' need for affiliation is positively associated with higher levels of innovative behavior. This suggests that managers are more likely to engage in innovation when operating within socially supportive and trust-based organizational environments. Therefore, it is recommended that strategic initiatives be developed to foster social cohesion and strengthen

institutional support mechanisms, ultimately enhancing interaction among managers and cultivating a shared sense of belonging.

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MEDIA AND YOUTHS' PERCEPTION OF SPORTS: THE REALITY SHAPED ON SCREEN

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Abstract

This study aims to examine young people's perceptions of sports through media and to explore how media influences these perceptions. Conducted within the scope of qualitative research, the study follows a phenomenological design. The sample consists of 11 volunteer youths living in Vezirköprü who actively use media and engage in sports. Data were collected through semi-structured face-to-face interviews based on a form developed by the researchers, including nine questions. Audio recordings were taken to ensure data reliability. The analysis revealed that media content related to athlete profiles, influencer lifestyles, national athletes, personal progress in sports, clothing, achievements, routines, and dietary habits significantly affects youths' motivation to engage in sports. Participants reported that they tend to imitate or take inspiration from those they follow, adopt a more disciplined lifestyle, are influenced by female athletes' success, and consider athletes' educational lives as role models. Moreover, most participants expressed that they critically assess the information they encounter on social media. Traditional media was viewed as more controlled and limited in interaction and information, while social media was perceived as more open to exploration, dynamic, and enjoyable.

Keywords: *Perception, Media, Media and sport, Social media.*

INTRODUCTION

Sport is an enjoyable and educational activity performed individually or in groups, generally within the framework of competition, governed by its own rules, and aimed at enhancing a person's mental and physical development (Atasoy & Kuter, 2005). Akkoyunlu (1996) defines sport as a physical competition involving various challenges, representing the human spirit's effort and passion for victory within a system of order and fairness. Additionally, sport can be described as a systematic set of activities designed to improve anatomical and physiological functions, enhance muscle

and joint capabilities, and optimize overall physical performance. Furthermore, the literature indicates that sport serves as a practical method with the potential to develop social skills and improve quality of life (Çufadar, 2025).

Sport supports the personal development of young people by enabling them to set goals through positive experiences. It has also been stated that active participation in sports enhances academic achievement, develops leadership skills, and boosts self-esteem, among other positive outcomes (Aykara & Albayrak, 2016). Sport not only teaches young individuals bodily development and motor skills but also contributes significantly to personality formation. Through sporting activities, young people discover their self-confidence, improve motivation, and strengthen attention and focus. Moreover, they acquire characteristic traits such as team integration, coping with success and failure in competitive environments, and adhering to principles of fairness during activities (Avcı & Afacan, 2016).

Linguistically, the term "media" originates from the Latin word "medium." In Latin, "medium" means medium or means, and in contemporary usage, the plural form "media" is employed. Media encompasses communication tools with visual and auditory features that fulfill essential functions such as informing, educating, and guiding individuals or communities through the transmission of various information (Vardarlıer & Zafer, 2019). This concept refers to a mechanism that delivers multiple messages to diverse socio-demographic groups in accordance with its own publishing principles, transmitting the formatted communications of the medium unilaterally (Necla, 2008).

As in the rest of the world, individuals in our country use most traditional and modern mass communication tools to meet their needs for news, information, entertainment, and education (Kıran, 2021). The rise of alienation, violent behavior, sexually focused attitudes, substance addiction, indifference, and lack of goal-setting among today's youth is largely influenced by media tools (Can, 2015). Technological literacy plays a crucial role in social media usage (Aktulun & Elmas, 2019). Due to its continuous update capability and easy accessibility, social media currently stands as one of the most effective communication platforms. Through these platforms, individuals express their thoughts and share diverse visual and auditory content. Social media, with its variety of

tools, also serves as a powerful mass communication resource supporting efficient learning and teaching processes (Öztürk & Talas, 2015). It is evident that social media will continue to function as a functional tool in education in the future as it does today. Catering to individuals of all ages and education levels, social media is important for its free access, widespread use, ease of accessibility, contribution to social cooperation, enhancement of peer interaction, and provision of more flexible educational opportunities. Moreover, social media introduces various approaches to learning and assessment, supports research processes, and can be utilized without institutional support from universities or similar entities, making it a valuable educational tool (Sarsar, Başbay & Başbay, 2015).

Media holds a powerful role in the development of sport as a social structure. From a profit-oriented perspective, it is evident that sport significantly contributes to mass communication tools. In essence, sport and media are mutually influential dynamics. The impact of both sport on media and media on sport cannot be overlooked. Sport relies on media support as a field that reaches and influences large audiences (Güler & Demir, 1995). In today's world, where visuality is paramount, the shaping of sport according to the demands of media has become inevitable. Media organizes sport to serve its own interests without causing problems, focusing largely on the emotional aspect and advertising potential due to commercial concerns, viewership rates, and sales pressure (Demir, 2024). Additionally, media plays an important role in introducing, promoting, and disseminating sport. Through media channels, many individuals become aware of sports branches they had never noticed or known about before, gain information about them, and watch these sports. Over time, this interaction fosters curiosity and attachment to a particular sport, turning it into a continuously followed area (Kaçar & Kara, 2024).

In the contemporary world, media, especially television, internet, and social media platforms, plays a significant role in shaping young individuals' perceptions, attitudes, and behaviors regarding sport. Sports content and athlete profiles presented on these platforms not only promote sport but also influence and shape youths' perceptions of sport. On media platforms where visual elements are emphasized, sport is often presented as a commercial tool centered on competition and high visual appeal. This

situation causes young people to perceive sport primarily as a visual and entertainment medium, neglecting its values such as health, discipline, team spirit, and personal development. Therefore, examining how young people's sports perceptions are shaped through media is crucial for understanding societal perspectives on sport and socio-cultural parameters. Accordingly, the aim of this study is to investigate the impact of sports content and athlete profiles in the media on young people's perceptions of sport.

MATERIALS AND METHODS

The execution of this study was approved by the Amasya University Social Sciences Ethics Committee with the decision number 108.01-260719.

Research Design

This study was conducted within the scope of qualitative research methods. Qualitative research has a flexible and interpretative structure that deeply examines the meaning of social phenomena. This structure provides both creativity and methodological consistency to the researcher (Dayanan Uğur & Saylık, 2025). The study employs the phenomenological design, which is one of the qualitative research patterns. Phenomenological research aims to understand the essence of individuals' lived experiences (Van Manen, 2007).

Population and Sample

The population of the study consists of young people aged 18 and above. The sample group includes 11 voluntary young individuals living in the Vezirköprü district who actively use media and participate in sports. Purposeful sampling, a type of criterion sampling, was used in the research. This sampling method aims to select samples directly related to the research problem by including objects, situations, or individuals with certain characteristics (Güvenç & Özdemir, 2025). The criterion in this study was the active use of media tools by the youth.

Data Collection Tool

A semi-structured interview approach was used for data collection. Face-to-face interviews were conducted using semi-structured forms (with 9 questions) developed

by the researchers. The open-ended questions in semi-structured interview forms allow individuals to express their feelings, thoughts, and experiences in their own words (Güvenç & Özdemir, 2025). Additionally, open-ended questions provide flexibility in meaning. The semi-structured questions developed by the researchers are as follows:

1. How effective are famous athletes or influencers active on social media in directing young people towards sports?
2. Do the profiles and posts of athletes and influencers in the media affect young people's perceptions (nutrition, work life, education, etc.)?
3. To what extent does media influence young people's sources of sports information (nutrition, injury, pain, knowledge, comments, etc.)? Do you question or research the information?
4. Do sports success stories presented on social and visual media encourage young people to engage in active sports? Do they increase their motivation?
5. How do sports-related news and the language used impact young people's perspective on sports?
6. Do you normalize these negative attitudes, or do you interpret them as unethical behavior? Please explain.
7. Do negative news in the media (violence, doping, unethical behaviors) negatively affect young people's perceptions of sports? Please explain.
8. What differences exist between social media and traditional media (TV, newspaper, radio) regarding sports perception? For example, does traditional media provide more detailed information while social media offers more entertaining and superficial content?
9. How do young people's media consumption habits related to sports influence their participation in physical activities? (Does media consumption lead to social media addiction or encourage more engagement in sports?)

Data Collection and Analysis

The study was conducted using the interview method, which is among qualitative data collection tools. To prevent data loss during interviews, audio recordings were made. The transcribed data were analyzed using the Nvivo software. Through content analysis,

themes and codes were created. Codes were assigned to appropriate themes and reported accordingly.

RESULTS

Information related to the qualitative data analysis results is presented in the table below.

Table 1. Demographic Information of the Participants

	Age	**Gender**	**Income Level**	**Educational status**	**Sports Participation Level**	**Preferred Media Tool**	**Media Usage Time**
K1	25	Male	Middle	High school	Professional	İnstagram	3-4 hours
K2	21	Male	Middle	Associate Degree	Amateur	İnstagram	6-7 hours
K3	21	Male	Middle	Associate Degree	Amateur	İnstagram	8-12 hours
K4	20	Male	Middle	Associate Degree	Amateur	İnstagram	6-7 hours
K5	20	Female	Middle	Associate Degree	Professional	X	4-5 hours
K6	22	Female	Middle	Associate Degree	Amateur	İnstagram	4-5 hours
K7	24	Male	Middle	Associate Degree	Amateur	İnstagram	1-2 hours
K8	25	Male	Middle	Bachelor's Degree	Amateur	İnstagram-TW	1-2 hours
K9	24	Male	Middle	Bachelor's Degree	Amateur	Facebook	7 hours
K10	23	Male	Middle	Bachelor's Degree	Amateur	İnstagram	3-4 hours
K11	23	Male	Middle	Bachelor's Degree	Amateur	Youtube	2-3 hours

Table 1 presents information about the participants. The study was conducted with a total of 11 individuals, including 2 females and 9 males. Most participants preferred Instagram as their media platform, held an associate degree, and engaged in sports at an amateur level. The age range of the participants varied between 20 and 25 years, and they spent between at least 1-2 hours and at most 8-12 hours on social media.

Table 2. The Influence of Famous Athletes or Influencers on Encouraging Youth to Participate in Sports on Social Media

Name	Node Type	Coded Words	Coded Text
Encouragement to Sport	Node	36	Football player profiles Their bodybuilding Their healthy nutrition Their lives National athletes Their self-care Their approaches Their achievements Sharing their development Their sports routines National athlete achievements Training videos Their working lives Their outfits Professional athletes

Table 2 presents information regarding the influence of famous athletes or influencers on encouraging youth to participate in sports on social media. Analysis of the data revealed that participants stated factors such as athlete profiles, the lives of influencers, national athletes, sharing their progress in sports, clothing, achievements, routines, and sharing their nutrition habits play an effective role in motivating youth to engage in sports.

Table 3. The Impact of Athlete Profiles and Influencers' Posts in the Media on Youth Perceptions

Name	Node Type	Coded Words	Coded Text
Perception	Node	15	Encouraging Being motivated Role modeling Achievements of female athletes Attracting attention Imitating Disciplined lifestyle Education

Table 3 presents participants' views on the impact of athlete profiles and influencers' posts in the media on young people's perceptions. Analysis of the data revealed that participants stated the videos caught their interest, they tended to imitate, occasionally modeled the athletes' educational lives, adopted a disciplined lifestyle, and were influenced by the successes of female athletes.

Table 4. The status of questioning information in the media

Name	Node Type	Coded Words	Coded Text
Information	Node	68	If I have knowledge, I do not question it I verify the accuracy from 5 to 6 sources I easily access information from the internet I research through social media I use trial and error method I look up words I do not know I research things that catch my attention I learn first, then research I always question

			There can be many false news
			I consult experts

Table 4 presents participants' views on the extent to which they question information in the media. Analysis of the data shows that the majority of participants (9 participants) stated that they question the information they obtain from social media; while other participants expressed that if they have prior knowledge on the topic, they do not question it, and one participant indicated using trial and error as a method.

Table 5. The effect of traditional media and social media on sports perception

Name	**Node Type**	**Coded Words**	**Coded Text**
Traditional and social media	Node	53	Traditional media is more rigid Traditional media language is formal Traditional media is insincere Social media is entertaining Traditional media is limited Social media is open to research Social media is more superficial Social media is cost-free Traditional media is regulated Traditional media is limited and controlled Interaction in traditional media is difficult

Table 5 presents participants' opinions on the impact of traditional and social media on sports perception. Analysis of the data revealed that the majority of participants (10 participants) stated that traditional media is more controlled, more limited in terms of information, and interaction is more difficult, while social media is more open to research and entertaining. Another participant (1 participant) expressed the view that social media provides more superficial information and is cost-free.

Table 6. Negative aspects of media consumption habits

Name	Node Type	Coded Words	Coded Text
Negative aspects	Node	49	Addictiveness Disconnecting from life Constant phone use Affecting daily tasks Not having time for surroundings Forming habits Not influencing Athlete comments Procrastinating life Desire to become famous Unconscious screen time Watching engaging videos for hours Desire to share every action Desire to earn easy money Adopting a sedentary lifestyle

Table 6 presents participant views on the negative aspects of media consumption habits. Analysis of the data revealed that the majority of participants (8 participants) stated that social media has negative effects such as postponing daily tasks, desire to become famous, watching videos for hours, desire to make easy money, the urge to share every action, inability to spend time with surroundings, adopting a sedentary lifestyle, and inappropriate language used by sports commentators. Meanwhile, other participants (3 participants) expressed that these issues have no impact on them and that with proper planning, everything can continue as routine.

DISCUSSION AND CONCLUSION

This section of the study presents the conclusions drawn from the analysis of the obtained data.

In the study, it was determined that footballer profiles, the lives of influencers, national athletes, sharing of development processes in sports, their clothing, achievements, routines, and nutrition habits are effective in the tendency to engage in sports. These findings suggest that the posts shared by well-known figures in the sports world have a significant impact on young people's motivation to engage in sports. Additionally, providing information related to areas of interest and the desire to be like them contribute to starting and continuing sports activities.

When the literature is examined, there are various studies that show similarities or differences with this study in terms of topic and scope. For example, in a study conducted by Bilim (2020), it is stated that guidance through identification and mass media tools such as media and television are effective in people's initiation to sports. Moreover, media tools like television play an important role in introducing sports to societies and educating and guiding individuals through sports channels. Additionally, well-known and respected athlete profiles have a significant influence on people's orientation and initiation to sports (Bilim, 2020). Furthermore, a study by Tian et al. (2023) expresses that success stories and training routines of athletes shared on social media increase young people's interest in sports. Research by Weber et al. (2022) concluded that sharing athletes' successes and training on social media positively affects the motivation of especially young female athletes.

It was found that participants who follow athletes and influencers tend to imitate them, take athletes as role models, adopt a disciplined lifestyle, are influenced by the achievements of female athletes, and emulate their educational lives. These findings reveal that individuals who regularly follow athletes and influencers not only imitate and model them but also adopt their lifestyles and disciplinary approaches as role models. Furthermore, as young people identify themselves with these figures, they exhibit similar behaviors, imitate their educational lives and achievements, which increases their orientation towards sports and positively contributes to their development processes. For example, young people can shape their behaviors by observing and imitating their surroundings. In other words, the content they watch in the media can affect their behaviors positively or negatively. Sometimes, young people immediately adapt to the attitudes, situations, and behaviors conveyed through

messages in the content they watch in the media (Üstündağ, 2019). Indeed, as a result of this reciprocal interaction, individuals tend to imitate the behavior and consumption style of the character they identify with (Pelikli & Özkaya, 2025). For instance, Mürütsoy and Toksarı (2021) found that young people take the lifestyles of athletes they follow on social media as examples. Additionally, research by Alqefari et al. (2024) concluded that young people see athletes and influencers they follow on social media as role models.

Most participants stated that they question the information they acquire on social media, while perceiving traditional media as more controlled, offering more limited information and less interaction, and considering social media as more open to research and entertaining. This finding reveals that young people perceive media tools differently. In other words, in this study, young people found social media more attractive, entertaining, and open for accessing information; on the other hand, they viewed traditional media as limited in information access. Therefore, they stated that they find social media more advantageous due to the opportunities it offers. The literature includes various studies with similarities or differences to this finding. For example, individuals who share event results on social media platforms can receive support and feedback, which not only contributes to increasing their motivation but also enables them to be part of social support structures (Aydemir, 2024). On social media, celebrities, politicians, various companies, and public institutions have the opportunity to communicate directly and without intermediaries with their audiences. This allows them to respond quickly and easily to questions and criticisms from their audiences (Öztürk & Talas, 2015). In the literature, for example, Kaplan and Haenlein (2010) found that social media users take a more active role compared to others. Kietzmann et al. (2011) stated that unlike traditional media, social media provides two-way interaction and creates strong communities among users.

Finally, it was determined that most participants view social media as causing negative situations such as procrastination of daily tasks, desire to be famous, watching videos for hours, inappropriate language use by sports commentators, desire to earn money easily, sharing every action, lack of time for the environment, and adoption of a sedentary lifestyle. This finding suggests that long-term interaction with social media

can lead to negative habits in individuals. Prolonged time spent on social media may lead individuals to adopt unhealthy lifestyles, pursue unrealistic goals, and experience negative role modeling through language use. In this respect, the findings show that poor-quality time spent on social media can result in individual and societal problems. The literature reveals similar or differing findings on this subject. Parents state that due to children's unconscious use of social media tools, they face problems such as losing daily routines, financial losses, academic failures, wasting excessive time, and spreading misinformation acquired from incorrect learning sources. All these negativities make children's lives more difficult (Çelik, Çelik & Aydın, 2019). Furthermore, sedentary or inactive times unknowingly spent with social media tools in digital environments are known to have negative effects on individuals' mental, physical, and psychosocial health. Insufficient social stimulation caused by media intensity emerging from technological devices and children's lack of adequate physical activity in their environment inevitably leads to abnormal developmental outcomes (Akbulut, 2013). For example, Andreassen (2015) found that social media addiction causes problems with time management, disruption of daily tasks, and negative psychological outcomes. Kuss & Griffith (2017) determined that excessive social media use is associated with sedentary lifestyle and low academic performance among youth. Additionally, Huang (2017) expressed that excessive social media use negatively affects psychological health.

Based on the analysis of the obtained data, the following recommendations are presented:

- The number of media literacy courses in educational stages should be increased to control and guide the negative effects of social media on young people in the desired direction.
- Functional monitoring mechanisms should be established to ensure that the language used by athlete profiles and influencers on both social and traditional media is positive, constructive, and complies with ethical rules.
- Awareness-raising activities should be conducted at all educational levels, especially primary education, to increase consciousness about social media use.

- Families and educational institutions should work on directing young people's perceptions toward physical activities to protect them from the negative effects of social media.

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RELATIONSHIP BETWEEN STRESS COPING AND ANXIETY LEVELS OF SPORTS SCIENCES FACULTY STUDENTS

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Abstract

The aims of this study are to examine 1- the anxiety and coping with stress levels of sports sciences faculty students in terms of some sociodemographic variables (age, gender, income level, internet usage time, department, sports experience, and frequency of sports participation), 2-the relationship between the scores of two scales. Correlational survey model was used in the study. Sample of the study consists of 286 students selected by random sampling method. Personal information form, Coping Response Inventory and Beck Anxiety Inventory were used as data collection tools. The results reveal that female students experience higher levels of anxiety than their male counterparts, despite demonstrating a lower propensity to seek professional psychological support. Furthermore, students engaged in individual sports exhibit superior problem-solving abilities compared to those engaged in team sports. The data also indicate that students aged 24 and above report higher anxiety levels relative to those in the 18–20 age group. Conversely, individuals within the 21–23 age group display a decreased tendency to seek environment support. The results showed that students attending the Department of Recreation demonstrated significantly higher levels of positive appraisal compared to students from other departments. However, their tendency to seek professional psychological support was found to be lower. Senior students (i.e., those in their fourth year) exhibited higher levels of anxiety, whereas first-year students reported lower tendencies to seek both professional help and environment support. Furthermore, individuals with 3 to 4 years of experience in sports reported elevated levels of anxiety and lower levels of logical analysis when compared to their peers with different durations of engagement. Those who trained one to two times per week experienced higher anxiety levels and demonstrated poorer coping skills than individuals who trained three or more times weekly. A weak, yet statistically significant, negative correlation was observed between stress coping skills and anxiety levels. These results suggest the need to expand psychological counseling services focused on reducing anxiety and enhancing students' coping abilities. In addition, it is recommended to develop sport-

specific support programs and to promote regular training habits in order to support students' mental health and resilience.

Key Words: *Anxiety, Sport Psychology, Coping Strategies.*

INTRODUCTION

Anxiety is characterized by intense feelings of fear, accompanied by somatic symptoms indicative of a hyperactive autonomic nervous system (Radeef, 2014). According to the American Psychiatric Association, (2013), it is defined as a state of anxiety, worry, and fear about uncertain outcomes. These symptoms physiologically manifest as palpitations, sweating, trembling or shaking, difficulty in breathing or the sensation of choking, a feeling of throat constriction, chest pain or tightness, nausea or abdominal pain, dizziness, inability to stand, lightheadedness or the sensation of fainting, trembling, chills, shivering, or hot flashes, numbness or tingling sensations, derealization (the sensation of unreality), depersonalization (the sensation of being detached from oneself), fear of losing control or "going crazy," and fear of death. The presence of four or more of these symptoms is required for diagnosis.

The term "stress" is associated with feelings of discomfort, and an increasing number of people define themselves as stressed. Stress is almost always seen as a negative factor that leads to a decline in an individual's overall performance. Therefore, stress can be a situation or experience that produces feelings of tension, anxiety, fear, or threat, and it can have internal or external origins (Lipp, 2004). Stress is defined as "the effort expended by an individual beyond physical and psychological limits due to incompatible conditions in the physical and social environment" (Cüceloğlu, 1994). The general prevalence rates of depression, anxiety, and stress are alarmingly high (Melaku et al., 2021). Depending on how each individual responds to and copes with stressful situations, negative stress or distress can initiate the development of numerous diseases and cause significant harm to a person's quality of life and productivity. As a result, there has been growing interest in identifying and reducing the causes of stress for organizations, schools, and societies (Sadir et al., 2010). Coping is a process that we engage in every day as individuals. When we feel stressed or wish to manage a challenging situation, we enter the coping process (Lazarus, 1966). There is no single

common way to cope with stress. The coping method for stress varies for each person according to their personality and lifestyle (Güçlü, 2001). Coping strategies are specific efforts that individuals use to manage both behavioral and psychological stress, allowing them to tolerate, reduce, or minimize stressful events. While people may differ in the way they think about and respond to stressful situations, coping plays a central role in adapting to stressful life events (Shakthivel et al., 2017). Coping with stress can be described as not eliminating stress but keeping it at a positive level (Karahan & Koç, 2005). When examining the factors that cause stress in athletes, expectations from teammates, coaches, and family (Anzilotti, 2019) and injuries experienced during sports are among the reasons that lead to stress, along with anxiety (Şenel & Yıldıran, 1998). With this stress and anxiety, the more anxious the athlete is during the competition, the more their performance decreases (Horris, 1984). In sports competitions, higher levels of anxiety have been observed in women. It has been interpreted that this is due to their self-confidence before the competition (Kahya & Küçükibiş, 2022).

Among the reasons for the decline in academic performance are stress (32.5%), anxiety (23.4%), sleep difficulties (22.2%), and work (14.7%) (Fiore, 2018). When students experience occupational stress, anxiety, and depression together, it can affect their quality of life and reduce their academic performance due to anxiety-related cognitive dysfunctions, such as memory impairments, mental blockages, poor decision-making abilities, and heightened sensitivity to others' evaluations (Nechita, 2014). Sources of the increased stress levels experienced by students include overcrowded classrooms, the semester grading system, insufficient resources and facilities, adjustment to a new environment, being away from home for the first time, changes in life arrangements, the breadth of the curriculum, long hours, and expectations for rote learning (Agrawal & Chahar, 2007). Sometimes, anxiety symptoms in university students or even normal individuals can become so severe that they interfere with their daily lives, and in such cases, this condition can be defined as generalized anxiety disorder (Biddle & Mutrie, 2008). High levels of depression, anxiety, and stress can lead to low quality of life, substance abuse, and even suicides (Sarkar et al., 2017; Moffat et al., 2004). Therefore, instead of eliminating anxiety, it is necessary to manage the stress brought by modern life and achieve psychological well-being. It is important for university students to reach

this awareness (Tunç, 2020). Physical activity has a positive effect on mood, anxiety, and overall health (Ströhle, 2009). Most coping models explain that individuals who effectively cope with stressful life events exhibit low levels of anxiety and depression (Braun-Lewensohn et al., 2009). Equipping students with the necessary coping strategies and skills to recognize personal distress and develop strategies to improve their well-being is essential for promoting professionalism (Dahlin et al., 2005).

Anxiety is a state of worry, concern, and fear that an individual experiences about uncertain situations. These symptoms manifest in the human body as palpitations, sweating, trembling or shaking, difficulty in breathing, and other signs (DSM-5). Stressful situations can trigger anxiety symptoms. For this reason, it is crucial for individuals to know how to cope with stress. This study examines the relationship between anxiety levels and coping with stress. In individuals who engage in sports, anxiety has been observed to have a positive effect up to a certain level, but beyond that threshold, it begins to have a negative impact. Therefore, the findings of this study are considered significant for individuals who engage in sports. Given that previous studies on these relationships have been limited to certain groups and have not adequately explored these issues, this research aims to be a pioneering study in this field.

METHOD

Ethical approval for the research was obtained from the Ondokuz Mayıs University Social and Human Sciences Research Ethics Committee with decision number 2024-1009 on October 25, 2024.

Research Model

In the study, correlational survey research model, which is commonly used to understand the current state of a topic or population, was employed. Survey models can be used to gain a general understanding of the current situation before conducting a more in-depth investigation into a subject. The main purpose of the correlational survey model is to examine the degree of existing or presumed relationships between two or more variables, as well as the situations in which the variables influence each other simultaneously and their changes (Karasar, 2005).

Research Group

Population of the study consists of students enrolled in sports sciences faculties at universities, while the sample is composed of 286 individuals selected through a random sampling method from students studying at Yaşar Doğu Faculty of Sports Sciences, Ondokuz Mayıs University, during the 2024/2025 academic year.

Data Collection Tools

For data collection, a Personal Information Form prepared by the researchers and two scales were used. The Personal Information Form includes questions about age, gender, the department studied, year of study, sports level, sport type, sports experience, and frequency of sports participation.

Coping Response Inventory:

Coping Response Inventory, developed by Moss in 1993, was adapted to Turkish by Koca Ballı and Kılıç (2016). The scale consists of 22 items in a 5-point Likert format and four sub-dimensions (logical analysis, positive reappraisal, seeking support, and problem-solving). Lower scores on the scale indicate that the individual uses fewer coping methods for stress. Additionally, reliability and validity studies of the scale have been conducted in the Turkish literature (Koca Ballı & Kılıç, 2016).

Beck Anxiety Inventory:

The Beck Anxiety Inventory was developed by Beck, Epstein, Brown, and Steer in 1998. Its Turkish adaptation was carried out by Ulusoy, Şahin, and Erkmen (1996). The scale consists of 21 items with a 4-point Likert format and two sub-dimensions (subjective anxiety and somatic symptoms). Lower scores on the scale indicate that the individual has low or no anxiety levels. Additionally, reliability and validity studies of the scale have been conducted in the Turkish literature (Ulusoy, Şahin, & Erkmen, 1996).

Data Collection:

Before administering the survey questions to the sports sciences faculty students constituting the research group, the purpose of the study was explained, and necessary information was provided regarding the points to be considered. The research surveys were administered to the students of the sports sciences faculty via Google Forms and physical surveys, based on voluntary participation.

Data Analysis:

To check the internal consistency of the responses given by the participants to the scale items, reliability coefficients (Cronbach Alpha) were calculated (Table 1).

Table 1. Internal Consistency Coefficients of Participants' Responses to Scale Items

Scales	Internal Consistency Coefficient	Evaluation
Beck Anxiety Inventory (BAI)	0.942	Highly Reliable
Subjective Anxiety (SA)	0.913	Highly Reliable
Somatic Symptoms (SS)	0.864	Highly Reliable
Coping Response Inventory (CRI)	0.947	Highly Reliable
Problem Solving (PS)	0.912	Highly Reliable
Positive Reappraisal (PR)	0.876	Highly Reliable
Logical Analysis (LA)	0.913	Highly Reliable
Seeking Professional Support (SPS)	0.760	Moderately Reliable
Seeking Environment Support (SES)	0.701	Moderately Reliable

In the study, the internal consistency of the Beck Anxiety Inventory and its subscale items was found to be highly reliable, while the internal consistency of the responses to the Coping Response Inventory items was found to be both highly and moderately reliable.

For the statistical evaluation of the data, normality assumption was first examined using the Kolmogorov-Smirnov and Shapiro-Wilk tests ($P > 0.05$). In the study, whether there were differences in the total scale scores based on gender, type of sport, and level was determined using the Student's t-test, while differences based on department, class, age, sports experience, and weekly training frequency were examined using One-Way Analysis of Variance (ANOVA) and Tukey's multiple comparison test. Additionally, the relationship between the total scores of the Beck Anxiety Inventory and the Coping Response Inventory was determined using the Pearson correlation coefficient. All statistical calculations were performed using the SPSS 22.0 statistical software package. The research findings were presented as n (%), mean, and standard deviation values, and results were considered statistically significant at $p < 0.05$.

FINDINGS

Distribution of the demographic characteristics of university students studying at Ondokuz Mayıs University Yaşar Doğu Faculty of Sports Sciences who voluntarily participated in the research is presented in Table 2.

Table 2. Frequency and Percentage Distributions of Participants' Demographic Characteristics

Gender	*n*	*%*	*Age*	*n*	*%*
Male	126	44.1	18-20	175	61.2
Female	160	55.9	21-24	91	31.8
Total	286	100.0	24 and above	20	7.0
			Total	286	100.0
Year of study	*n*	*%*	*Sports Level*	*n*	*%*
1st Year	87	30.4	Amateur	199	69.6
2nd Year	74	25.9	Professional	87	30.4
3rd Year	73	25.5	Total	286	100.0
4th Year	52	18.2			
Total	286	100.0			
Sports Experience (Years)	n	%	Sport Type	*n*	*%*
1-2 years	16	5.6	Individual	147	51.4
3-4 years	53	18.5	Team	139	48.6
5-6 years	54	18.9	Total	286	100.0
7 years or more	163	57.0			
Total	286	100.0			
Frequency of Sports Participation	*n*	*%*	Department	n	%
1-2 days per week	99	34.6	Physical Education and Sports Teaching	61	21.3
3-4 days per week	104	36.4	Coaching Education	89	31.1
5 or more days per week	83	29.0	Sports Management	108	37.8
Total	286	100.0	Recreation	28	9.8

	Total	286	100.0

Of the individuals who voluntarily participated in the study, 55.9% were males, 51.4% were team athletes, 69.6% were amateurs, 61.2% were aged between 18 and 20 years, 30.4% were in their first year, 34.6% did sports 3-4 times per week, 57.0% had 7 or more years of sports experience, and 37.8% were enrolled in the management department (Table 2).

Table 3. Relationship between Participants' Beck Anxiety and Coping with Stress Methods in terms of Gender

Scales and Sub-dimensions	Gender	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	Female	126	17.58	11.86	**0.002**
	Male	160	13.10	12.43	
Subjective Anxiety (SA)	Female	126	10.71	7.52	**0.005**
	Male	160	8.10	7.80	
Somatic Symptoms (SS)	Female	126	6.87	6.87	**0.002**
	Male	160	5.00	5.00	
Coping Response Inventory (CRI)	Female	126	72.80	13.85	0.381
	Male	160	74.43	16.69	
Problem Solving (PS)	Female	126	21.35	4.45	0.993
	Male	160	21.36	5.18	
Positive Reappraisal (PR)	Female	126	20.08	4.50	0.559
	Male	160	20.41	4.93	
Logical Analysis (LA)	Female	126	21.09	4.30	0.286
	Male	160	21.71	5.22	
Seeking Professional Support (SPS)	Female	126	4.31	2.08	0.015
	Male	160	4.95	2.26	
Seeking Environment Support (SES)	Female	126	5.95	1.98	0.906
	Male	160	5.98	2.11	

In the study, statistically significant differences were found between female and male students studying at the Faculty of Sports Sciences and voluntarily participating in the research, in terms of the total and subscale scores of the Beck Anxiety Scale and the professional support-seeking subscale of the Coping with Stress Methods Scale

(P<0.05; Table 3). The study determined that female students had higher total and subscale scores on the Beck Anxiety Scale compared to male students, while the total score of the professional support-seeking subscale of the Coping with Stress Methods Scale was lower for female students.

Table 4. Relationship between Participants' Beck Anxiety and Coping with Stress Methods in terms of Sport Type

Scales and Sub-dimensions	Type of sport	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	Individual	147	15.34	11.99	0.705
	Team	139	14.79	12.78	
Subjective Anxiety (SA)	Individual	147	9.28	7.64	0.940
	Team	139	9.21	7.93	
Somatic Symptoms (SS)	Individual	147	6.06	4.84	0.414
	Team	139	5.57	5.20	
Coping Response Inventory (CRI)	Individual	147	75.26	14.29	0.082
	Team	139	72.07	16.58	
Problem Solving (PS)	Individual	147	22.00	4.53	0.021
	Team	139	20.67	5.12	
Positive Reappraisal (PR)	Individual	147	20.80	4.48	0.052
	Team	139	19.71	4.96	
Logical Analysis (LA)	Individual	147	21.83	4.42	0.155
	Team	139	21.02	5.23	
Seeking Professional Support (SPS)	Individual	147	4.68	2.28	0.923
	Team	139	4.66	2.13	
Seeking Environment Support (SES)	Individual	147	5.93	2.08	0.758
	Team	139	6.00	2.03	

In the study, no significant differences were found between the total subscale scores of the Beck Anxiety Scale and the Coping with Stress Methods Scale (except for the problem-solving subscale) based on the type of sport (P>0.05; Table 4). However, it was observed that students who declared themselves to be engaged in individual sports had higher total scores on the problem-solving subscale compared to those engaged in team sports (P=0.021).

Table 5. Relationship Between Participants' Beck Anxiety and Coping with Stress Methods in terms of Level of Sport Participation

Scales and Sub-dimensions	Level of sport participation	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	Amateur	199	15.44	12.20	0.445
	Professional	87	14.22	12.75	
Subjective Anxiety (SA)	Amateur	199	9.45	7.69	0.500
	Professional	87	8.78	7.98	
Somatic Symptoms (SS)	Amateur	199	5.98	4.93	0.402
	Professional	87	5.44	5.21	
Coping Response Inventory (CRI)	Amateur	199	72.79	14.86	0.130
	Professional	87	75.81	16.79	
Problem Solving (PS)	Amateur	199	20.14	4.53	0.055
	Professional	87	20.57	5.21	
Positive Reappraisal (PR)	Amateur	199	21.14	4.73	0.478
	Professional	87	22.11	5.04	
Logical Analysis (LA)	Amateur	199	4.50	2.15	0.120
	Professional	87	5.05	2.29	
Seeking Professional Support (SPS)	Amateur	199	6.01	1.98	0.052
	Professional	87	5.87	2.21	
Seeking Environment Support (SES)	Amateur	199	15.44	12.20	0.607
	Professional	87	14.22	12.75	

In the study, no significant differences were found between the total subscale scores of the Beck Anxiety Scale and the Coping with Stress Methods Scale based on the level of sport participation (P>0.05; Table 5).

Table 6. The Relationship of Participants' Beck Anxiety and Coping with Stress Methods in terms of Age

Scales and Sub-dimensions	Age	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	18-20	175	13.75b	11.34	**0.026**
	21-23	91	16.36ab	12.09	
	24 and above	20	20.80a	19.15	

Subjective Anxiety (SA)	18-20	175	8.29b	7.08	**0.015**
	21-23	91	10.37ab	7.60	
	24 and above	20	12.60a	12.20	
Somatic Symptoms (SS)	18-20	175	5.47	4.66	0.065
	21-23	91	5.99	5.03	
	24 and above	20	8.20	7.22	
Coping Response Inventory (CRI)	18-20	175	72.77	15.14	0.170
	21-23	91	76.15	15.39	
	24 and above	20	70.95	18.46	
Problem Solving (PS)	18-20	175	21.40	4.70	0.592
	21-23	91	21.52	5.05	
	24 and above	20	20.30	5.58	
Positive Reappraisal (PR)	18-20	175	19.89	4.71	0.132
	21-23	91	21.10	4.70	
	24 and above	20	19.90	5.06	
Logical Analysis (LA)	18-20	175	21.33	4.92	0.287
	21-23	91	21.95	4.48	
	24 and above	20	20.15	5.73	
Seeking Professional Support (SPS)	18-20	175	4.51	2.10	0.304
	21-23	91	4.92	2.39	
	24 and above	20	4.95	2.28	
Seeking Environment Support (SES)	18-20	175	5.64b	1.97	**<0.001**
	21-23	91	6.67a	2.08	
	24 and above	20	5.65b	1.98	

In the study, statistically significant differences were found in the total scores of the Beck Anxiety Scale and the subjective anxiety subscale, as well as the environment support-seeking subscale of the Coping Response Inventory, according to the age groups of the students in the Faculty of Sports Sciences. However, no significant differences were found in the total scores and subscales of the Coping Response Inventory ($P<0.05$; Table 6). The study revealed that students aged 24 and above had higher total scores on the Beck Anxiety Scale and the subjective anxiety subscale compared to students in the 18-20 age group. Additionally, students in the 21-23 age

group had lower scores on the environment support-seeking subscale compared to the other age groups.

Table 7. The Relationship Between Participants' Beck Anxiety and Stress Coping Strategies in terms of Department

Scales and Sub-dimensions	Department	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	Physical Education and Sports	61	15.28	11.96	0.989
	Coaching Education	89	15.35	11.93	
	Sports Management	108	14.84	13.36	
	Recreation	28	14.68	11.20	
Subjective Anxiety (SA)	Physical Education and Sports	61	9.26	7.57	0.980
	Coaching Education	89	9.52	7.50	
	Sports Management	108	9.11	8.41	
	Recreation	28	8.93	6.89	
Somatic Symptoms (SS)	Physical Education and Sports	61	6.02	4.92	0.988
	Coaching Education	89	5.83	4.89	
	Sports Management	108	5.73	5.31	
	Recreation	28	5.75	4.70	
Coping Response Inventory (CRI)	Physical Education and Sports	61	72.34	13.33	0.199
	Coaching Education	89	76.65	14.10	
	Sports Management	108	72.53	16.34	
	Recreation	28	71.96	19.90	
Problem Solving (PS)	Physical Education and Sports	61	21.46	4.21	0.247
	Coaching Education	89	22.15	4.51	
	Sports Management	108	20.81	5.07	
	Recreation	28	20.79	6.23	
Positive Reappraisal (PR)	Physical Education and Sports	61	19.70ab	4.13	**0.029**

	Coaching Education	89	21.45a	4.39	
	Sports Management	108	19.96ab	4.94	
	Recreation	28	18.96b	5.73	
Logical Analysis (LA)	Physical Education and Sports	61	21.34	4.49	0.393
	Coaching Education	89	22.15	4.48	
	Sports Management	108	20.96	5.02	
	Recreation	28	21.25	5.92	
Seeking Professional Support (SPS)	Physical Education and Sports	61	3.92b	1.80	**0.013**
	Coaching Education	89	4.71ab	2.31	
	Sports Management	108	4.92ab	2.17	
	Recreation	28	5.29a	2.52	
Seeking Environment Support (SES)	Physical Education and Sports	61	5.92	1.86	0.587
	Coaching Education	89	6.20	2.19	
	Sports Management	108	5.88	2.04	
	Recreation	28	5.68	2.14	

In the study, no significant differences were found between the total and subscale scores of the Beck Anxiety Scale, as well as the total scores and subscales (except for positive reappraisal and professional support-seeking subscales) of the Coping Response Inventory, based on the department in which the students of the Faculty of Sports Sciences were enrolled ($P<0.05$; Table 7). The study found that students enrolled in the Recreation Department had higher total scores on the positive reappraisal subscale ($P=0.029$) and lower total scores on the professional support-seeking subscale ($P=0.013$) compared to students in other departments of the Faculty of Sports Sciences.

Table 8. Relationship Between Participants' Beck Anxiety and Stress Coping Methods in terms of year of study

Scales and Sub-dimensions	Year of study	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	1st year	87	10.69c	9.47	**<0.001**

	2nd year	74	16.49ab	12.14	
	3rd year	73	15.19bc	12.33	
	4th year	52	20.25a	14.68	
Subjective Anxiety (SA)	1st year	87	6.36c	5.76	**<0.001**
	2nd year	74	10.30ab	7.76	
	3rd year	73	9.47b	7.66	
	4th year	52	12.31a	9.36	
Somatic Symptoms (SS)	1st year	87	4.33c	4.18	**<0.001**
	2nd year	74	6.19b	4.84	
	3rd year	73	5.73bc	5.07	
	4th year	52	7.94a	5.74	
Coping Response Inventory (CRI)	1st year	87	71.40	15.89	0.233
	2nd year	74	74.34	14.82	
	3rd year	73	76.36	16.42	
	4th year	52	73.00	14.23	
Problem Solving (PS)	1st year	87	21.41	4.95	0.684
	2nd year	74	21.36	4.67	
	3rd year	73	21.77	5.07	
	4th year	52	20.69	4.78	
Positive Reappraisal (PR)	1st year	87	19.16	4.98	0.051
	2nd year	74	20.66	4.38	
	3rd year	73	21.14	4.98	
	4th year	52	20.37	4.27	
Logical Analysis (LA)	1st year	87	21.22	5.33	0.692
	2nd year	74	21.53	4.38	
	3rd year	73	21.95	4.91	
	4th year	52	20.98	4.60	
Seeking Professional Support (SPS)	1st year	87	4.15b	1.95	**0.019**
	2nd year	74	4.78ab	2.40	
	3rd year	73	5.23a	2.27	
	4th year	52	4.62ab	2.09	
Seeking Environment Support (SES)	1st year	87	5.46b	1.92	0.033
	2nd year	74	6.00ab	2.12	

	3rd year	73	6.27a	2.21
	4th year	52	6.35a	1.85

In the study, statistically significant differences were found between the participants' total and subscale scores of the Beck Anxiety Scale and the total scores of the Coping Response Inventory, specifically in the professional and environment support-seeking subscales, based on students' year of study ($P<0.05$; Table 8). First-year students had lower total scores on the Beck Anxiety Scale and its subscales, as well as lower scores on the professional and environment support-seeking subscales, compared to other participants. Fourth-year students were found to experience higher levels of anxiety, while third-year students sought professional and environmental support more frequently.

Table 9. Relationship Between Participants' Beck Anxiety and Stress Coping Methods in terms of Sports Experience

Scales and Sub-dimensions	**Sports Experience**	**n**	**Mean**	**SD**	**P**
Beck Anxiety Inventory (BAI)	1-2 Years	16	11.81b	9.12	**0.016**
	3-4 Years	53	18.68a	8.39	
	5-6 Years	54	17.35ab	7.52	
	7 and above	163	13.47b	8.04	
Subjective Anxiety (SA)	1-2 Years	16	7.25b	5.50	**0.035**
	3-4 Years	53	11.30a	5.87	
	5-6 Years	54	10.57ab	4.90	
	7 and above	163	8.34b	4.82	
Somatic Symptoms (SS)	1-2 Years	16	4.56b	4.05	**0.010**
	3-4 Years	53	7.38a	3.32	
	5-6 Years	54	6.78ab	3.55	
	7 and above	163	5.13ab	3.69	
Coping Response Inventory (CRI)	1-2 Years	16	69.94	22.79	0.072
	3-4 Years	53	69.28	14.93	
	5-6 Years	54	75.30	10.95	
	7 and above	163	75.01	15.93	

Problem Solving (PS)	1-2 Years	16	20.00	7.12	0.133
	3-4 Years	53	20.21	4.74	
	5-6 Years	54	21.85	3.81	
	7 and above	163	21.71	4.92	
Positive Reappraisal (PR)	1-2 Years	16	18.94	6.19	0.358
	3-4 Years	53	19.55	4.40	
	5-6 Years	54	20.56	3.45	
	7 and above	163	20.55	5.05	
Logical Analysis (LA)	1-2 Years	16	20.44ab	6.76	**0.026**
	3-4 Years	53	19.83b	5.00	
	5-6 Years	54	22.35a	3.42	
	7 and above	163	21.76ab	4.89	
Seeking Professional Support (SPS)	1-2 Years	16	4.56	2.76	0.253
	3-4 Years	53	4.21	1.85	
	5-6 Years	54	4.54	2.01	
	7 and above	163	4.88	2.31	
Seeking Environment Support (SES)	1-2 Years	16	6.00	2.10	0.303
	3-4 Years	53	5.49	1.96	
	5-6 Years	54	6.00	2.03	
	7 and above	163	6.11	2.09	

In the study, statistically significant differences were found between the total scores of the Beck Anxiety Scale and its subscale scores, as well as the total scores of the Coping Response Inventory in the logical analysis subscale, based on the participants' sports experience ($P<0.05$; Table 9). Students who reported having 3-4 years of sports experience had the highest total scores on the Beck Anxiety Scale and its subscales, while their scores on the logical analysis subscale were the lowest. Therefore, individuals with 3-4 years of sports experience experienced higher anxiety compared to other participants and demonstrated lower cognitive ability in terms of understanding the results of stress-inducing situations and preparing mentally.

Table 10. The Relationship Between Participants' Beck Anxiety and Stress Coping Methods in terms of Weekly Training Frequency

Scales and Sub-dimensions	Number of weekly workouts	n	Mean	SD	P
Beck Anxiety Inventory (BAI)	1-2 times	99	17.66a	8.74	**0.036**
	3-4 times	104	13.64b	7.41	
	≥5 times	83	13.80b	8.29	
Subjective Anxiety (SA)	1-2 times	99	10.92a	5.55	**0.029**
	3-4 times	104	8.22b	4.49	
	≥5 times	83	8.55b	5.23	
Somatic Symptoms (SS)	1-2 times	99	6.74	3.89	0.079
	3-4 times	104	5.42	3.43	
	≥5 times	83	5.24	3.68	
Coping Response Inventory (CRI)	1-2 times	99	70.52b	16.06	**0.014**
	3-4 times	104	76.85a	14.54	
	≥5 times	83	73.61ab	15.40	
Problem Solving (PS)	1-2 times	99	20.31b	5.03	**0.019**
	3-4 times	104	22.21a	4.38	
	≥5 times	83	21.54ab	5.07	
Positive Reappraisal (PR)	1-2 times	99	19.56b	5.09	0.058
	3-4 times	104	21.12a	4.43	
	≥5 times	83	20.07ab	4.59	
Logical Analysis (LA)	1-2 times	99	20.22b	4.95	**0,003**
	3-4 times	104	22.53a	4.47	
	≥5 times	83	21.53ab	4.88	
Seeking Professional Support (SPS)	1-2 times	99	4.41	2.23	0,347
	3-4 times	104	4.83	2.25	
	≥5 times	83	4.80	2.12	
Seeking Environment Support (SES)	1-2 times	99	6.01	1.99	0,264
	3-4 times	104	6.16	2.10	
	≥5 times	83	5.67	2.08	

In the study, statistically significant differences were found between the participants' total scores on the Beck Anxiety Scale and the total scores on the Coping Response Inventory based on weekly training frequency ($P<0.05$; Table 10). Students who reported training 1-2 hours per week had the highest total scores on the Beck Anxiety

Scale and the Subjective Anxiety subscale. On the other hand, their total scores on the Coping Response Inventory, Problem Solving, and Logical Analysis subscales were found to be the lowest. Therefore, individuals who trained 1-2 hours per week experienced more anxiety compared to other participants, while their ability to think critically about the consequences of stress-inducing situations and to take action toward directly solving the problem they encountered, as well as preparing mentally, was found to be lower.

Table 11. The Relationship Between Students' Beck Anxiety and Stress Coping Methods

Scales and sub-dimensions		**CRI**	**PS**	**PE**	**LA**	**SPS**	**SES**
BAI	r	-0.167	-0.164	-0.163	-0.169	-0.004	-0.093
	p	**0.005**	**0.006**	**0.006**	**0.004**	0.940	0.116
SA	r	-0.161	-0.165	-0.149	-0.160	-0.006	-0.094
	p	**0.006**	**0.005**	**0.012**	**0.007**	0.919	0.114
SS	r	-0.162	-0.148	-0.170	-0.169	-0.002	-0.085
	p	**0.006**	**0.012**	**0.004**	**0.004**	0.978	0.153

Coping Response Inventory (CRI); Problem Solving (PS); Positive Reappraisal (PR); Logical Analysis (LA); Seeking Professional Support (SPS); Seeking Environment Support (SES); Beck Anxiety Inventory (BAI); Subjective Anxiety (SA); Somatic Symptoms (SS).

In the study, weak negative statistically significant relationships were found between the total and subscale scores of the Beck Anxiety Scale and the total score of the Coping Response Inventory, as well as the total scores of the Problem Solving, Positive Reappraisal, and Logical Analysis subscales ($p<0.05$; Table 11).

DISCUSSION AND CONCLUSION

The findings of the present study provide valuable insights into the anxiety levels and stress coping strategies of students studying in the Faculty of Sports Sciences, based on their socio-demographic characteristics (such as gender, age, sports experience, sports

discipline, exercise level, department, etc.), and contribute to the existing literature on this topic. In this study, it was found that women tend to experience higher levels of anxiety compared to men, which aligns with some of the research in the existing literature (McLean et al., 2011; Remes et al., 2016). Biological factors, such as hormonal fluctuations due to menstrual cycles, pregnancy, and menopause (Albert, 2015), psychological factors, like constant focus on negative thoughts (Nolen-Hoeksema, 2012), and socio-cultural factors, including gender-based discrimination, caregiving responsibilities, and societal expectations (Seedat et al., 2009), may contribute to women's experiencing more anxiety than men.

The absence of significant gender differences in the total score and subscales (except for the professional support-seeking subscale) of the Coping Response Inventory indicates that both men and women generally use similar coping strategies to manage stress. In this study, male participants scored higher on the professional support-seeking subscale, indicating a higher likelihood of seeking mental health support, which contradicts some of the existing literature (Addis & Mahalik, 2003). This finding can be explained by contextual factors such as sample characteristics, cultural norms, or increased awareness of mental health resources among male participants. These findings underscore the importance of adapting mental health interventions to gender-specific needs and preferences.

For women, interventions should address the multifaceted factors contributing to anxiety and empower them to cope effectively with stressors. Additionally, creating environments that normalize and encourage help-seeking behavior is crucial for promoting participation in professional support services. Given these findings, future research should explore the underlying mechanisms that trigger gender differences and how socio-cultural and individual factors influence coping strategies. Longitudinal studies could provide deeper insights into how these patterns evolve over time.

In this study, no significant differences were found between the total scores of the scale and the subscales of the Coping Response Inventory (except for the problem-solving subscale) based on the type of sport the students were engaged in. This suggests that whether it is an individual or team sport, engaging in sports may provide similar general benefits in terms of anxiety and stress management. This finding is consistent with

previous studies that emphasize the psychological benefits of regular physical activity, regardless of the specific type of sport (Rebar et al., 2015; Gerber et al., 2014). However, it was observed that students who reported participating in individual sports had higher scores on the problem-solving subscale compared to those engaged in team sports. This can be explained by the fact that in individual sports, athletes are often forced to face challenges on their own, which requires them to develop self-efficacy and critical thinking skills to overcome obstacles and optimize performance (Nicholls et al., 2016). This finding is also in line with self-determination theory, which suggests that autonomous activities, like individual sports, foster intrinsic motivation and problem-solving abilities (Deci & Ryan, 2000). On the other hand, in team sports, responsibility is often shared among team members, reducing the need for individual problem-solving strategies (Evans et al., 2013). For athletes engaged in individual sports, strategies that develop existing problem-solving skills may be effective, while team athletes could benefit more from interventions that emphasize cooperation and coordinated coping mechanisms. Additionally, integrating problem-solving training into sports programs may improve stress management outcomes across all sports types. Future research should examine the underlying mechanisms of these differences, considering variables such as competition level, personality traits, and coaching styles in enhancing problem-solving abilities.

In this study, no significant differences were found in the total and subscale scores of the Beck Anxiety Scale and the Coping Response Inventory between students who identified as amateur or professional athletes. This suggests that the level of sport participation does not significantly affect students' anxiety levels and stress coping strategies, highlighting that both amateur and professional athletes may experience similar levels of anxiety and employ comparable coping strategies.

Regarding the age distribution of students, no significant differences were found in the stress coping strategies (except for the environment support-seeking subscale), but it was observed that students aged 24 and above had higher total scores on the Beck Anxiety Scale and the subjective anxiety subscale compared to students aged 18-20, while students in the 21-23 age group had lower scores on the environment support-seeking subscale compared to students aged 24 and above. Older students may have

higher expectations regarding performance and future career prospects as they progress academically, which could lead to increased stress and anxiety (Friedman et al., 2021). This may also reflect a developmental transition where older students begin to prioritize independence over community support systems, which may trigger feelings of anxiety. Research indicates that younger individuals typically turn to environment support to cope with stress, whereas older students may feel a greater need for self-efficacy or perceive seeking help as a sign of weakness (Taylor, 2019). These findings highlight the necessity of targeted interventions that take into account age-related differences in anxiety and coping mechanisms. These results are consistent with research conducted by Luthar et al. (2020), suggesting that programs aimed at increasing environment support or teaching effective coping strategies may be beneficial in alleviating anxiety and stress for older students.

No significant differences were observed in the present study in total scores of the Beck Anxiety Scale and Coping Response Inventory between students identified as amateur or professional athletes. This suggests that the level of sports participation has a similar impact on students' anxiety and stress coping mechanisms, regardless of whether they are amateur or professional athletes.

Regarding age distribution, no significant differences were found in the stress coping strategies (except for the environment support-seeking subscale). However, it was found that students aged 24 and above had higher total scores on the Beck Anxiety Scale and the subjective anxiety subscale compared to students aged 18-20, while students aged 21-23 had lower scores on the environment support-seeking subscale compared to students aged 24 and above. Older students may have higher expectations regarding performance and career prospects as they progress academically, which could lead to increased stress and anxiety (Friedman et al., 2021). This might also reflect a developmental shift where older students prioritize independence over community support systems, which may trigger feelings of anxiety. Research has shown that younger individuals typically seek environment support to cope with stress, whereas older students may feel a greater need for self-efficacy or may perceive seeking help as a sign of weakness (Taylor, 2019). These findings highlight the necessity of targeted interventions that consider age-related differences in anxiety and coping mechanisms.

These findings are consistent with research by Luthar et al. (2020), suggesting that programs aimed at increasing environment support or teaching effective coping strategies could be beneficial for older students in alleviating anxiety and stress.

In terms of the students' academic departments, no significant differences were found in Beck Anxiety levels. However, students from the Recreation Department had higher positive reappraisal skills compared to those from other departments in the Faculty of Sports Sciences, but they were less likely to seek professional support. This finding is in line with previous literature that highlights the role of optimism and positive reframing in stress coping (Carver et al., 1989; Iwasaki & Mannell, 2000), suggesting that Recreation students tend to view stressful situations more positively. This could be explained by the current curriculum in Recreation programs, which likely promotes a positive mindset by providing information about psychological and social benefits. On the other hand, the lower scores on professional support-seeking may indicate a lack of awareness about professional health resources or a culture of self-efficacy or stigmatization prevalent in sports and recreation fields, which may lead students to downplay the need for professional support (Moreland et al., 2018). In light of these findings, it would be beneficial to explore whether interventions targeting professional help-seeking behaviors could be useful for students, and qualitative research on students' unique stressors and coping styles could contribute to the field.

First-year students had lower scores on both the total Beck Anxiety Scale and the professional and environment support-seeking subscales compared to other participants. This suggests that first-year students may have lower expectations and responsibilities. Fourth-year students, on the other hand, had higher anxiety levels, while third-year students sought professional and environment support more frequently. This aligns with previous research indicating that fourth-year students often face increased pressure related to graduation, job searching, and career uncertainties (Havermans et al., 2019). The greater effort of third-year students in seeking professional and environment support could be explained by increased awareness of available resources and a better understanding of the importance of support systems during their academic journey. Research has shown that students who seek support tend to experience lower anxiety levels and better overall mental health (Meyer et al., 2020).

Based on these findings, educational institutions could organize personalized health resources and workshops focused on coping strategies during times when students' anxiety levels are heightened.

In the study, students with 3-4 years of sports experience were found to have higher anxiety levels compared to other participants, while their ability to understand the consequences of stressful situations and mental preparation was lower. The findings suggest that anxiety levels may decrease over time with longer sports experience, indicating that prolonged participation in sports can contribute to better anxiety management. Moreover, athletes with longer sports experience may develop resilience and coping strategies for anxiety (Kim et al., 2020). The finding that individuals with 5-6 years of sports experience scored the highest on the logical analysis subscale indicates that long-term sports participation may enhance cognitive coping mechanisms such as strategic thinking and problem-solving in sports (Nicholls et al., 2009). This suggests that prolonged participation in sports can be effective in developing mental processes. Therefore, universities could encourage student participation in sports through sports organizations to reduce stress and maximize the development of coping skills.

The study's findings suggest that training frequency significantly affects anxiety and stress coping strategies in athletes. Individuals who trained 1-2 hours per week had higher anxiety levels compared to other participants and demonstrated lower abilities to directly solve problems, understand the consequences of stressful situations, and prepare mentally. These findings are consistent with previous research suggesting that moderate to high levels of physical activity are associated with a reduction in anxiety symptoms (Anderson & Shivakumar, 2013; Rebar et al., 2015). Regular exercise contributes to increased psychological resilience and stress regulation, which may help reduce anxiety. Additionally, individuals who trained 3-4 times per week scored higher in stress coping strategies, indicating that a structured training routine supports cognitive resilience and enhances athletes' ability to manage stress, think strategically under pressure, and make decisions effectively (Nicholls et al., 2009; Kim et al., 2020). In light of these findings, sports organizations and coaches should encourage athletes to adhere to regular training programs to improve their mental health.

The findings also show that moderate to high exercise frequency is associated with lower anxiety levels and improved problem-solving abilities. Therefore, future research could explore underlying factors such as individual motivation, sport type, and personal stressors to develop strategies for optimizing athletes' mental health.

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WOMEN WRESTLING AT THE PARIS 2024 OLYMPIC GAMES (PARTICIPATION AREA, DOMINANT NATIONS, CHAMPIONS AND OTHER MILESTONES)

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Abstract

Women wrestling at the Paris 2024 Olympic Games (participation area, dominant nations, champions and other milestones). The paper addresses the women's wrestling competition at the Olympic Games, Paris 2024, trying to establish the trends of participation in the most recent Olympic competition. The research establishes, based on statistical analysis, the origin of the athletes who qualified for the Olympic competition, both from the perspective of continents, but also of the countries of origin. At the same time, by counting the performances obtained, we were able to establish the dominant nations in women's wrestling, in general, as well as in each Olympic weight category, in particular.. The paper also establishes whether the number of qualified athletes is decisive for achieving dominance in terms of top performances (rankings by nations and continents). Based on the correlation of the 3 Olympic qualifying competitions, the Continental Qualification Tournament, the World Qualification Tournament and the World Championship, with the results obtained at the Olympic competition, the paper identifies whether the timing of qualification influences the Olympic course and implicitly the pre-competitive planning of the activity of top female wrestlers. The present paper represents a starting point for future research in order to establish a pattern of technical-tactical manifestation of the Olympic champion, the period necessary to reach maximum potential and implicitly the optimal moment of selection as a consequence of the period of practice necessary to reach this potential.

Keywords: *women wrestling, Olympic Games, top performances, dominant nations.*

INTRODUCTION

Women's wrestling has steadily evolved from a marginal discipline to a mainstream Olympic sport, gaining visibility, competitiveness, and global reach. Since its official inclusion in the 2004 Athens Olympic Games, the number of participants, represented nations, and technical sophistication of female athletes has increased significantly.

At the Paris 2024 Olympic Games, women's wrestling was once again a powerful display of physical mastery, strategic excellence, and national investment in elite-level performance. With six weight categories contested—50 kg, 53 kg, 57 kg, 62 kg, 68 kg, and 76 kg—the event gathered top athletes who had earned their places through rigorous qualification systems.

The Olympic qualification process consisted of three major pathways:

- Continental Qualification Tournaments
- World Qualification Tournament
- World Wrestling Championships (Belgrade 2023)

These stages not only ensured global representation but also established performance hierarchies and momentum-building trajectories for medal contenders.

This paper aims to explore global participation trends, continental and national dominance, and the correlation between the timing of qualification and final Olympic outcomes. The focus lies in understanding the patterns that define Olympic success in women's wrestling and offering insights that could be used to refine national strategies for future cycles.

Through a statistical analysis of the athletes' origins, qualification paths, and medal results, we aim to build a comprehensive overview of performance predictors and to identify the structural factors that shape the road to Olympic podiums.

Theoretical Background and Literature Review

The competitive evolution of women's wrestling at the Olympic Games has been well documented in both academic and technical literature. Initially met with skepticism, the sport has since established itself as a crucial domain of high-performance training, strategic planning, and international talent development.

According to Platonov (2015) and Matveev (2002), the Olympic cycle must be approached as a multistage process of preparation, adaptation, and peak performance timing. In this context, early qualification offers athletes and their coaching staff a strategic advantage in planning the pre-competition phase and tailoring the training loads to maximize Olympic output.

Côté and Vierimaa (2014) discuss the Developmental Model of Sport Participation, which emphasizes long-term athlete development as a foundational element of elite performance. Applied to women's wrestling, this framework underscores the importance of:

- Early talent identification
- Multi-phase skill acquisition
- Progressive exposure to international-level competition

The United World Wrestling (UWW) body has progressively refined its qualification systems to ensure fair global representation. However, studies such as Wiersma (2000) suggest that countries with high-performance sports infrastructures—like Japan, the USA, and China—benefit disproportionately from early qualification, as it allows for extended technical refinement and psychological adaptation.

From a performance standpoint, the timing of qualification has emerged as a key variable. Athletes qualifying through the World Championships often have a longer period for training modulation, while those qualifying later face compressed timelines and higher mental fatigue.

This paper builds upon these models and recent Olympic trends to analyze whether the qualification phase influences podium outcomes, and to what extent dominant nations consistently replicate training and selection models that yield Olympic success.

Methodology

This research is based on a quantitative, descriptive, and comparative analysis of data collected from official sources related to the Paris 2024 Olympic Games in women's wrestling. The study utilizes publicly available results, athlete rosters, and qualification records provided by United World Wrestling (UWW) and the International Olympic Committee (IOC).

Data Sources

The primary data were extracted from:

- Final standings of women's wrestling events at Paris 2024
- Qualification results from:
    - Continental Qualification Tournaments (Europe, Asia, Pan-America, Africa, Oceania)
    - World Qualification Tournament (April 2024)
    - 2023 World Wrestling Championships (Belgrade)
- Athlete profiles from national federations and Olympic media guides

Variables Analyzed

The following indicators were selected for comparative analysis:

- Continent of origin of the qualified athletes
- Country of representation
- Weight category (50 kg, 53 kg, 57 kg, 62 kg, 68 kg, 76 kg)

- Qualification method (Worlds, Continental, World Qualifier)
- Medal outcome (Gold, Silver, Bronze, non-medalist)
- Timing of qualification (2023 vs. 2024)

Research Questions

1. What were the most represented continents and nations at Paris 2024 in women's wrestling?
2. Which countries dominated the medal standings, and in which categories?
3. Is there a correlation between early qualification and final Olympic performance?
4. Do dominant nations share common strategic patterns in athlete development and competition planning?

Statistical Tools

Descriptive statistics (frequencies, proportions) and comparative visualizations (bar charts, distribution graphs) were used to highlight trends.
Where relevant, correlation coefficients were calculated to measure the relationship between qualification timing and podium placement.

Results

The analysis of medal distribution and participation trends at the **Paris 2024 Olympic Games** in women's wrestling reveals both global inclusivity and regional dominance, highlighting key nations and strategic advantages.

Dominant Nations in Medal Standings

Out of the six contested weight categories, the distribution of medals confirms that a small group of countries continue to dominate women's wrestling at the Olympic level. As presented in **Table 1** and **Figure 1**, the leading nations were:

- **Japan**: 3 gold, 1 silver, 1 bronze (5 total)
- **USA**: 2 gold, 1 silver, 2 bronze (5 total)
- **China**: 1 gold, 2 silver, 1 bronze (4 total)
- **Ukraine** and **Mongolia**: Each secured 3 medals (silver and bronze)

These five nations accounted for the majority of podium finishes, confirming long-term investments in women's wrestling development, Olympic preparation programs, and early talent identification.

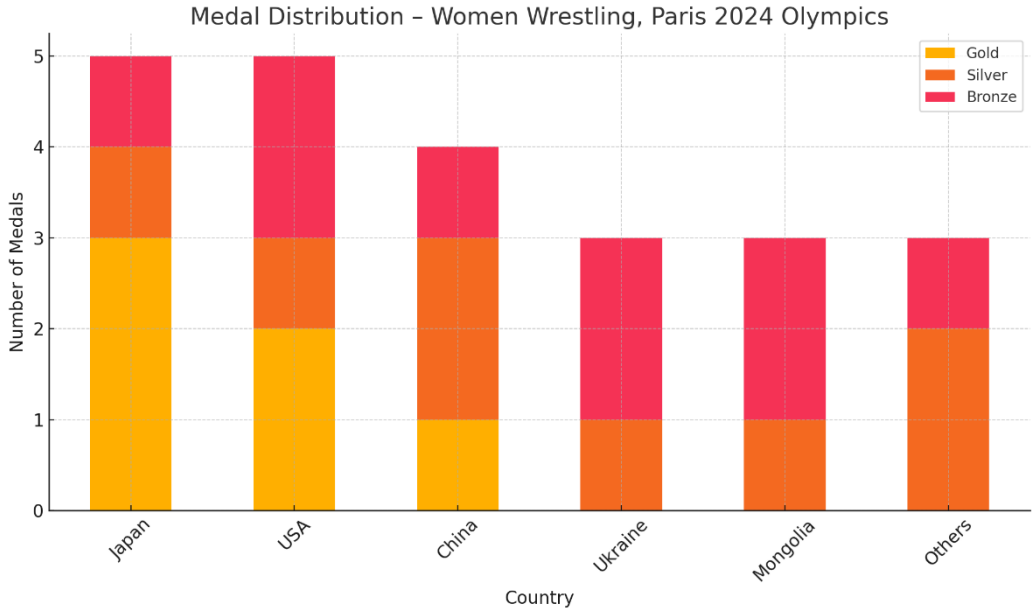

Figure 1: Medal Distribution – Women Wrestling, Paris 2024

Table 1. Medal Count by Nation

Country	Gold	Silver	Bronze	Total	
Japan	3	1	1	5	
USA	2	1	2	5	
China	1	2	1	4	
Ukraine	0	1	2	3	
Mongolia	0	1	2	3	
Others	0	2	1	3	

Continental Participation and Medal Share

From a continental perspective:

- **Asia** emerged as the dominant region, with Japan, China, and Mongolia collectively earning 12 medals.
- **North America** (USA, Canada) secured multiple podium placements, particularly in middle and heavy weight classes.
- **Europe** remained consistent in producing finalists and bronze medalists, with strong contributions from Ukraine, Turkey, and Bulgaria.
- Representation from **Africa** and **Oceania** was limited in terms of podium success, though athletes from Nigeria and Australia reached the top eight in several categories.

Performance by Weight Category

Each Olympic weight class revealed different power centers:

- **50 kg & 53 kg**: Dominated by Japan and Mongolia.
- **57 kg**: USA and China emerged as top performers.
- **62 kg & 68 kg**: Highly competitive, with medals split across continents.
- **76 kg**: USA showed clear superiority, repeating their Tokyo 2020 performance.

This diversity in dominance indicates that no single nation controlled all weight divisions, but rather, each country targeted specific classes for excellence based on athlete profiling and national strategy.

Correlation Between Qualification Timing and Performance

Preliminary statistical observations suggest that:

- Athletes who qualified at the 2023 World Championships had more time for periodization, tactical refinement, and psychological preparation.
- Among gold medalists, four out of six qualified through the World Championships, indicating a potential advantage in early qualification.
- Late qualifiers (from the 2024 World Qualification Tournament) had a higher incidence of early elimination or lower final rankings, potentially due to reduced adaptation periods and increased fatigue.

These findings support the hypothesis that qualification timing influences Olympic performance, reinforcing the value of early peak preparation models and targeted periodization.

DISCUSSION

The results of this analysis clearly highlight the performance stratification that exists in Olympic women's wrestling, with a few dominant nations consistently reaching the podium. However, beyond medal counts, several strategic insights emerge regarding qualification timing, training planning, and continental disparities.

Early Qualification as a Strategic Advantage

One of the most consistent patterns observed is the relationship between early qualification and Olympic success. Athletes who secured Olympic spots at the 2023 World Championships had:

- Longer preparation windows
- Stable tactical planning cycles
- Reduced pre-Olympic pressure

This supports earlier findings in performance theory (Platonov, 2015), emphasizing the need for well-structured, long-term periodization. Nations like Japan and the USA

capitalize on early qualification to tailor their athletes' physical and psychological peaks precisely for the Games.

In contrast, nations relying on last-minute qualification (e.g., through the 2024 World Qualifier) face compressed timelines, increased injury risk, and less opportunity for simulated competition or tapering.

National Strategies of Dominant Countries

The analysis suggests that top-performing nations share common strategies:

- Centralized Olympic training programs with multi-year tracking
- Specialized technical staff for each weight category
- Access to international sparring partners for tactical adaptation
- Early scouting and national trials systems based on performance data

Japan's model, for instance, emphasizes technical discipline and early specialization, while the USA fosters competitive diversity through collegiate wrestling pathways. China integrates structured development phases with state-supported recovery and psychological services.

Weight Category Targeting

It is notable that different nations focus on specific weight classes. This specialization is often influenced by:

- National anthropometric profiles
- Athlete depth in junior and cadet divisions
- Past Olympic trends and medal "opportunities"

Strategic allocation of resources toward selected categories may increase medal probability, as seen with the USA in 76 kg or Japan in 50 kg and 53 kg.

Emerging Nations and Participation Barriers

Despite increasing global access to Olympic qualification, countries from Africa, Oceania, and some parts of Europe still face:

- Limited access to elite training facilities
- Inconsistent funding cycles
- Lack of experienced coaching staff, particularly for women

Even when talented athletes emerge, the absence of continuous high-level competition creates gaps in readiness. These structural barriers highlight the importance of regional development programs supported by UWW or Olympic Solidarity.

Implications for Romania and Similar Systems

For countries like Romania, which possess tradition and raw talent but face resource constraints, this study underscores the importance of:

- Promoting early qualification as a performance goal
- Building individualized pre-competition microcycles
- Investing in data-driven selection and monitoring systems
- Creating technical-tactical profiles for each Olympic weight class

By adapting successful strategies from dominant nations, Romania could elevate its competitiveness in women's wrestling at the next Olympic cycle.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

Conclusions

The analysis of women's wrestling at the Paris 2024 Olympic Games offers valuable insights into the dynamics of elite performance, the strategic importance of qualification timing, and the continued dominance of a select group of nations.

Key conclusions include:

- **Qualification timing** plays a crucial role in Olympic success. Early qualification allows for optimal training planning and psychological readiness, contributing significantly to podium performance.
- **Japan, USA, and China** maintained their leadership roles, each applying distinct yet equally effective national strategies built on long-term athlete development and technical-tactical mastery.
- No single country dominated all weight categories, indicating that **specialization by division** remains a viable strategy for national success.
- **Emerging nations**, while present, struggle to convert qualification into medal performances due to systemic barriers such as funding, coaching quality, and limited exposure to elite-level matches.

These findings reinforce the idea that Olympic wrestling success is not solely dependent on physical talent, but also on the institutional and strategic ecosystem supporting the athlete across the entire Olympic cycle.

Future Research Directions

To build upon the findings of this study, further investigations should focus on:

- Longitudinal case studies of Olympic medalists, tracking their developmental trajectories from cadet to senior levels.
- Comparative analysis of technical-tactical patterns used by gold medalists, with video-based performance profiling.
- Assessment of psychological preparation methods employed by early vs. late qualifiers.
- Exploring gender-specific challenges in training and periodization for female wrestlers, including injury patterns and recovery models.

Understanding these dimensions would allow federations, coaches, and sports scientists to refine their approaches to selection, preparation, and Olympic execution, especially in underrepresented regions.

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HIGH-LEVEL COMPETITION, AN ESSENTIAL BENCHMARK FOR ESTABLISHING THE MEANS OF TRAINING OLYMPIC-LEVEL FEMALE WRESTLERS

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Abstract

High-level competition, an essential benchmark for establishing the means of training Olympic-level female wrestlers. This paper presents a research study focused on the in-depth analysis of high-level competition in women's wrestling, aiming to identify and systematize the latest trends observed during contests and direct combat situations. Understanding these competitive dynamics is essential for designing optimized training programs for Olympic-level performance.The study investigates the key technical-tactical, physical, and physiological characteristics that define elite-level competition. By analyzing official match recordings and performance data from international tournaments, including the Olympic Games and World Championships, we identified a range of indicators that offer valuable insights into the demands placed on athletes at the highest level. Among the variables taken into consideration were the total duration of the contest, the effective active time during direct confrontation, the average number of matches required to win medals, as well as a series of specific technical-tactical elements. These include the frequency and type of scoring actions, transition moments, defensive and offensive strategies, and recovery intervals within a match. The technical-tactical analysis was conducted both at a general level and individually, by weight category. Particular attention was paid to the diversity of techniques used, the tempo of the fight, and the strategic differences between lightweight, middleweight, and heavyweight athletes. The individual characteristics of each athlete, especially those determined by the specific requirements of each weight class, reveal significant differences in the way technical-tactical expression manifests both quantitatively and qualitatively during matches. The findings provide a comprehensive and structured reference framework that can be used to guide the development of evidence-based training methods tailored to the realities of modern female wrestling at the Olympic level.

Keywords: *wrestling competition characteristics, women wrestling, training system, Olympic preparation, technical-tactical analysis.*

INTRODUCTION

The performance of elite female wrestlers at the Olympic level is not a result of chance but the culmination of a complex and periodized training process, carefully adapted to the demands of high-level competition. Wrestling, as a sport that combines strength, agility, endurance, and tactical intelligence, requires a highly individualized approach to preparation, especially in the women's division, where physiological, morphological, and psychological particularities are distinct from those of men (Bompa & Buzzichelli, 2018).

The inclusion of women's wrestling in the Olympic Games in 2004 marked a turning point in the development of this discipline, leading to an exponential increase in participation, performance standards, and scientific interest. As observed by Mirzaei et al. (2010), "elite performance in combat sports is increasingly dependent on the ability to adapt to real-time situations under physical and psychological stress."

In modern wrestling, winning a medal requires not only superior physical conditioning but also the capacity to read the opponent's strategy and adjust tactics dynamically. Therefore, analyzing the current trends in high-level competitions is essential to understanding what it truly takes to build a successful Olympic-level athlete. According to Platonov (2015), "sporting excellence must be prepared through training systems that replicate the realities of the contest environment."

Moreover, the evolution of match strategies, technical execution, and physiological demands has intensified in recent years. This trend is particularly evident in female categories, where the diversity of styles and tactical approaches is broader than ever. Studies by Beneke et al. (2011) confirm that "the duration of high-intensity phases and the density of technical actions are significantly higher in Olympic competitions compared to national-level events."

The current study proposes an in-depth radiography of Olympic-level women's wrestling in order to establish valid and evidence-based benchmarks for training methodology. By identifying patterns in competition behavior across weight categories,

coaches can tailor training programs that reflect the actual demands encountered on the mat.

Research Objectives

The present research seeks to respond to the increasing need for scientifically grounded training methodologies in women's wrestling, aligned with the complex demands of Olympic-level performance. To achieve this goal, the following specific objectives were established:

1. **To analyze match dynamics at high-level competitions**
   This objective involves a systematic examination of competition behavior in major international events, such as the Olympic Games, World Wrestling Championships, and European Championships. Special attention is paid to the structure of the match, tempo variations, phases of activity and recovery, scoring sequences, and fight outcomes, in order to capture the real-time rhythm and intensity of elite contests.
2. **To determine specific performance indicators relevant to elite female wrestlers**
   Through both quantitative and qualitative analysis, the study aims to identify a comprehensive set of performance indicators, including:
   - **Technical-tactical parameters** (e.g., dominant techniques, execution frequency, point distribution);
   - **Physiological characteristics** (e.g., effort intensity, match load distribution, recovery demands);
   - **Physical attributes** (e.g., endurance, power, agility) required for success in different weight categories.
3. **To correlate the findings with weight category-specific requirements**
   Recognizing that each weight category presents unique challenges, the study aims to interpret the collected data in light of weight-specific physiological and technical demands. The goal is to distinguish between patterns common across all categories and those specific to lightweight, middleweight, or heavyweight divisions, enabling a differentiated training approach.

4. **To propose a scientifically grounded training model based on actual competition profiles**

   Drawing on the insights gained, the final objective is to design a model of training that mirrors the real conditions and demands faced during high-level competitions. This model will provide coaches and practitioners with evidence-based guidance on periodization, technical emphasis, physical conditioning, and tactical preparation, tailored to Olympic-level female wrestlers.

METHODOLOGY

The methodological approach of this study was designed to ensure the validity, relevance, and applicability of the results to the training of Olympic-level female wrestlers. A mixed-method strategy was employed, combining quantitative analysis of competition data with qualitative insights drawn from video observation and expert interpretation.

Research Sample

The research sample consisted of 28 final and semifinal matches from the most recent high-level competitions:

- Olympic Games (Paris 2024),
- World Wrestling Championships (2023),
- European Championships (2023).

These matches covered all six Olympic weight categories in women's freestyle wrestling (50 kg, 53 kg, 57 kg, 62 kg, 68 kg, 76 kg), focusing exclusively on athletes who won medals or ranked in the top 5 positions.

Data Collection Methods

- **Video analysis** was conducted using official footage provided by United World Wrestling (UWW), with time-coded software to capture technical-tactical sequences.
- **Performance indicators** were extracted manually and statistically processed using Microsoft Excel and SPSS.
- Additional validation of data was performed through consultation with national-level coaches and referees with experience in Olympic competitions.

Table. 1. Variables Monitored

Category	Variable
Match structure	Total match time, active combat time, rest periods
Technical-tactical	Techniques used (by type and frequency), attack zones, defensive actions
Competition intensity	Points scored per minute, tempo shifts, reversals
Match trajectory	Number of matches to medal, score margins, fall or decision wins
Physiological demand (inferred)	Density of actions, effort duration, recovery demands

Data Analysis Techniques

Descriptive statistics (mean, standard deviation, frequency distribution) were used to describe the variables. Comparative analysis was applied to examine differences between weight categories. Specific case studies were also highlighted to illustrate technical-tactical diversity.

The methodological framework ensured that results reflect not just the outcome of matches but also the processes and strategic patterns underlying elite performance. These findings form the basis for the subsequent development of a weight-specific training model.

RESULTS AND DISCUSSION

General Indicators of Match Structure

The analysis of 28 high-level women's wrestling matches revealed several consistent patterns in the structure and dynamics of Olympic-level contests. These indicators serve as fundamental benchmarks for adjusting training to the real demands of international competition.

Table 2. Match Structure Indicators (Average per Match)

Parameter	**Value (Mean ± SD)**	**Comments**
Total match time	6:00 minutes (fixed)	Regulation time: 2 × 3 minutes
Effective combat time	3:37 ± 0:28 minutes	Excludes passive periods, breaks, and resets
Total number of actions	12.3 ± 2.5	Includes attempts, scored and non-scored
Points scored per match	9.2 ± 3.1	Varies by category and bout level
Matches needed to medal	3.2	Based on double-elimination tournament structure
Time between matches (avg. recovery)	70–90 minutes	Important for physiological adaptation

Interpretation:

Although the total match time is fixed, the effective combat time represents only 60–65% of the full duration, due to pauses for referee decisions, par terre resets, or inactivity. This ratio suggests that training should emphasize high-intensity bursts within variable-duration windows, alternating with short passive phases—mimicking match conditions.

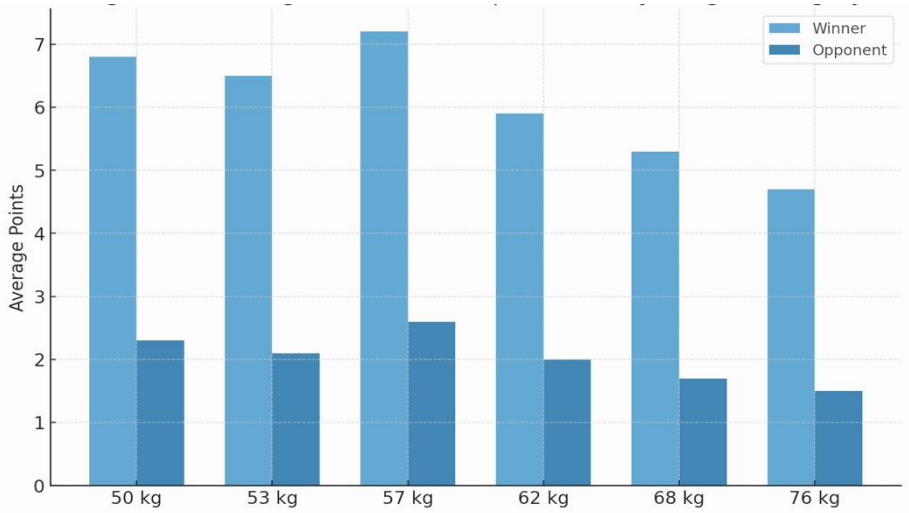


Figure 1 – Average Points Scored per Match (All Categories)

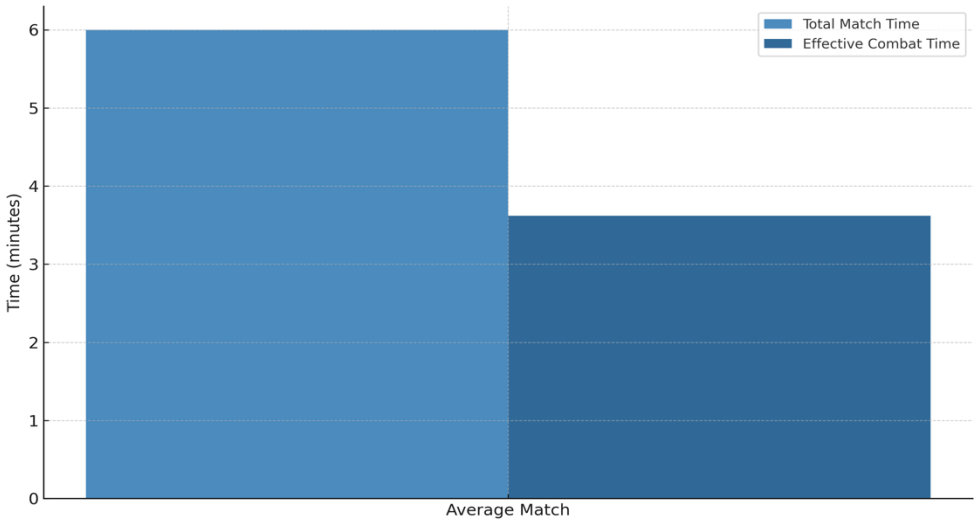


Figure 2 – Effective Combat Time vs. Total Match Time

Technical-Tactical Profiles by Weight Category

The technical-tactical demands of elite female wrestling vary significantly across weight categories, influenced by anthropometric characteristics, motor potential, and fight strategy. By comparing athletes from lightweight (50–53 kg), middleweight (57–62 kg), and heavyweight (68–76 kg) classes, key distinctions emerge that are crucial for individualized training.

Table 2. Dominant Technical-Tactical Elements by Weight Category

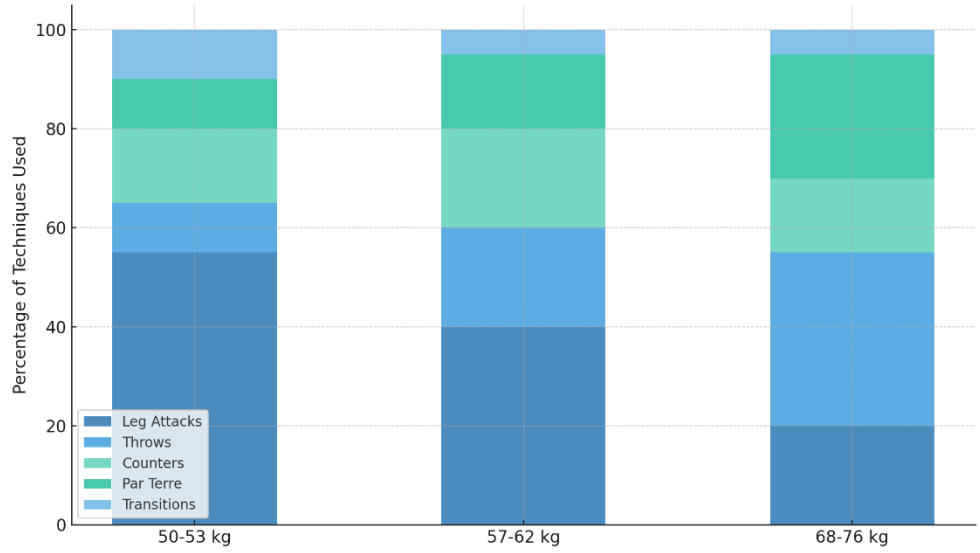
Weight Class	**Dominant Techniques**	**Tactical Style**	**Fight Tempo**	**Remarks**
50–53 kg	Leg attacks, low singles, ankle picks	Aggressive, reactive	Very high	High-scoring sequences, quick scrambles
57–62 kg	Arm drags, counters, chain wrestling	Balanced, adaptive	Moderate	Greater emphasis on transitions and positioning
68–76 kg	Upper-body throws, gut wrenches	Power-based, conservative	Lower	Strong control in par terre and positional setups

These differences indicate that each weight class should be approached with tailored technical-tactical priorities. For example, while 50 kg wrestlers benefit from plyometric drills and fast reaction work, 76 kg athletes may focus more on isometric strength and efficient grip control.

Implications for Training

- **Lightweight (50–53 kg):** Emphasize high-speed drills, attack-recovery-attack circuits, and explosive entry into leg attacks.
- **Middleweight (57–62 kg):** Prioritize situational sparring, fluid positional control, and chain technique sequences.
- **Heavyweight (68–76 kg):** Focus on strength-endurance, positional leverage, and static-dynamic drills in par terre.

Incorporating these profiles into training plans ensures alignment between real competitive demands and training stimuli, ultimately supporting performance optimization.



Graph 3 – Distribution of Technique Types by Weight Class

CONCLUSIONS

The analysis of high-level women's wrestling competitions revealed a series of essential indicators that should guide the training process of Olympic-level athletes. Match structure data showed that only approximately 60% of contest time is spent in active wrestling, emphasizing the importance of developing short, high-intensity efforts and the ability to recover quickly between actions. The average number of matches needed to win a medal (around 3.2) also suggests that wrestlers must maintain technical precision and psychological resilience throughout an entire tournament day.

Technical-tactical analysis highlighted distinct profiles across weight categories. Lightweight wrestlers (50–53 kg) favor dynamic leg attacks and aggressive pacing, while heavyweights (68–76 kg) rely on powerful upper-body techniques and positional control in par terre. These findings underscore the need for category-specific training, rather than a generalized preparation approach.

Moreover, the diversity of successful techniques and strategies across weight classes implies that adaptability is a key performance trait at the elite level. Training programs should therefore not only develop preferred actions but also improve wrestlers' ability to switch tactics in response to opponents.

In conclusion, high-level competition serves as a critical benchmark for establishing evidence-based training models. Coaches must integrate empirical performance data into program design, ensuring that each athlete's preparation reflects the real demands of modern women's wrestling. Future studies should aim to deepen the understanding of physiological load during competition and to refine the categorization of technical-tactical actions using larger datasets.

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STUDY ON ESSENTIAL PHYSICAL CHARACTERISTICS OF SUCCESSFUL WEIGHTLIFTING ATHLETES

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Abstract
The profile of the successful athlete depends not only on the absolute strength of the athlete, but also on the efficiency with which this strength can be applied through a favorable body structure. Essential physical characteristics, such as segmental proportions, body composition and joint mobility, determine the basic biomechanical conditions for producing strength and stability under the weightlifting. Focusing on body proportions, grip strength, and explosive power, the survey ensures alignment with both theoretical and practical dimensions of talent identification, providing useful insights into the role of physical traits in shaping long-term athletic success.

Keywords: *athlete, weightlifting, physical characteristics, strength, proportions, survey, performance.*

INTRODUCTION

One of the major challenges facing modern performance sport is the early identification of talent, a task all the more complex in disciplines that combine strength, technique, coordination and psychological components, as in weightlifting. As an Olympic discipline, weightlifting is distinguished by a distinct set of demands: lifting a weightlifting in the snatch and clean & jerk events requires not only maximum strength, but also the ability to generate explosive force in extremely short intervals, very precise biomechanics, postural stability, joint mobility and exceptional psychological balance. International champions demonstrate all these attributes in top form, capable of reaching or breaking world and Olympic records.

If we want to predict a child's potential, it is paramount to understand what a champion looks like. Thus, studies describing the characteristics of elite weightlifting athletes will be analyzed: anthropometric parameters (e.g. trunk-to-limb ratio, percentage of muscle mass), biomechanical factors (specific mobility, weightlifting trajectory, optimal lifting technique) and physiological (explosive strength, RFD, muscle fiber type). In addition, psychological aspects (resilience, motivation, ability to concentrate under pressure) and socio-cultural factors (family support, sporting tradition) will be integrated to provide a

complete picture of the ideal performer. Essentially, we will present: the traits to which we aspire and subsequently want to recognize at a young age that will complete the profile of successful athletes.

Key physical characteristics

Identifying the profile of successful weightlifters involves a comprehensive understanding of the physical, biomechanical, neuromuscular and psychological characteristics that contribute to performance. Elite athletes typically exhibit a specific set of traits that optimize lifting heavy weights in a highly technical context [Storey & Smith, 2012; Haff & Triplett, 2015]. Although there is considerable individual diversity, research has identified several common patterns, ranging from body proportions and composition to neuromuscular qualities such as explosive strength and coordination efficiency, as well as psychological traits such as motivation, resilience and the ability to cope with competitive pressure [Gourgoulis et al., 2009; Carter & Ackland, 1994].

Anthropometrics: limb proportions, torso length and more

Anthropometric characteristics play a crucial role in determining the biomechanical advantages that elite weightlifters can capitalize on during competition. The distribution of segmental proportions, particularly in terms of limb length and torso dimensions, has a significant impact on an athlete's ability to maintain stability, transmit force efficiently and optimize the trajectory of the weightlift during lifts. Studies consistently demonstrate that weightlifters with shorter trunks in relation to their overall height, combined with strong and well-developed lower limbs, possess a biomechanical advantage.

These traits support a stable center of gravity and reduce the opposing moment of force during key phases of lifting, such as the catch position or second pull (Meyer et al., 2017; Monteiro et al., 2021). The relationship between femur and tibia length is another key anthropometric factor influencing weightlifting performance.

A favourable ratio, characterized by relatively shorter femurs and slightly longer tibiae, enhances the weightlifter's ability to maintain an upright trunk position during squat movements and recovery to chest press. This alignment minimizes mechanical

inefficiencies by reducing forward tilt and alleviating pressure on the lower back, allowing greater vertical force to be applied.

Research using motion capture and biomechanical modeling confirms that lifters with these proportions achieve higher mechanical performance and experience fewer compensatory movements during lifts, which is essential for both performance and injury prevention (Schleppe et al., 2020; Picerno et al., 2022). Arm length also contributes significantly to lifting mechanics, particularly in determining starting position, weightlifting trajectory, and overhead stabilization. Athletes with slightly shorter arms in relation to their torso often exhibit greater control when stabilizing the weightlifting overhead on the snatch.

The reduced lever length minimizes rotational moments, allowing better stability of the bar trajectory and reducing the energy demands on the shoulders and scapular stabilizers during the grip phase. In contrast, athletes with longer arms tend to adopt different starting positions, characterized by a deeper hip flexion, which may influence the trajectory of the weightlifting during the pull phase.

These adjustments require customized technical adaptations to optimize efficiency and minimize deviation from the ideal weightlifting trajectory (Caruso et al., 2019; Štefanovský et al., 2023). Furthermore, the compactness of an athlete's torso directly affects their ability to maintain an advantageous center of mass throughout the lift. A shorter torso, together with broad shoulders and narrow waist, facilitates more efficient force transfer through the kinetic chain. This configuration allows the athlete to generate higher peak forces while maintaining a stable base of support, especially during the explosive triple extension phase.

Biomechanical analyses of elite lifters show that compact trunks contribute to reduced energy loss and improved load distribution during both the snatch and the clean & jerk (Kim et al., 2018; Stoll et al., 2021). In addition to segmental ratios, pelvic width and hip joint structure influence weightlifting performance. A wider pelvic structure, combined with a deep acetabular orientation, improves stability during squat and grip positions, allowing athletes to efficiently absorb the load and transition smoothly into the recovery phase.

This structural alignment supports greater mobility of the hip joint and facilitates the full range of motion required for technical accuracy under heavy loads. Athletes with these anatomical advantages often exhibit superior consistency and reduced variability in the execution of lifts over multiple attempts (García-González et al., 2020; Mangine et al., 2022). While favorable anthropometric traits offer significant advantages, it is important to note that athletes with less than ideal proportions can achieve elite performance through tailored training and technical adjustments.

For example, those with longer torsos or arms can compensate by emphasizing torso strength and flexibility to enhance stability and adapt their technique to optimize bar trajectory and joint alignment. Motion capture data and individualized biomechanical analysis allow coaches to identify these compensatory strategies, ensuring that athletes maximize their lifting potential regardless of their anatomical starting point (McGuigan et al., 2019; Ursino et al., 2022).

These anthropometric attributes highlight the complex relationship between physical structure and biomechanical efficiency in weightlifting. By leveraging specific segmental ratios and body proportions, elite weightlifters optimize stability, force transmission, and technical execution, highlighting the importance of the anthropometric profile in both talent identification and the development of an individualized training program.

Body composition: lean to fat mass ratio

Body composition is a fundamental determinant of weightlifting performance as it directly influences an athlete's ability to generate power, maintain mobility and compete effectively within weight classes. Successful weightlifters typically have high levels of lean muscle mass combined with relatively low fat mass.

This composition provides a superior strength-to-weight ratio, which is essential for lifting heavier loads while maintaining agility and technical precision. Muscle mass contributes to the athlete's ability to produce force quickly and efficiently, while moderate levels of body fat ensure adequate energy reserves without compromising movement dynamics or biomechanical efficiency (Keogh et al., 2021; Storey et al., 2018). The distribution and quality of muscle mass also plays a critical role.

For example, the development of muscle groups in the posterior chain, such as the gluteus maximus, hamstrings and erector spinae, is particularly important for force production during the pulling phases of the snatch and the clean & jerk. In addition, the muscle mass in the shoulders, quadriceps must be optimized to support weightlifting stabilization and explosive extensions, essential for the execution of both lifts (Lanzoni et al., 2019).

Differences in body composition and its influence on weightlifting performance can vary between male and female athletes, with men often exhibiting greater absolute muscle mass and strength potential, whereas women tend to demonstrate superior flexibility and stability, which are equally important for technical efficiency (Zaras et al., 2016).

The role of fat mass in weightlifting is nuanced. While high percentages of body fat can contribute to total body mass and provide some biomechanical advantages in certain weight classes, excess fat can reduce the strength-to-weight ratio and impede agility. Maintaining fat levels within an optimal range allows weightlifters to combine the force-generating benefits of muscle mass with the speed and mobility needed to excel in dynamic movements such as snatching and cleaning & jerking. This balance is particularly important for weightlifters in the lower weight classes, where a higher force-to-weight ratio is often the deciding factor for success (Cholewa et al., 2022; Kim et al., 2021).

Effective management of body composition is an integral component of a weightlifter's training plan, particularly in the context of weight categories. Athletes must carefully adjust their lean and fat mass to compete optimally in their chosen division. Strategies to achieve these adjustments include nutrition protocols, hydration management and specific recovery interventions. Protein-rich diets are commonly used to support muscle growth and repair, while carbohydrate intake is strategically modulated to fuel training sessions and restore glycogen levels without promoting excessive fat gain. Recent studies have also emphasized the importance of periodized nutritional approaches that align macronutrient intake with specific phases of training, competition preparation, and recovery (Slater et al., 2019; Helms et al., 2021).

Hydration is another critical factor influencing body composition and performance, as athletes often use short-term dehydration strategies to meet pre-competition weight requirements. However, inadequate dehydration can impair muscle function, coordination, and recovery capacity, emphasizing the need for carefully monitored rehydration protocols to restore performance capabilities after weight-gain. Electrolyte balance is particularly important, as imbalances can disrupt neuromuscular function and increase the risk of cramping or fatigue during competition (Sawka et al., 2015; Garthe & Maughan, 2018).

Body composition management is also complicated by gender differences. Female weightlifters, for example, may face unique challenges due to hormonal variations that influence fat distribution, muscle mass accumulation, and energy metabolism. Estrogen, while beneficial for joint stability and recovery, can favor fat storage in certain areas, which can impact body composition strategies.

This requires tailored training and dietary plans to account for these physiological differences, ensuring that athletes achieve an optimal strength-to-weight ratio while maintaining overall health and hormonal balance (Devries et al., 2016; Kostek et al., 2020).

Monitoring body composition in weightlifters has become increasingly sophisticated, with techniques such as dual-energy X-ray absorptiometry (DXA) and bioelectrical impedance analysis 42 (BIA) providing detailed information about muscle and fat distribution.

These tools enable coaches and athletes to make data-driven adjustments to training and nutrition plans, optimizing performance outcomes while minimizing health risks (Ackland et al., 2018; Peeters et al., 2020)

Joint flexibility and mobility

Joint flexibility and mobility are essential components of successful performance in weightlifting, as they enable athletes to adopt and maintain biomechanically advantageous positions during the execution of the snatch and clean & jerk. These positions require a combination of flexibility, stability, and strength to achieve optimal weightlifting trajectories, minimize energy loss, and ensure technical accuracy under

heavy loads. The shoulders, hips, and ankles are particularly vital, as their mobility directly influences the athlete's ability to achieve the ranges of motion required for efficient force transfer and stabilization of the weightlifting (Prieske et al., 2019; Chaabene et al., 2020).

Shoulder mobility is essential for maintaining a stable overhead position, especially during the snatch. The overhead position requires a combination of shoulder flexion, external rotation, and upward rotation of the scapula to ensure that the weightlifting remains aligned with the athlete's center of gravity. Restricted mobility in the shoulder girdle can lead to compensatory movements such as excessive lumbar extension or altered bar trajectory, both of which compromise lifting efficiency and increase the risk of injury (Welsch et al., 2020; Oliveira et al., 2022).

In addition, mobility deficits may impede an athlete's ability to achieve a safe and balanced lockout, particularly when stabilizing heavy overhead loads. Ankle mobility, particularly in dorsiflexion, is another key factor influencing weightlifting performance. Adequate dorsiflexion allows athletes to achieve deep squat positions necessary for the catch phase of both the snatch and the chest press. Insufficient ankle mobility can lead to forward bending, shifting the athlete's center of gravity and putting more pressure on the knees and lower back. Research has shown that limited ankle dorsiflexion is associated with increased variability of the weightlift trajectory and reduced lift stability, often leading to missed attempts during the catch or recovery phases (Malliaras et al., 2020; Garcia et al., 2023).

Hip mobility is equally important, as it facilitates flexion and deep rotation required for correct positioning in the pull and grip phases. The external rotational ability of the hips in combination with deep flexion ensures that the knees pass over the toes, promoting stability and alignment during squat movements. Deficits in hip mobility can force athletes into compromised positions, such as valgus knee collapse or excessive forward trunk tilt, which negatively affect both performance and joint health (Baumeister et al., 2018; Monteiro et al., 2021).

Flexibility and mobility training is an integral part of weightlifting training as it addresses the specific demands of the sport and reduces the risk of injury. Static stretching, dynamic warm-ups and joint mobilization exercises are commonly used to

improve range of motion in key areas, particularly the shoulders, hips and ankles. Recent studies highlight the efficacy of proprioceptive neuromuscular facilitation (PNF) stretching and mobility exercises incorporating resistance bands in improving passive and active joint flexibility (Behm et al., 2021; Lima et al., 2022).

These methods not only increase range of motion, but also improve joint stability, which is essential for safely handling heavy loads. Joint mobility also plays a role in injury prevention, as restricted movement patterns can increase stress on surrounding structures such as ligaments, tendons and cartilage. For example, inadequate ankle dorsiflexion can lead to compensatory knee valgus, increasing the risk of anterior cruciate ligament (LCA) injury. Similarly, limited shoulder mobility can cause impingement or rotator cuff strain when athletes attempt to stabilize the weightlifting in suboptimal positions (Bishop et al., 2017; Zemp et al., 2021).

Individual differences in joint mobility often require customized approaches to flexibility training. Coaches and practitioners frequently use motion capture technology and functional movement examinations to identify specific mobility limitations and develop personalized interventions. For example, athletes with tight shoulder girdles may benefit from focused thoracic spine mobility exercises, whereas those with restricted ankle dorsiflexion might incorporate calf stretches and weighted dorsiflexion exercises to address their deficits (Schache et al., 2019; Cheung et al., 2023).

Joint flexibility and mobility requirements also vary by gender, with female weightlifters usually exhibiting greater passive flexibility but needing additional emphasis on stability to maintain control during dynamic movements. Male athletes, on the other hand, may need more intensive flexibility training to achieve the required ranges of motion, particularly in the shoulders and hips. These gender differences highlight the importance of individualized training strategies to optimize performance while addressing the unique anatomical and physiological characteristics of each athlete (Santos-Concejero et al., 2020; Cormier et al., 2022).

Joint flexibility and mobility are indispensable for effective performance in weightlifting. By improving shoulder, hip, and ankle mobility, athletes can achieve optimal lifting positions, maintain stability, and reduce the likelihood of injury. Specific

mobility training, based on biomechanical assessments, ensures that athletes can meet the demanding technical and physical demands of the sport.

The present article aims to present the importance of the perception of weightlifting, the importance of selection, selection factors, anthropometric attributes and the feasibility of weightlifting training as they were centralized from the questionnaire applied to the specialists.

Materials and methods

In the research, a questionnaire was developed and addressed to the nomenomized weightlifting coaches. The questionnaire contained 46 questions of which 5 were demographic and the others were categorized according to the interest of data collection. Figure 1 presents the questions related to perception of weightlifting, importance of selection, factors of selection, anthropometric attributes and feasibility of training. This represents only a part of the questions asked to the specialists and the results of which we wish to present in this article.

Table 1. Perception of weightlifting, importance of selection, factors of selection, anthropometric attributes and feasibility of weightlifting training.

INIT-PC06	Perception of weightlifting as a sport for children	Weightlifting safety	Do you consider weightlifting a safe and beneficial sport for children?
INIT-PC07	Perception of weightlifting as a sport for children	Degree of risk	Do you consider weightlifting a high-risk sport?
INIT-PC08	Perception of weightlifting as a sport for children	Recommended age	At what age should you start weightlifting?
INIT-IS09	The importance of selection in sport	Importance of selection	Do you consider selection in sport important?
INIT-IS10	The importance of selection in sport	Early selection	Do you think that early selection in weightlifting can contribute to high performance?
INIT-IS11	The importance of selection in sport	Use of the system	Do you consider that a selection system in weightlifting is useful?

INIT-FS12	Important factors in selection	Physical factor	Do you consider that the physical factor is important in the selection process for weightlifting?
INIT-FS13	Important factors in selection	Technical factor	Do you consider that the technical factor is important in the selection process for weightlifting?
INIT-FS14	Important factors in selection	Theoretical factor	Do you consider the theoretical factor is important in the selection process for the weightlifting?
INIT-FS15	Important factors in selection	Tactical factor	Do you consider the tactical factor to be important in the selection process for the weightlifting?
INIT-FS16	Important factors in selection	Psychological factor	Do you consider the psychological factor important in the selection process for the weightlifting?
INIT-FG17	Genetic and biological factors	Antropometric measurements	Do you think anthropometric measurements are relevant for the selection process in weightlifting?
INIT-FG18	Genetic and biological factors	Biometric measurements	Do you think biometric measurements are relevant to the selection process in weightlifting?
INIT-FG19	Genetic and biological factors	Genetic factors	Do you think that genetic factors may have a significant bearing on the selection process in weightlifting?
EXP-AAF01	1. Anthropometric and physical attributes	Body proportions	To what extent do you think body proportions (e.g. arm/leg length, torso to height ratio) influence success in weightlifting?
EXP-AAF02	1. Anthropometric and physical attributes	Grip strength	How important is grip strength in 9-12 year olds in predicting long-term potential in weightlifting?
EXP-AAF03	1. Anthropometric and physical attributes	Vertical jump test	To what extent would you recommend including the vertical jump test as a predictor of potential in weightlifting?
EXP-AAF04	1. Anthropometric and physical attributes	Long jump test	To what extent do you consider the long jump test to be relevant for

			assessing explosive strength in children?
EXP-FZA05	2. Feasibility of training	Introduction of techniques	To what extent do you consider it feasible to introduce basic weightlifting techniques (e.g. snatch, clean & jerk) to children aged 9-12 years?
EXP-FZA0	2. Feasibility of training	Physical training exercises	How important is the influence of physical training exercises (e.g. trunk strengthening, pilometry) for children aged 9-12 years?
EXP-FZA07	2. Feasibility of training	Progressive load management	To what extent do you agree that progressive load management is essential for young weightlifting athletes?
EXP-FZA08	2. Feasibility of training	Age-specific technical exercises	To what extent is it feasible to introduce age-specific technical exercises for children under 12?

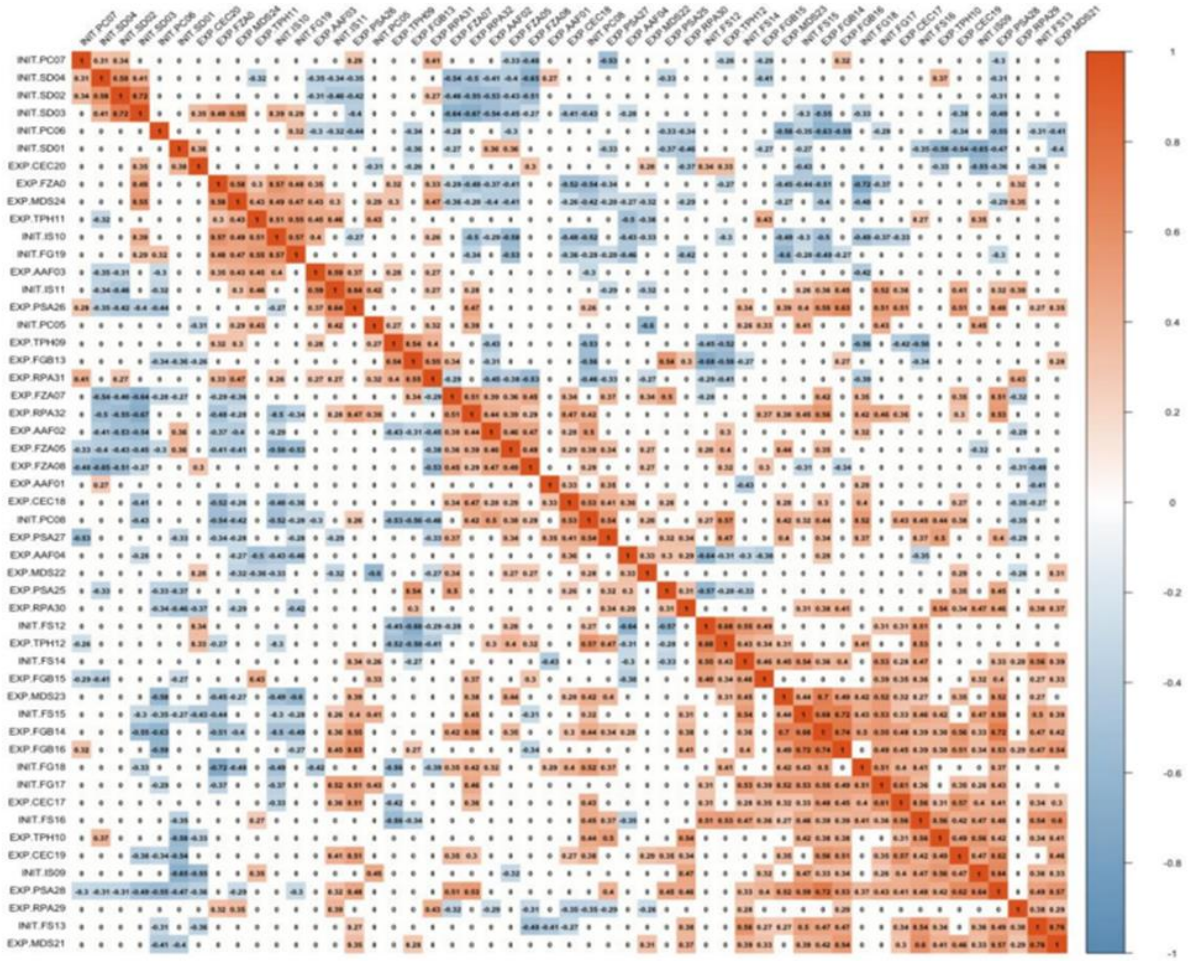
The questionnaire was administered between March and September 2022 to 56 weightlifting professionals nationwide. The questionnaire was written in Google form and was sent to the respondents via a login link. The answers were automatically centralized through the Google platform.

The questionnaire was built on these categories of questions as a result of the literature review on how to investigate specialists internationally. The questions found in the questionnaires from the research questionnaires available in the studied databases were centralized and then scaled in order to be statistically analyzed. This process resulted in these categories of questions and within each category the questions considered relevant to them were identified and selected.

Questionnaires provide a flexible and rigorous means of collecting quantitative and qualitative data, facilitating a nuanced exploration of complex phenomena. In the context of this research, which examines talent identification and development in performance weightlifting, the Questionnaire proved to be the most appropriate methodology due to its scalability, accuracy and adaptability.

RESULTS

Correlative results related to all the questions included in the questionnaire administered to the specialists are presented in Figure 1. The paper presents only the results that are the subject of this article.



The first section of the survey, focusing on the perception of weightlifting for children, reveals a complex interaction between the perceived safety of the sport, the risks associated with the sport and the recommended age of initiation. The correlation analysis shows a moderately strong inverse relationship between the perception of weightlifting as safe and beneficial (INIT-PC06) and its perception as a high-risk sport (INIT-PC07), with a correlation coefficient of approximately -0.6 and a p-value below 0.01. This statistically significant result suggests a clear division among experts: those who consider the sport to be safe tend to reject the idea that it is too risky and vice versa. The domain of anthropometric and physical attributes examines measurable physical characteristics and their perceived influence on performance in weightlifting, particularly in the identification of future champions. There is an extremely strong and

statistically significant correlation between the perceived importance of body proportions (EXP-AAF01) and the relevance of grip strength (EXP-AAF02), with a correlation coefficient close to 0.81 and a p-value below 0.01. This strong relationship reflects the practical reality that body proportions and grip strength both play an essential role in weightlifting mechanics. Proportions, such as the ratio of limb length to torso length, influence leverage, while grip strength has a direct impact on the ability to control and stabilize the weightlifting, particularly in complex lifts such as the Clean & jerk. The alignment of these factors highlights a common biomechanical basis that experts consistently prioritize when evaluating talent.

Another notable correlation is observed between the importance of body proportions (EXP-AAF01) and the vertical jump test (EXP-AAF03), with a coefficient of approximately 0.65 and a p-value below 0.05. This relationship emphasizes the role of explosive power as a critical predictor of success in weightlifting, given that vertical jump performance is a well-established proxy for lower-body strength and neuromuscular efficiency. However, the weaker, but still positive, correlation between the vertical jump test (EXP-AAF03) and the long jump test (EXPAAF04), with a coefficient of approximately 0.52 and a borderline significant p-value, suggests subtle distinctions in how these tests are evaluated. The vertical jump appears to be considered more relevant to the upward explosive force required in weightlifting, whereas the long jump may be considered less specific because of its horizontal component, which differs slightly from the vertical requirements of the sport. Interestingly, the relationship between grip strength (EXP-AAF02) and the long jump test (EXP-AAF04) is relatively weak, with a correlation coefficient below 0.4 and an insignificant p-value. This weak correlation likely reflects the divergent nature of these attributes: while grip strength is essential for barbell control, the long jump emphasizes lower-body strength without directly engaging upper-body musculature. Such distinctions may indicate that experts perceive these attributes as having complementary, rather than overlapping, roles in assessing potential.

Overall, the data in this domain reflect a multifaceted understanding of physical attributes, emphasizing the interplay between anthropometry, strength and power. Strong and significant correlations highlight areas of consensus, while weaker and

insignificant relationships indicate the nuanced, sometimes independent, roles that these attributes play in the identification and cultivation of weightlifting talent. These findings reinforce the complexity of talent identification in weightlifting, where experts must balance a variety of physical characteristics to construct a comprehensive profile of potential

DISCUSSION

This component of the survey is designed to capture coaches' perceptions of the critical role that physical characteristics play in predicting success in weightlifting. In particular, it assesses attributes such as body proportions, grip strength, and explosive power - generally recognized as essential in differentiating high-potential athletes in strength sports.

By including items such as Body proportions, the survey aligns with the hypothesis that anthropometric measures such as limb length and trunk-to-limb ratio significantly influence performance. These factors are particularly relevant, given their biomechanical implications for the execution of key weightlifting movements such as the snatch and the clean & jerk (Bayios et al., 2006; Zatsiorsky & Kraemer, 2006).

The Grip Strength (Grip Strength) element is directly related to hypothesis 1.3, examining the early predictive value of grip strength for long-term success in competitive weightlifting. Grip strength is not only a proxy for overall upper body explosiveness, but also a practical measure widely used in talent identification programs in a variety of sports (Cronin et al., 2007; Franchini et al., 2011).

Coaches' responses to this item will provide information about the priority they place on grip strength as a developmental marker, particularly for young athletes aged 9-12 years, where early identification can have significant implications for targeted training interventions. The inclusion of elements such as

Vertical Jump Test and Long Jump Test (vertical and horizontal jump tests) further strengthens the alignment with hypotheses 1.2 and 1.3 by exploring coaches' views of explosive strength as a predictor of weightlifting potential. Numerous studies have demonstrated that jumping ability is closely correlated with neuromuscular strength, an

essential quality for generating the rapid force required in Olympic lifting (Carlock et al., 2004; Markovic & Jaric, 2007).

These elements allow the survey to assess whether coaches see the value of incorporating such field tests into their talent identification processes, potentially linking athletic testing protocols with their experiential judgment. The inclusion of these elements is justified by a rich literature on the biomechanical and physiological determinants of success in weightlifting. For example, optimal body proportions - such as a shorter femur relative to torso length - have been associated with an increased mechanical advantage during lifting movements, reducing energy cost and increasing efficiency (Siahkouhian et al., 2011; Knechtle et al., 2020).

Similarly, explosive power, as measured by vertical and broad jump tests, has been widely validated as a proxy for neuromuscular efficiency and correlates strongly with performance in strength and power sports (Newton & Dugan, 2002; McGuigan & Winchester, 2008).

The inclusion of these measures aligns the survey with both scientific findings and established practices in elite athlete selection, ensuring that the responses will provide valuable data to advance evidence-based talent identification in weightlifting. In summary, this component of the survey directly addresses critical research hypotheses by exploring how coaches perceive anthropometric and physical attributes as indicators of potential in weightlifting.

CONCLUSIONS

In weightlifting, success depends not only on the absolute strength of the athlete, but also on the efficiency with which this strength can be applied through a favorable body structure.

Essential physical characteristics, such as segmental proportions, body composition and joint mobility, determine the basic biomechanical conditions for force production and stability under the weightlifting.

Focusing on body proportions, grip strength, and explosive power, the survey ensures alignment with both the theoretical and practical dimensions of talent identification,

providing useful insights into the role of physical traits in shaping long-term athletic success.

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THE EFFICIENCY OF COMBINED TRAINING USING CLASSICAL EXERCISES AND CORE STABILITY EXERCISES IN STRENGTH DEVELOPMENT FOR SENIOR HANDBALL PLAYERS

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Abstract

The present paper aims to highlight the effectiveness of strength training through the combined use of classical exercises and core stability exercises, employing the circuit training method, in handball players competing in the National League at the senior level. The subjects of the research are 18 male players from the CSM Vaslui handball team, with an average age of 27.5 years. Over a 12-week period, a training program was implemented, designed by combining exercises specifically aimed at strength development with core stability exercises. The program was applied once a week during technical-tactical training sessions (30 minutes at the beginning of the session, immediately after warm-up) and as part of the physical training sessions (twice a week, 90 minutes each). The tests used targeted the maximal strength level of the lower limbs (4 control tests) and upper limbs (3 control tests). The results, which indicate the strength index levels, showed improvements in all tests from the initial to the final assessment. In conclusion, classical strength development exercises can be effectively combined with core stability exercises to improve the strength level of performance handball players.

Keywords: *strength; core-stability; handball.*

INTRODUCTION

Modern handball has changed significantly in recent decades, becoming a high-speed, intense, and tactically complex sport. The evolution of rules, equipment, and athletes' physical training has led to the emergence of a dynamic style of play that places high demands on players' physical, technical-tactical, and psychological qualities (Wagner et al., 2014). Modern handball involves rapid changes of direction, repeated sprints, jumps, and constant physical contact, which means a high physical intensity. Players must combine explosive strength, reaction speed and movement, anaerobic endurance, as well as resistance to contact in both offensive and defensive phases (Póvoas et al.,

2012). The speed of the game has increased significantly, implying limited time for decision-making. Players need to react quickly to changing situations and execute precise actions within a very short time frame. Modern players must be able to perform in multiple positions and quickly adapt to transitions between attack and defense. This requires balanced physical development and a deep understanding of the game. Rapid transitions between offense and defense—and vice versa—are essential for team success. Modern teams seek to capitalize on every counterattack or defensive retreat opportunity, which requires exceptional physical conditioning and the ability to sustain anaerobic effort. Each player has a well-defined role but must also collaborate fluidly within the team system. Defensive systems (6-0, 5-1, 3-2-1) and offensive strategies (with double pivot, 7-player attack) are increasingly sophisticated, requiring tactical intuition and game intelligence (Grupean, 2015). Modern physical training in handball is no longer separate from the specifics of the game. Functional methods, ball-specific exercises, and circuits that replicate the intensity and demands of the match are used. Strength, speed, and agility are developed in contexts as close as possible and consistent with competitive developments (Ghervan, 2007).

This study aims to analyze the possibility of developing specific maximal strength in senior performance handball players using a program that combines the classic circuit for strength development with a strength/speed/core-stability circuit, applied over 12 weeks during the pre-competition/competition period. Since the program is intended to be applied to a handball team competing in the first league during the pre-competition/competition period, we will limit ourselves to a descriptive study.

The study hypothesis starts from the assumption that classic strength development training using the circuit method, combined with a strength/speed/core-stability circuit, will significantly improve specific maximal strength indicators.

METHODOLOGY

1. Participants

The subjects of the research are 18 members of the CSM Vaslui men's handball team, with an average age of 27.5 years. The athletes included in this study compete in the National League and have practiced performance sport for at least 10 years. The CSM

Vaslui men's handball team is a competitive team in the national championship, ranked 8th–9th in the national standings.

2. Research instruments

The tests used aimed to assess the maximal strength level of the lower limbs (4 control tests) and the upper limbs (3 control tests). The 7 tests and the order in which they were performed are:

1. Barbell Bench Press (BBP) – pressing the barbell with the upper limbs, lying supine on a bench, with feet supported on the floor;
2. Barbell Squat (BS) – squatting with the barbell, standing with feet slightly apart laterally;
3. Triceps Rope Pull-down (TRP) – triceps extension at the cable machine, sitting on the gym bench with bent knees and feet resting on the floor;
4. Barbell Hip Thrust (BHT) – lying supine with the back supported on a bench, legs bent with feet resting on the bench, raising the pelvis with the barbell placed on the hips;
5. Barbell Hang Clean (BHC) – from a squat position, feet slightly apart, explosively lifting the barbell first to the chest, then standing up and pushing the barbell overhead by extending the elbows;
6. Lever Lying Leg Curl (LLLC) – flexion and extension of the legs lying supine on the strength training machine bench;
7. Lever Leg Extension (LLE) – lying supine on the strength machine bench, extending and flexing the legs.

Before starting the strength development program, maximal strength evaluation was performed for each participant on these 7 tests to establish the strength level at the study's start and quantify progress at its conclusion.

Maximal strength is defined practically by the 1RM (one-repetition maximum) test and represents the maximum weight a person can lift/press in a single repetition with correct technique for a given exercise. The 1RM test is considered the "gold standard" for measuring dynamic strength in field conditions (non-laboratory). It is widely used by strength coaches to assess athletes' strength capacity, identify possible imbalances

between muscle group levels, and calibrate training loads specifically for each individual.

1RM Testing Protocol: Testing maximal strength requires safety precautions (presence of a spotter/assistant, thorough warm-up) and a standardized protocol. Typically, the test begins with a general warm-up, followed by specific warm-up with submaximal weights: for example, performing 6–10 repetitions with about 50% of the estimated 1RM weight, then after a 1–2-minute rest, performing 3–5 repetitions with about 80% of the estimated 1RM.

After warming up, single 1RM attempts begin: the load is gradually increased (usually by increments of about 5–10% of the initial weight for upper body exercises and 10–20% for lower body exercises) and a single repetition is attempted. If successful (correct form, no assistance), the participant rests for 2–4 minutes and tries a heavier weight. This process repeats until the participant can no longer surpass a certain load; the highest weight successfully lifted or pressed represents the 1RM.

Ideally, maximal strength is reached within 3–7 single attempts to avoid fatigue before full strength potential is exhausted. When multiple exercises are used for evaluation (e.g., squat, bench press, deadlift), adequate rest is ensured between tests for different muscle groups, or testing is split across different days to avoid fatigue influence.

By finding the 1RM values in the main exercises (e.g., 1RM squat, 1RM bench press, 1RM hang clean, etc.), the coach can set relative work intensities for the program (e.g., % of 1RM for different repetition ranges) and objectively measure progress (an increase in maximal strength at retesting indicates program effectiveness).

For example, if at the start of the program an athlete's 1RM in squats is 100 kg, strength training can be planned around specific percentages (60–80% 1RM for hypertrophic strength development, 85–95% for maximal strength, >100% for supramaximal or negative training, etc.).

At the end of the 8-week program, the 1RM testing will be repeated to quantify strength gains — a key indicator of program success.

3. Research procedure

The design of the *12-week training program for increasing maximal strength* involved adhering to the principles of progressive overload, specificity, and adequate recovery.

Over 12 weeks, the proposed and designed training program was applied, based on combining specific strength development exercises with core stability exercises.

The program consisted of two physical training sessions per week, each lasting 90 minutes, using circuit training methods with 12 classical strength exercises performed on machines or with specific equipment. Between these two training sessions, the program was supplemented once a week with a strength/speed/core-stability circuit consisting of 10 exercises, performed during a technical-tactical training session (30 minutes at the start of the session, immediately after warm-up).

Since the goal was not only to increase maximal strength but also to improve explosive power (strength manifested at high speed), which underlies jumping ability and throwing strength, the program included periods of high load (for absolute strength) as well as explosive executions and sufficient rest intervals to allow neuromuscular system recovery.

4. Structure and Periodization of the Training

Considering the intense nature of strength training sessions, a frequency of three sessions per week was chosen, interspersed between days dedicated to technical-tactical preparation and competitions (for example: strength training on Monday, Wednesday, and Friday; while Tuesday, Thursday, Saturday, and Sunday are reserved for technical-tactical training or competitions). In sports training, it is important that practical applied interventions consider the specificity of the sport when aiming for optimal performance improvement (Zu et al., 2025). Practical research indicates that a frequency of at least three weekly sessions is necessary to achieve a sufficient volume of strength stimulation in a circuit training regime, but at the same time, the number of training days should not be exaggerated, with training intensity being the critical factor for progress. In our study, the technical-tactical training days ensured muscular and neural adaptation, thus preventing overtraining and securing positive adaptations to strength stimuli. Each week of strength training comprised three identical or slightly varied sessions in which the strength circuit was performed. A training session included 3 to 5 circuit sets, depending on the program phase (initially fewer sets for accommodation, increasing volume in the intermediate phase, then reduced towards the end to avoid supramaximal

strain). Within a circuit set, the athlete performs each exercise sequentially in the established order, with short breaks between exercises (30–60 seconds, just enough to move between stations and prepare), an approach that allows alternating muscle groups and maintaining high intensity without compromising execution. After completing a circuit, a longer break (5–8 minutes) is taken before starting the next, allowing partial recovery. This method maximizes gym time efficiency and increases metabolic demand; however, the main goal remains strength development. Therefore, emphasis is placed on the quality of each execution and maintaining a high level of effort for every exercise, even when performed in a circuit format. The 12 exercises used in the strength training sessions were: Contralateral Db T-Bench Press; Pull-Ups Classic Grip; Bench Squat; Plate Pullover; Lying Leg Curl; Machine Triceps Extension; Resistance Band Abduction – Bosu; Resistance Band Adduction; Neutral Grip Shoulder Press, Barbell Hang Clean; Quadriceps Extension; Barbell Hip Thrust.

In the technical-tactical training program, the strength/speed/core-stability circuit included the following 10 exercises: stepping on a stepper with the opposite knee raised at a 90° angle; balancing on a Bosu – moving the foot in the four cardinal directions while simultaneously pushing a sandbag (disc) forward; gradual lowering into a push-up over 3 seconds followed by an explosive return to the initial position; deceleration – standing on a Bosu while holding a resistance band in tension, lowering into a lateral lunge; Pull Over; Hamstring exercise on a Swiss ball; ladder drills; passing an 800g medicine ball while standing on one leg on a Bosu in various ways; halo exercise with a sandbag; lateral twists with a sandbag while seated on a Bosu with legs elevated.

The dosing was as follows: 3 sets, each exercise repeated for 30 seconds, 15 seconds rest between stations, 30 seconds rest between sets, for a total work time of 30 minutes. The training period was structured over 12 weeks (Table 1). The program was designed with progressive variations in intensity (% of 1RM – maximal strength) and volume (number of sets and repetitions). Initially, the emphasis was on moderate volume and technique refinement, followed gradually by heavier loads with fewer repetitions, and in the final phase, volume was reduced to allow maximal strength manifestation and avoid excessive central nervous system fatigue.

Table 1. Periodization of the two strength training programs over 12 weeks

Week	Training days - strength	Intensity %1RM	SERIES	REPETITIONS	Evaluation
S1	July 08 and 12, 2024	50 - 60	3	15-20	1RM_IE
S2	July 15 and 19, 2024	60 - 65	4	10-15	
S3	July 22 and 26, 2024	70	3	10-15	
S4	July 29 and August 02, 2024	75	4	10-12	
S5	August 05 and 09, 2024	75	4	10-12	
S6	August 12 and 16, 2024	80	4	08-10	
S7	August 19 and 23, 2024	80	4	06-08	
S8	August 26 and 29, 2024	85	5	06-08	
S9	September 02 and 05, 2024	90	5	04-06	
S10	September 09 and 12, 2024	90	5	04-06	
S11	September 16 and 19, 2024	95	3	2-3	
S12	September 23 and 26, 2024	100/50	Test/2series		1RM_FE

RESULTS

The processed results are presented in Table 2. The statistical processing includes the arithmetic mean, the difference between the initial test mean and the final test mean, the standard deviation, and the coefficient of variation for the 7 tests assessing strength capacity.

Table 2. Statistical results obtained from the initial and final testing of the athlete group

	M (Kg)	Diff M FE_IE (kg)	S	CV
BBP_IE	103.06	16.39	11.52	11.18
BBP_FE	119.44		12.11	10.14
BS_IE	126.94	16.39	19.94	15.70
BS_FE	143.33		16.27	11.35
TRP_IE	74.17	10.28	7.33	9.88
TRP_FE	84.44		7.65	9.06
BHT_IE	142.22	12.22	32.64	22.95
BHT_FE	154.44		35.02	22.67
BHC_IE	63.50	6.17	9.76	15.37
BHC_FE	69.67		9.15	13.14
LLLC_IE	73.89	7.56	8.82	11.94

LLLC_FE	81.44		7.02	8.62
LLE_IE	68.56	3.78	1.92	2.80
LLE_FE	72.33		2.40	3.32

Legend: M = mean; S = standard deviation; CV = coefficient of variation; DiffM = Difference between means; IE = initial evaluation; FE = final evaluation; BBP = Barbell Bench Press; BS = Barbell Squat; TRP = Triceps Rope Pull-down; BHT = Barbell Hip Thrust; BHC = Barbell Hang Clean; LLLC = Lever Lying Leg Curl; LLE = Lever Leg Extension.

For the BBP test, it is observed that the arithmetic mean increased by 16.39 kg from 103.06 kg in the initial evaluation (IE) to 119.44 kg in the final evaluation (FE). The standard deviation increased from 11.52 in IE to 12.11 in FE, which indicates a decrease in group homogeneity, while the coefficient of variation decreased from 11.18 in IE to 10.14 in FE, highlighting a better clustering of values around the mean. Thus, we can emphasize that the strength of the bench press from the dorsal lying position improved considerably.

For the BS test, which assessed lower limb strength, an average value of 126.94 kg was recorded in IE and 143.33 kg in FE, showing a difference of 16.39 kg. The standard deviation decreased by 3.77, from 19.94 in IE to 16.29 in FE, indicating improved group homogeneity, and the coefficient of variation dropped by 4.35, from 15.70 in IE to 11.35 in FE, indicating that the subjects' values in FE were closer to the mean. We highlight that the average value in the squat test improved by 16.29 kg following the intervention.

Regarding the TRP test, the mean value increased by 10.28 kg, from 74.17 kg in IE to 84.44 kg in FE. The standard deviation increased from 7.33 in IE to 7.65 in FE, showing decreased group homogeneity, while the coefficient of variation decreased from 9.88 in IE to 9.06 in FE, emphasizing a concentration of individual values toward the mean. This shows an improvement in triceps extension strength using the lat pulldown machine.

Looking at the statistical processing for the BHT test, the results show a mean difference of 12.22 kg from 142.22 kg in IE to 154.44 kg in FE. The standard deviation increased from 32.64 in IE to 35.02 in FE, indicating decreased group homogeneity, while the coefficient of variation decreased slightly from 22.95 in IE to 22.67 in FE, which highlights a reduced variability between individual values relative to the mean. We

consider that the improvement in strength in the hip thrust test, performed with the barbell placed at hip level while lying on a gym bench with bent knees and feet on the floor, is a result of the applied intervention.

For the BHC test, the statistical analysis shows an increase in the mean value by 6.17 kg, from 63.50 kg in IE to 69.67 kg in FE, a decrease in standard deviation from 9.76 in IE to 9.15 in FE, highlighting improved group homogeneity, and a decrease in the coefficient of variation from 15.37 in IE to 13.14 in FE, indicating a reduced spread of individual values around the mean. These improvements support the possibility of enhanced overhead barbell lifting strength.

From the processed data of the LLLC test, a force increase of 7.56 kg was observed, from a mean value of 73.89 kg in IE to 81.44 kg in FE. The standard deviation decreased from 8.82 in IE to 7.02 in FE, indicating improved homogeneity, and the coefficient of variation decreased from 11.94 in IE to 8.62 in FE, showing a better distribution of individual values around the mean. This evolution highlights increased lower limb flexion strength in the leg press test performed from the dorsal lying position with bent legs.

Regarding the LLE test, which assessed lower limb extension strength, an increase in the mean value of 3.78 kg was recorded, from 68.56 kg in IE to 72.33 kg in FE. The standard deviation increased from 1.92 in IE to 2.40 in FE, indicating decreased group homogeneity, and the coefficient of variation increased from 2.80 in IE to 3.32 in FE, meaning a greater spread of individual values relative to the mean in FE.

DISCUSSION AND CONCLUSION

The objective of this observational study was to investigate the effects of a 12-week training program (covering the pre-competition and competition periods) aimed at the potential development of maximal strength in performance handball players, through a program that combined classical strength training with a strength/speed/core-stability circuit.

The collected and processed data suggest that combined training produces effects in the process of strength improvement. The increases in mean values from the initial

evaluation (IE) to the final evaluation (FE) were: +16.39 kg in the bench press with upper limbs from the dorsal lying position (BBP) and in the squat with the barbell on the shoulders while standing (BS); +10.38 kg in arm extension while seated on a bench with elbows bent at shoulder level (TRP); +12.22 kg in hip thrust with the barbell from the dorsal lying position on the bench, feet placed on the bench with knees bent (BHT); +6.17 kg in the barbell lift from the ground overhead from the squat position (BHC); +7.56 kg in leg flexion from the prone lying position on the bench with knees extended (LLLC); and +3.78 kg in leg extension while seated on the bench (LLE), highlighting an increase in strength levels.

We consider the increase in strength across these seven tests to be the result of using a combined training approach that included classical strength exercises alongside stability exercises. A meta-analysis conducted by Rodriguez et al. in 2025, which aimed to highlight the effects of abdominal muscle stability training on handball throwing performance, demonstrated an increase in throwing speed among handball players. Moreover, "traditional weight training, primarily using the barbell for compound lifts, produced the most significant and robust results" in achieving sports performance (Hadjisavvas et al., 2024).

The increase in mean strength values across the seven assessment tests is due to the combined training method incorporating classical strength exercises with stability exercises. Therefore, we consider that the obtained and highlighted results validate the study hypothesis, according to which *classic strength development training using the circuit method, combined with a strength/speed/core-stability circuit, will significantly improve specific maximal strength indicators.*

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COMPARISON OF FLEXIBILITY, BALANCE, STANDING LONG JUMP, HAND GRIP AND BACK STRENGTH VALUES IN SOCCER PLAYERS AND WRESTLERS

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Abstract

The present study aimed to compare flexibility, balance, standing long jump, handgrip and back strength values in football players and wrestlers aged 11-17 years. A total of 236 participants, 139 male football players and 97 male wrestlers, were included in the study. T-test, one-way analysis of variance and LSD tests were used for statistical analysis. No statistically significant difference was found between anthropometric measurements and fat percentages of football players and wrestlers ($p>0.05$). While there was no significant difference in the balance values of football players and wrestlers ($p>0.05$), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values ($p<0.05$ and $p<0.001$). While no significant difference was found in balance values in terms of age ($p>0.05$), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values ($p<0.001$). Long jump and strength values increased with increasing age in general. Flexibility value was positively correlated with hand grip strength, back strength and standing long jump ($p<0.001$). Balance value was only positively correlated with fat percentage ($p<0.001$). Hand grip strength was positively correlated with standing long jump and back strength ($p<0.001$). It was concluded that standing long jump values of football players were better than those of wrestlers, while flexibility, hand grip and back strength values of wrestlers were better than those of football players. Balance values were found to be similar. Standing long jump, flexibility, hand grip and back strength were found to increase with increasing age. Coaches and trainers should take these differences into consideration in football players and wrestlers aged between 11 and 17 years.

Keywords: *Football, Wrestling, Flexibility, Balance, Standing long jump, handgrip and back strength.*

INTRODUCTION

Flexibility, balance and strength values as biomotor characteristics are important parameters in the performance of athletes (Aslan et al., 2013). Athletes have complex physiological demands and these demands require athletes to have highly developed capacities in terms of maximal strength, power, muscular endurance, maximal aerobic power and anaerobic abilities (Chaabene et al., 2017). Improving strength and balance performance components is important to reduce the risk of injury and improve sports performance (Löklüoğlu et al.,2024). A relationship has been reported between trunk, upper and lower limb function and sports performance. High trunk muscle strength improves trunk stability, reduces the risk of back injury and improves athletic performance. Increased trunk muscular endurance is associated with improved shoulder mobility and stability, which in turn is associated with improved performance (Nakai et al., 2024). Standing long jump is complicated by the difficulty of motor coordination in both upper and lower segments. This movement is also considered a basic skill in various sports. In particular, it is an important test index for assessing the physical fitness levels of secondary school students (Zhou et al., 2020). Hand grip strength is often used to predict a strong hand grip. It is considered a general indicator of muscle strength and power and is useful in assessing general health status when combined with other biological parameters (Quattrocchi et al.,2024).

In football, lower and upper extremities play an important role in all the dynamics that make up a competition such as sprinting, throwing, tackling, and sudden turns (Çakır-Atabek, 2014). Research on flexibility in football has primarily focused on examining its effect on susceptibility to injury and the acute effects of flexibility on performance (Bogalho et al.,2022). Some researchers suggest that high levels of strength and power should go hand in hand with high levels of flexibility. Flexibility, as an important element of conditioning, supports technical preparation and also prevents injuries (Hrysomallis, 2011; Mirzaei et al., 2011; Chaliburda & Cieśliński, 2022).

Wrestling, which is among the Olympic branches, is a branch in which motoric characteristics such as strength, power, flexibility and balance come to the fore in terms of its characteristics (Özbar et al., 2002). Wrestling is a sport that requires very quick movements in short periods of time and it is largely dependent on body strength

(Cicoğlu et al., 2007). Flexibility is also an important factor for success in wrestling where complex skills are dominant. Flexibility creates a positive effect on the application of techniques by providing wrestlers with the ability to move extensively (Aslan et al., 2013). Especially in wrestling, where the balance feature comes to the fore in the correct and fast application of techniques, balance performance of athletes should be at an excellent level (Özbar et al., 2002). In wrestling, balance is very necessary for the positioning of athletes so that they cannot be easily knocked down by the opponent (Dafer, 2020). Wrestling styles require a unique physical profile, including strength, power, agility and flexibility (Chaliburda & Cieśliński, 2022).

Information about the timing and magnitude of changes in athletes' physical performance will also be of great value to coaches/fitness coaches in terms of knowing when to expect improvements in certain physical characteristics or physical performance and when not to expect them (Smpokos et al., 2022). For this purpose, changes in flexibility, balance, standing long jump, hand grip strength, and back strength were examined based on sport type and age group. The present study aimed to determine flexibility, balance, standing long jump, hand grip strength, and back strength values in football players and wrestlers and to compare these values between the two sports.

Method

Participants: A total of 236 athletes between the ages of 11 and 17, including 139 male amateur football players and 97 male wrestlers in Samsun province participated in this study voluntarily.

Measurement parameters:

Body weight (kg): Body weight was measured without shoes and in sportswear. After stepping on the measuring device, the student stood still and the value was recorded.

Height (cm): Height was measured without shoes and in sportswear. During measurement, the heel, hip, back and head (back section) were aligned vertically. The head was positioned so that the eyes were looking straight ahead. After assuming this

position, the student was asked to take a deep breath and hold it, and the measurement was taken at that moment.

Sit-and-Reach (Flexibility) Test. Sit-and-reach test was used to measure flexibility. Participants sat on the floor with their bare feet flat on the test bench, leaned forward, kept their knees straight, and reached forward as far as possible with their hands in front of their bodies, and tried to slowly push the ruler forward. The test administrator stood next to the participant and prevented them from bending their knees. The participant waited for 1-2 seconds without stretching forward or backward at the furthest point. The test was repeated twice and the highest value was recorded (Canlı, 2020).

Standing Long Jump Test: For standing long jump test, participants were instructed to jump as far as possible horizontally by pushing off with both legs simultaneously, starting with a bilateral take-off and landing. The shortest distance from the landing heel to the starting point was measured in centimetres, and the arms were used to increase the jump distance. The furthest distance achieved was used for analysis. Participants performed two trials, and the best result was used for data analysis (Reina et al., 2018).

Flamingo balance test: The athlete stepped onto the balance material with the selected foot. In order to maintain balance and assume the correct position before the test, the athlete received support from the test administrator and held onto the test administrator. The athlete then bent the free leg behind the knee and held it with the hand on the same side. When the athlete was ready, the assistant let go of his hand and started the stopwatch at the same time. Every time the athlete lost his balance (contact with the ground, letting go of his foot), the stopwatch was stopped and restarted when the athlete was ready. The total number of times the athlete lost his balance within 60 seconds was recorded (Tsigilis et al., 2002).

Strength Tests:

Back strength measurement: After placing their feet on the dynamometer stand, the athletes performed the measurement by pulling the dynamometer bar vertically upwards as much as possible, with their knees and arms tense, their backs straight, and their bodies slightly bent forward. The measurements were repeated twice, and the best results were recorded in kilograms (Arı et al.,2024).

Hand Grip Strength Test: TK 5401 Takei Digital Hand Dynamometer was used in this test, which aimed to determine hand grip strength. Participants stood in a resting position without support and squeezed the dynamometer twice with their hands. The average of the two values read on the dynamometer was recorded as the participants' hand dynamometer value (Canlı, 2020).

Skin Fold Thickness Measurements:

Skin fold thickness measurements of children were taken from the triceps, subscapular, and suprailiac regions by using a skinfold caliper (Holtain LTD, England). Measurements were taken twice from the right side of the athletes, and the average of the two measurements was recorded as the result. For the measurement of skinfold thickness, the thickness of the subcutaneous fat layer between the thumb and index finger was pulled up slightly enough to separate it from the muscle tissue. The caliper was placed approximately 1 cm away from the fingers and the thickness of the subcutaneous fat layer was read from the indicator on the caliper within 2-3 sec and recorded in mm (Harrison et al., 1988).

Triceps Skinfold Thickness: The right elbow was placed at a 90º angle and the distance between the acromion process and the olecranon process on the posterior aspect of the arm was measured with a tape measure and the midpoint was marked. The measurement from this midpoint was then made parallel to the axis of the arm as recommended by Harrison et al (1988) (Saraçoğlu, 2019).

Subscapularis: Skinfold thickness was measured by lifting the skin and subcutaneous fat layer just below the scapula with the thumb, index and middle fingers of the left hand, following the natural orientation of the skinfold (the natural orientation of the skinfold extends at an angle of approximately 45° to the vertical axis of the body), as recommended by Harrison et al (1988).

Suprailiac Skinfold Thickness: With the athlete in an upright posture with feet together and arms hanging freely at the sides, the measurement was made from the top of the iliac crest diagonally over the axilla line as recommended by Harrison et al (1988) (Saraçoğlu,2019).

Calculation of Body Density and Body Fat Percentage:

Using the skinfold thicknesses, the body densities (BM) of the participants were determined individually by using the J-P (Jackson-Pollock) formula (1985). Body fat percentages (BMI) were then calculated using the Siri formula (Siri, 1961). The Jackson-Pollock and Siri formulas used for the research group are given below.

J-P equation = VY = chest + abdomen + thighs = sum of skinfolds (ST) Body Density = 1.10938 - (0.0008267 x ST) + (0.0000016 x ST2) - (0.0002574 x age)

Siri equation = BFP% = (495/BFP) - 450

Statistical procedure:

Statistical calculations were made with SPSS 25.00 program. Normality assumption of the data obtained in the study was evaluated with the Kolmogorov-Smirnov test ($p>0.05$). The data were found to be normally distributed. Student t-test was used for pairwise comparisons, one-way analysis of variance was used for multiple comparisons and LSD tests were used to determine the differences.

RESULTS

Table 1. Anthropometric measurements and fat percentages of football players and wrestlers

Parameters	Sport	n	Mean	St.deviation	t	p
Age (Years)	Football	139	13.80	1.59	-0.75	0.468
	Wrestling	97	13.95	2.06		
Height (cm)	Football	139	160.64	9.96	0.78	0.441
	Wrestling	97	159.40	12.92		
Body weight (kg)	Football	139	49.90	10.29	-0.018	0.943
	Wrestling	97	49.88	12.12		
Fat percentage (%)	Football	139	15.42	3.02	1.77	0.088
	Wrestling	97	14.49	4.66		
Sport experience (Years)	Football	139	6.50	1.62	-0.41	0.675
	Wrestling	97	6.60	2.02		

No statistically significant difference was found between anthropometric measurements and fat percentages of football players and wrestlers (p>0.05).

Table 2. Flexibility, balance, standing long jump, hand grip and back strength values of football players and wrestlers

	Sport	N	Mean	St.deviation	t	p
Flexibility (cm)	Football	139	22.07	6.47	-4.62	0.000**
	Wrestling	97	26.09	6.10		
Balance (number)	Football	139	6.10	4.17	-0.48	0.630
	Wrestling	97	5.85	3.21		
Right hand grip strength (kg)	Football	139	27.76	7.33	-2.11	0.036*
	Wrestling	97	30.25	10.08		
Left hand grip strength (kg)	Football	139	27.12	7.33	-2.30	0.23*
	Wrestling	97	29.71	9.40		
Standing long jump (cm)	Football	139	202.86	31.00	2.40	0.017*
	Wrestling	97	193.34	25.27		
Back strength (kg)	Football	139	86.80	28.96	-2.98	0.003*
	Wrestling	97	101.32	43.26		

*p<0.05 and **p<0.001

While no significant difference was found in the balance values of football players and wrestlers (p>0.05), statistically significant differences were found between flexibility, standing long jump, hand grip and back strength values (p<0.05 and p<0.001).

Table 3. Comparison of flexibility, balance, standing long jump, hand grip and back strength values by age

Parameters	Age	n	Mean	St. deviation	F/LSD	p
Flexibility (cm)	11 (1)	24	23.48	4.20	4.31	<0.001**
	12 (2)	40	20.66	6.10	1<7	
	13 (3)	50	23.36	7.39	2<3.5.7	
	14 (4)	40	22.90	6.76	3.4<7	
	15 (5)	30	25.91	6.28		

	16 (6)	25	23.07	5.03		
	17 (7)	27	28.22	6.07		
Balance (number)	11 (1)	24	5.55	3.25	0.66	0.681
	12 (2)	40	6.24	3.32		
	13 (3)	50	6.32	3.99		
	14 (4)	40	5.37	3.65		
	15 (5)	30	6.36	4.31		
	16 (6)	25	6.52	5.05		
	17 (7)	27	5.04	3.13		
Right hand grip strength (kg)	11 (1)	24	18.70	1.85	46.29 1<2.3.4.5.6.7 2<3.4.5.6.7 3<4.5.6.7 4<5.6.7 5.6<7	<0.001**
	12 (2)	40	22.36	3.04		
	13 (3)	50	25.89	5.81		
	14 (4)	40	29.29	7.35		
	15 (5)	30	33.36	5.95		
	16 (6)	25	35.12	7.26		
	17 (7)	27	40.96	6.32		
Left hand grip strength (kg)	11 (1)	24	17.94	1.78	35.89 1<2.3.4.5.6.7 2<3.4.5.6.7 3<4.5.6.7 4<5.6.7 5.6<7	<0.001**
	12 (2)	40	21.93	3.34		
	13 (3)	50	26.34	6.22		
	14 (4)	40	28.75	7.90		
	15 (5)	30	32.70	6.52		
	16 (6)	25	34.24	6.20		
	17 (7)	27	37.90	6.13		
Standing long jump (cm)	11 (1)	24	169.30	19.29	14.43 1.2<3.4.5.6.7 4.5<6	<0.001**
	12 (2)	40	181.66	20.39		
	13 (3)	50	195.24	27.27		
	14 (4)	40	203.82	27.45		
	15 (5)	30	209.03	19.58		
	16 (6)	25	223.10	25.10		
	17 (7)	27	216.20	30.73		
Back strength (kg)	11 (1)	24	60.75	11.48	37.33 1.2<3.4.5.6.7 3<4.5.6.7 4<6.7	<0.001**
	12 (2)	40	67.05	11.52		
	13 (3)	50	78.29	21.73		
	14 (4)	40	94.74	33.12		
	15 (5)	30	103.40	31.54		

	16 (6)	25	117.25	21.92	5.6<7	
	17 (7)	27	145.68	35.79		

**p<0.001

While no significant difference was found in balance values with respect to age (p>0.05), a statistically significant difference was found between flexibility, standing long jump, hand grip and back strength values (p<0.001). Long jump and strength values were found to increase with age.

Table 4. Correlations of flexibility, balance, standing long jump, hand grip, back strength and fat percentage

	Balance	Right hand grip	Left hand grip	Standing long jump	Back strength	Fat percentage
Flexibility	,014	,384**	,365**	,190**	,359**	-,016
Balance		-,033	-,049	-,173*	,000	,338**
Right hand grip			,892**	,560**	,818**	,049
Left hand grip				,557**	,811**	,004
Standing long jump					,479**	-,122
Back strength						,121

Flexibility value was positively correlated with hand grip strength, back strength and standing long jump (p<0.001). Balance value was only positively correlated with fat percentage (p<0.001). Hand grip strength was positively correlated with standing long jump and back strength (p<0.001).

DISCUSSION AND CONCLUSION

The present study aimed to determine flexibility, balance, standing long jump, hand grip strength, and back strength values in football players and wrestlers and to compare these values between the two sports. The results found were discussed in line with similar studies conducted in the literature. In terms of sociodemographic characteristics of the

participants, mean age was found to be 13.80 years for football players and 13.95 years for wrestlers, while sports experience was found to be 6.50 years for football players and 6.60 years for wrestlers in the present study. There are different results in terms of fat percentages at these ages in the literature. For example, Canlı (2020) found an average body fat percentage of 12.50 in children with an average age of 11 years in his study. Arı et al. (2024) found mean body fat percentage as 12.74 in football players around the age of 14. İmamoğlu et al. (2018) found mean fat percentage as 10.88 in U15 football players. In the present study, mean fat percentage was found to be 15.42% in football players and 14.49% in wrestlers. The fat percentages in the study can be considered to be consistent with the literature for these ages.

Hepsert et al. (2023) found the value of standing long jump in 10-year-old football players to be 178.46 cm in the pre-test and 151.77 cm in the post-test after 8 weeks of training. Hepsert et al. (2023) found that the value of standing long jump in 11-year-old football players was 216.03 cm in the pre-test and 217.63 cm in the post-test after 8 weeks of training. Chaliburda and Cieśliński (2022) found the value of standing long jump in junior wrestlers as 255 cm in medal winners and 246 cm in non-medal winners. While the standing long jump score of children in the 12 and 14 age group was 161.91 cm in the study of Günay et al. (2011), Arabacı et al. (2008) found 203.95 cm for the group with an average age of 14.65 years. According to the study of Şimşek et al. (2014), the 9 years age group had the lowest standing long jump score, and while it was not different from the age groups of 10, 11 and 12 age groups, there were some differences from the age groups of 13, 14 and 15. İmamoğlu et al. (2018) found mean standing long jump value in U15 football players as 196.2 cm. In the present study, standing long jump value was found to be 202.86 cm in football players and 193.34 cm in wrestlers. In the present study, standing long jump was found to be 169.30 cm in 11-year-old athletes and 223.10 cm in 16-year-old athletes. A statistically significant difference was found between the values of standing long jump in football players and wrestlers in the present study ($p<0.05$). Statistically significant difference was found between standing long jump values in terms of age ($p<0.001$). An increase in the value of standing long jump was observed with increasing age. The increase in maturation and sports experience with increasing age is effective in this increase. Long jump values

increase with increasing age. The fact that the long jump values of football players are higher than wrestlers may be due to some anthropometric and physiological differences. For example, it is a known fact that football is a running-based sport and that football players use their legs more than wrestlers in competitions and training. Hepsert et al. (2023) and Aktuğ and İri (2018) attributed the long jump values of children playing football being better than other branches to the fact that the quedriceps muscle is the main reason determining the performance during shooting and long jump in football. Yıldız et al. (2018) found a significant relationship between standing long jump and short distance running performances in 10-11 age group male tennis athletes when they examined the standing long jump and sprint performance in child tennis players.

In their 2020 study, Canlı found that the mean flexibility value in children with a mean age of 11 years was 19.50 cm. Özdemir and Civan (2018) found that the flexibility value in 17-year-old football players was 23.06 cm in the pre-test and 27.26 cm in the post-test in the experimental group. Demirkan (2015) determined the flexibility value in adolescent wrestlers to be between 30.6 and 33.6 cm. Demirkan et al. (2015) reported flexibility values between 32 and 36 cm for wrestlers in another study. According to the study by Şimşek et al. (2014), the 15-year-old athlete group achieved the highest score in flexibility and was similar to the 9, 10, 13, and 14-year-old athlete groups, while the 11-year-old athlete group achieved the lowest score and was similar to the 10 and 12-year-old groups. In the present study, flexibility value was found to be 22.07 cm in football players and 26.09 cm in wrestlers. A statistically significant difference was found between the flexibility values of football players and wrestlers ($p<0.001$). Again, a statistically significant difference was found between flexibility values in terms of age ($p<0.001$). The present study showed differences in flexibility values in terms of age. The lowest flexibility value was 20.66 cm in 12-year-old athletes, while the highest flexibility value was 28.22 cm in 17-year-old athletes. The inconsistent results in flexibility in terms of age may also be due to the different numbers of wrestlers and football players in each age category.

Berisha and Çilli (2018) reported the mean values of the flamingo balance test in 11-year-old students in Kosovo as 11.8 for boys. In the present study, the mean balance test scores were found to be 6.10 for football players and 5.85 for wrestlers. Balance test results did not vary in terms of sport type or age ($p>0.05$). Although wrestling requires more balance than football, the lack of difference can be interpreted as indicating that football players have better leg muscle strength and development than wrestlers.

Many studies in the literature have also reported an increase in hand grip strength in children who participate in sports and exercise (Katie et al., 2003). In a study by Canlı (2020), the mean hand grip strength in children with an average age of 11 years was found to be 20.20 kg. Karacabey et al. (2016) found that the mean right hand grip strength of football players aged 10–12 was 15.27 kg and the mean left hand grip strength was 15.29 kg. Arı et al. (2024) found the mean handgrip test values for 14-year-old football players to be 46.30 kg for the right hand and 46.29 kg for the left hand. According to the study by Şimşek et al. (2014), left and right hand grip strength gradually increased between the ages of 9 and 13, remained constant and showed no further development between the ages of 13 and 15. In the present study, handgrip strength was found to be 27.76 kg for the right hand and 27.12 kg for the left hand in football players, and 30.25 kg for the right hand and 29.71 kg for the left hand in wrestlers. Similarly, hand grip strength was found to be lowest in 11-year-old athletes (18.70 kg for the right hand and 17.94 kg for the left hand) and highest in 17-year-old athletes (40.96 kg for the right hand and 37.90 kg for the left hand). A statistically significant difference was found between the hand grip strength values of football players and wrestlers ($p<0.05$). Statistically significant differences were also found between handgrip strength values in terms of age ($p<0.001$). Handgrip strength values generally decrease with age. It is noteworthy that the difference in handgrip strength in terms of sport type is small, while the difference in terms of age is greater. The fact that wrestlers have better hand grip strength than football players may also be due to the nature of the sport they practise. For example, while the use of hands is prohibited in football (except for goalkeepers), the use of hands and gripping movements is a high priority in wrestling. Again, the fact that the right hand grip strength is higher than the

left hand grip strength suggests that most of the subjects are right-handed and that this is related to handedness.

Dafer (2020) found that elite class wrestlers had back muscle strength ranging from 112.50 to 153.00 kg. Arı et al. (2024) found that football players around the age of 14 had a mean back strength of 64.31 kg. In Demirkan's (2015) study, although there was no significant difference in back strength values between age groups, the back strength of 15-year-old wrestlers was relatively lower than that of 16- and 17-year-old wrestlers. In the present study, back strength was found to be 86.80 kg in football players and 101.32 kg in wrestlers. Similarly, back strength increased with age, from 60.75 kg for 11-year-old athletes to 145.60 kg for 17-year-old athletes. Statistically significant differences were found between the back strength values of football players and wrestlers ($p<0.05$). Again, statistically significant differences were found between back strength values in terms of age ($p<0.001$). Back strength values generally increased with age. Smpokos et al. (2022) suggested that U-19 players had higher levels of power, strength, flexibility, and endurance than U-17, U-16, and U-15 players. This may be due to differences in their sporting training history and individual levels of strength/power/endurance ability. Increases in muscle strength in children depend on age, gender, maturity level, previous level of physical activity, and body measurements (Özer & Özer, 2020).

Şahin (2021) found no statistically significant relationship between body fat percentage and right-left hand grip strength, back strength, and leg strength in elite-level freestyle wrestlers. Arı et al. (2024) found no statistically significant relationship between body fat percentage and right-left hand grip strength and back strength in their study. In Demirkan's study (2015), moderate to high correlations were found between lean body mass and muscle strength and values obtained from hand grip and leg-back strength in wrestlers. In the present study, flexibility was positively correlated with handgrip strength, back strength, and standing long jump ($p<0.001$). Balance was positively correlated only with body fat percentage ($p<0.001$). A positive correlation was found between handgrip strength and standing long jump and back strength ($p<0.001$). The

differences between these studies are thought to be due to differences in the participants' sports disciplines, age, height, weight, and sports experience.

CONCLUSION AND RECOMMENDATIONS

The value of standing long jump increases with age and is higher in football players than in wrestlers. The reasons for this include the fact that football is a running-based sport and that football players use their legs more than wrestlers. Flexibility values, which vary by age, are better in wrestlers than in football players. This may be due to the nature of wrestling and the flexibility exercises performed by wrestlers. Balance test results are similar in terms of sport type or age. Hand grip strength values, which vary by age, are higher in wrestlers than in football players. One of the reasons for this is the nature of the sport. In football, the use of hands (except for goalkeepers) is prohibited, while in wrestling, the use of hands and gripping movements is of primary importance. Back strength increases with age and is higher in wrestlers than in football players. In addition to physical movements or exercises, this may be due to the greater use of back muscles in wrestling. Flexibility value has a positive correlation with handgrip strength, back strength, and standing long jump. Balance value shows a positive correlation only with fat percentage. Handgrip strength has a positive correlation with standing long jump and back strength.

As a conclusion, it has been determined that footballers have better standing long jump values than wrestlers, while wrestlers have better flexibility, hand grip and back strength values than footballers. There are similarities in terms of balance. Standing long jump, flexibility, hand grip strength, and back strength have been found to increase with age. Coaches should take these differences into account when working with football players and wrestlers aged 11-17.

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UNDERSTANDING THE SPORTS INDUSTRY THROUGH THE LENS OF PHYSICAL EDUCATION STUDENTS: A WORD CLOUD ANALYSIS APPROACH

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Abstract

In today's era, physical education and sports science students play a significant role as the future builders of the sports industry in various fields and contribute to its development. Understanding their attitudes towards the growth of the sports industry, predicting future trends, and evaluating the possible effects of these trends is of great importance. This research was conducted with the aim of investigating and analyzing the attitudes of physical education students towards the sports industry. The method of this research is textual data analysis using word cloud analysis. Undergraduate physical education students answered question about the basic and important features of the sports industry from their point of view. In the word cloud analysis, 46 distinct words were identified, with the top five being equipment, entertainment, money, trade, and education. The results of this research show that physical education students consider the sports industry as a multidimensional and comprehensive entity that goes beyond mere physical activities and includes economic, social, and cultural dimensions. They emphasize the importance of advertising and branding, strengthening social connections through sports, and creating job and business opportunities. These findings indicate that educational and research programs at universities should pay special attention to these dimensions in order to prepare students to face the challenges and opportunities in this industry.

Keywords: *Recreation; Sports Development; Sports Industry; Sports Sector Growth; Student Perspectives; Word Cloud Analysis.*

INTRODUCTION

Physical education students' attitudes toward the sports industry encompass various dimensions and reflect the widespread impact of this industry on society. A university is an institution that helps optimize industry by producing new ideas, knowledge, and solutions. In a way, university and industry are recognized as the main pillars of the development of any country, and a strong and solid connection between the two will lead to achieving sustainable development (Shariati Feizabadi et al., 2023). In recent years, sport has been recognized as an essential element for maintaining a healthier, more balanced, and higher quality life, and it is now widely accepted that sports activities, along with cultural ones, psychologically prepare individuals for daily life, with its global spread influenced by the socio-economic conditions of societies (Ekmekçi et al., 2013). Sport is a field where various functions and impacts are manifested, and as part of socio-economic achievements, the sports industry must adapt to new living and business conditions, while increased investment in areas like athletes, equipment, and facilities will help it deliver a more efficient final product to the market (Savić et al., 2018). Sports as one of the key elements in promoting physical and mental health, improving the quality of life, and social and economic development of societies plays a significant role and with its multidimensional effects, it helps to expand social solidarity and cultural progress.

In recent years, sport has become crucial for promoting a healthier and more balanced life, and is widely recognized for its role, alongside cultural activities, in psychologically preparing individuals for daily life, and its global popularity varies based on a society's socio-economic conditions (Orunbayev, 2023). The growth and changes in the structure of the sports industry have led to a transformation in the marketing methods and channels for sports goods and services, allowing the industry to quickly adapt to new technological conditions and provide products and services with faster access and more diverse experiences (Yurtsizoglu & Golmohammadi, 2024). Sport, which attracts large groups of consumers, has been used as a marketing tool and has become commercialized under the influence of the growing consumer society. The sports industry involves producing or providing sports products for consumers or sports organizations, as well as forming or managing an existing sports organization or part of

it. (Mullin et al., 2014). Along with its health-giving and cultural role, sports has found a special place in contemporary societies as an effective tool in marketing and economic development, and the evolution of the sports industry structure has turned it into a dynamic platform for providing diverse and technology-based products and services.

Along with sports industries and sporting events, there are many related businesses that provide employment opportunities to the general public (Hazra & Biswas, 2016). A positive and constructive attitude towards business can be seen as a valuable opportunity to design, develop, and expand programs and activities related to self-employment and entrepreneurship among students (Gül et al., 2023). However, it is challenging for students to find a good job in the sports industry after graduation without having at least one internship experience (Lu, 2021). For this reason, students try to gain multiple internship experiences throughout their studies to gain a competitive edge over their classmates. (Eagleman & McNary, 2010). Physical education students generally need well-structured and detailed plans to develop their skills and address the challenges and issues they face (Gül et al., 2023). The sports industry and related businesses create numerous job opportunities, but students' success in entering this field requires gaining practical experience through internships, which play a key role in enhancing their skills and increasing their competitiveness.

Sports science students, as future experts of the sports industry, play an essential role in the development of this field. Examining their views and understanding of the key concepts of this industry can not only help to identify aspects affecting their life and career path, but also provides a valuable tool for predicting future trends and improving strategic planning in this field. The role of these students in various fields of the sports industry is considered as the basis for progress and innovation in this sector. In this regard, it is very important to understand their perceptions about the growth of the sports industry, predict future trends and evaluate the potential effects of these trends on the industry. In this study, the issues of globalization and the sports industry are discussed and the perceptions of sports science students regarding the growth of the sports industry are investigated. Using an innovative method such as word cloud analysis, how students understand key concepts in the sports industry is analyzed. The purpose of this research is to investigate and analyze the attitude and view of physical education

students towards the sports industry. Considering the rapid changes in the field of sports science and the ever-increasing needs of this industry, this research identifies various aspects of the sports industry and their relationship with the daily life of students. The main research question is how physical education students define the sports industry and which aspects of this industry are more important and prominent for them?

METHODOLOGY

Word clouds are a tool that displays qualitative data. In this tool, the size or orientation of words indicates their importance or frequency (Davies et al., 2021). The current research uses word cloud analysis in order to achieve a detailed and comprehensive analysis of students' answers to the research question. Word clouds are used as a simple and attractive way to visualize text by displaying frequent words in a summarized and visual format (Heimerl et al., 2014). It is a type of text visualization that is known for its aesthetic, social and analytical aspects (LE & Lauw, 2016). By displaying words based on their number of repetitions and importance, word clouds are considered a tool to understand the key features of a dataset. This method allows us to identify key words and phrases that appear frequently in students' responses and use them as key indicators in understanding students' attitudes and perceptions about the sports industry.

In this research, data was collected from 143 undergraduate students of Physical Education and Sports Sciences of Sivas Cumhuriyet University, including all academic orientations, in April 2024 through convenience sampling method. The sampling method plays an important role in enhancing the representativeness of the sample and the generalizability of research findings, with convenience sampling, as one of the non-probability methods, being based on the ease of access to participants from the target population (Golzar et al., 2022). Convenience sampling is popular because it is low-cost, saves time compared to other sampling methods, and is easy to implement (Stratton, 2021).

For this study, the opinions of physical education students have been used because these students study directly in fields related to the sports industry and are familiar with the challenges, opportunities and trends of this field. As future makers and professionals of this industry, their opinions and views can provide a more accurate and realistic picture

of the conditions and needs of the sports industry and express the view that this range of students have towards the industry. This analysis can contribute to a deeper understanding of the needs, expectations and priorities of students in relation to the sports industry and lay the foundation for more effective planning for the development of this field.

In this research, students were asked to express their definition of the sports industry using a minimum of one word and a maximum of three words. This request was presented in the form of questions with single-word answers (maximum three words for each student). Answer forms were given to the students and after filling in the demographic information, they wrote down their answers. After collecting the papers and entering all the information into an Excel file, a total of 457 words were recorded. In several steps, the words were filtered. In the first step, words that were not relevant to our study were removed, leaving 339 words. In the next step, words that appeared less than three times (only once or twice) were excluded to improve the quality and clarity of the word cloud. After removing these words, 316 words remained. Finally, this process led to the selection of keywords and repetitive words that represented the students' views and understanding of the sports industry for more detailed analysis and creating a word chart.

Finally, after categorizing these 316 words, a total of 46 distinct words with varying frequencies were identified, which can also be seen in the word cloud analysis. Among these, the top 5 words on the list were: equipment, recreation, money, trade, and education. In Table 1, the comprehensive process of collecting, filtering, and summarizing words is briefly explained.

Table 1: Steps of processing and analyzing keywords in defining the sports industry from the perspective of physical education students

Stage	Description	Words Remaining
Data Collection	Students provided 1-3 word definitions of the sports industry.	457
Step 1: Filtering	Removed irrelevant words.	339
Step 2: Refining	Excluded words with fewer than 3 occurrences.	316

Final Categorization	Categorized remaining words.	46 distinct words to enter into word cloud

A total of 46 specific words were identified and noted based on the students' responses and the frequency of repetition of those words. These words represent the students' collective understanding of the sports industry.

The website wordclouds.com has been used to display these keywords as word clouds. In this image, the size of each word is determined based on its repetition in the text; In such a way that the words with more repetition are shown in bigger form and the words with less repetition are shown in smaller form (Golmohammadi et al., 2025). Also, EndNoteTM20 software was used to manage and cite sources so that the required references can be placed in the text in a suitable way and researchers can gain a deeper understanding of the research topic. These tools help researchers to present research results in a coherent and understandable way and facilitate access to the required resources.

RESULTS

The data obtained from the samples of this study, which consisted of undergraduate students in the Sports Science Faculty at Sivas Cumhuriyet University in Turkey, show that 64.34% of them are male students and 35.66% are female students. The largest age group falls between 20 and 21 years, comprising 37.06% of the total. Additionally, 25.87% of the students are in the 18 to 19 age range, 26.57% are between 22 and 23 years old, and 10.49% are over 24 years old. This data reflects a mix of students of different ages and genders. This diversity of age and gender in the samples not only shows the breadth of different experiences and perspectives, but also provides the possibility of better analysis of attitudinal and cognitive differences between different student groups. In this way, we can achieve a better understanding of the effects of different factors such as age and gender on the attitudes and understanding of students towards the sports industry.

Figure 1 is a word cloud representing the most frequently mentioned terms that reflect the definitions of physical education students regarding the sports industry.

Table 2. Most frequently mentioned words in this study

No	Word	WF*	No	word	WF	No	Word	WF*
1	equipment	20	16	competition	6	31	communication	3
2	recreation	18	17	facility	6	32	doping	3
3	money	17	18	health	6	33	fans	3
4	trade	17	19	development	5	34	footwear	3
5	education	16	20	organization	5	35	management	3
6	fitness	16	21	program	5	36	marketing	3
7	advertisement	14	22	sport-club	5	37	match	3
8	football	13	23	brand	4	38	nutrition	3
9	specific-sport	13	24	business	4	39	official	3
10	hall	12	25	consumer	4	40	profession	3
11	service	12	26	field	4	41	shop	3
12	production	9	27	law	4	42	sports-uniform	3

13	media	8	28	physical-activity	4	43	stadium	3
14	merchandise	7	29	supplement	4	44	technology	3
15	sponsor	7	30	athlete	3	45	tournament uniform	3
***WF= Word Frequency**						46	uniform	3

The most frequently mentioned words in the study (table 2), ranked from 1st to 11th, were: *equipment* with 20 mentions, *recreation* with 18 mentions, *money* with 17 mentions, *trade* with 17 mentions, *education* with 16 mentions, *fitness* with 16 mentions, *advertisement* with 14 mentions, *football* with 13 mentions, *specific-sport* with 13 mentions, *hall* with 12 mentions, and *service* with 12 mentions. The remaining words all had between 9 and 3 mentions. These words reflect the diverse components perceived as integral to the sports industry by the students. These findings show that students perceive different and diverse components as key elements of the sports industry. From equipment and facilities to financial issues, business, education and advertising are all among the topics that are frequently addressed. This variety of topics shows the importance of combining different factors for the progress and dynamism of this industry. On the other hand, referring to specific sports and sports spaces such as halls also emphasizes the importance of physical infrastructure in the development of sports. These results can be used as a basis for strategic planning in the sports industry.

DISCUSSION

Based on the results of word cloud analysis, in this section, the words that are repeated more than 10 times in the students' answers are discussed as key indicators in defining the sports industry. In the following, these characteristics are analyzed to gain a more accurate understanding of the attitude of physical education students towards the sports industry. Given the rapid changes in sports science, it is important to know students' aspirations to better tailor educational programs. Also, understanding their future expectations can help identify and meet the new needs of the sports industry (Turhan & Canpolat, 2023). The recurring themes identified in the keyword analysis reflect students' perceptions of the sports industry and the multiple aspects of their engagement

with the field. By examining these key indicators, we can identify the values and priorities that shape their understanding of the sports industry. This information will help educators and stakeholders design appropriate training programs for the next generation of sports professionals and help bridge the gap between academic training and the practical realities of industry. In this way, students will be prepared to manage the challenges of this field and participate in its development. Therefore, the successful movement of university graduates towards professionalization in today's dynamic industry requires an effective convergence between university education and industry to develop practical skills necessary for various occupations (Lu, 2021).

The connection between the sports industry and universities is a new topic that has received little attention, while the progress of any society depends on the growth of universities and its service and manufacturing industries (Shariati Feizabadi et al., 2023). Examining the results shows that the analysis of keywords and characteristics related to the sports industry not only reveals the attitude of physical education students, but also helps to identify the values and priorities that shape their understanding of this industry. These findings emphasize that the design of educational programs in accordance with the future needs and expectations of students plays an essential role in cultivating practical skills and abilities required for various jobs in this field.

The rapid development of the social economy will lead to the growth of the sports industry and subsequently affect the sports economy (Li et al., 2022). Sports have become a big part of the entertainment industry and compete for money that fans spend (Gillentine et al., 2009). The fast changes in customer demands and growing expectations for product performance push sports equipment makers to constantly create new and improved products to stay competitive (Meier et al., 2019). Today, the sports industry is known for its new technologies, especially in the production of sports equipment and supplies, and these technologies play a significant role in its growth and development (Savić et al., 2018). Sports also act as an independent tool for advertising, aiming to create a deep understanding of the brand. Businesses shape brand values through advertising, and sports events convey these values to consumers, meaning that in today's world, every person encounters hundreds of advertising messages in their daily environment (Yurtsızoğlu & Golmohammadi, 2023). Additionally, football, as one

of the most popular sports industries in the world, has garnered significant attention not only because of its universality and influence on national identities but also due to the high revenue it generates from match-day sources, broadcasting, and merchandising (Şener & Karapolatgil, 2015). Furthermore, sports and fitness have become one of the important and key industries in the contemporary world (Oakley & Rhys, 2008). The reality shows that today's global social developments have caused a change in the values and goals of sports, transforming them from simple physical activities into an integral part of modern life. Changes in sports content have led to increased relevance to the creative process and greater engagement with creative domains (Peng et al., 2024). This research examines and defines the sports industry from the point of view of physical education students and shows that this industry, as a wide and dynamic field, is affected by social and economic developments.

The results of this study show the different aspects that physical education students connect to the sports industry and provide valuable insights into their views. The frequent mention of terms such as equipment, recreation, money, and trade reflects the multifaceted nature of this industry. Equipment, as one of the fundamental elements, not only facilitates participation in sports but also contributes to the broader economic aspects of the industry. The emphasis on recreation indicates a growing recognition of the role of entertainment and wellness in the sports sector, highlighting the shift towards promoting physical activity as a vital component of a healthy lifestyle. The prominence of economic terms such as money and business also underscores the importance of financial sustainability and commercial viability in the sports landscape. Examining sports such as soccer and fitness or other specific sports, represents important areas of the sports industry and clearly demonstrates the attitudes of a wide range of physical education students. As a global sport, soccer is not only a cultural phenomenon and a symbol of competition and social participation, but its economic impact through sponsorships and income from events proves its special importance in the sports industry. Rather, as a growing sector related to health and wellness, fitness is most closely associated with the sports industry and emphasizes individual development and fostering community spirit through various programs and initiatives. In this way, students clearly understand the importance of these sports in the structure and economy

of the sports industry and pay special attention to their role in promoting physical activities and promoting an active lifestyle. Concepts such as education, advertising, sports halls, and services are other key elements of students' understanding of the sports industry. Education plays an important role in the training of expert staff and the transfer of knowledge and skills in this industry, which indicates its importance in the sustainable development of this sector. Advertising as an effective tool for attracting audiences and increasing revenues has a special place in expanding the market and promoting sports. Also, halls and services have a significant impact on the quality of sports activities as necessary infrastructure and support to provide a suitable sports experience. These concepts well reflect the pivotal role of education, commercialization, and physical infrastructure in the growth and dynamism of the sports industry. The results of this research show that physical education students have a comprehensive understanding of the various dimensions of the sports industry and are aware of the role of various factors such as equipment, recreation, economy and education in the development of this industry. These findings emphasize the importance of providing suitable infrastructure, training of specialized human resources, and using new advertising tools for the growth and dynamism of this field. Also, students' special attention to popular sports and health and fitness-related sectors shows their awareness of contemporary needs and changing trends in this industry. This recognition can provide a suitable platform for formulating educational and implementation strategies in order to strengthen students' practical skills and enable their active participation in the future of the sports industry.

RESEARCH LIMITATIONS

This research focused on undergraduate students studying physical education who are engaged in academic settings. Because of this, the results may not apply to other groups, such as non-students or those in different fields of study. These groups might have different views and experiences related to the sports industry that could affect how they see it. Looking at the characteristics of the sports industry based on physical education students' opinions might be influenced by their personal experiences and feelings. This

could introduce bias into the results and affect the reliability of the findings. For example, students' views may be shaped by their positive or negative experiences during their studies or sports participation, leading to different interpretations of what the sports industry involves. Moreover, some important aspects of the industry might not have been captured in this study. Therefore, using a variety of data collection and analysis methods could help identify these aspects more thoroughly and accurately. For instance, conducting in-depth interviews with professional athletes, coaches, academics, and industry experts could provide a better understanding of their views and experiences. This approach would allow for more generalizable findings and a clearer understanding of the current state and needs of the sports industry. Due to the limitations of this research, the findings may not be able to represent all perspectives and dimensions of the sports industry, especially those that exist among different groups such as non-students or sports industry professionals. This issue shows the importance of using more comprehensive approaches and using diverse samples in future researches. Examining the views of experts, professional athletes and coaches can provide a deeper understanding of the real needs and challenges of this industry. By adopting such an approach, it is possible to achieve results that are not only more comprehensive and valid, but also can be a more effective guide for improving development policies and programs in the sports industry.

CONCLUSION

The results of this research show that physical education students consider the sports industry as a multidimensional and comprehensive set that goes beyond just physical activities. This view clearly indicates that the sports industry in their mentality includes different dimensions, each of which is somehow related to their daily life and personal experiences. Among these dimensions, we can mention sports products, equipment, advertising, sports, leisure time, as well as business and trade. These students believe that the sports industry not only helps meet the physical and health needs of people, but also acts as an economic platform that can create many job and business opportunities. In particular, paying attention to advertising and branding in sports has a special

importance in establishing a relationship with the audience and can play an effective role in attracting capital and increasing income. In addition, physical education students pay attention to the social and cultural effects of the sports industry. Sports, as a group and social activity, can strengthen social connections and create a collective identity among people. These different dimensions of the sports industry show that this field can be used as an effective tool in improving the quality of life as well as the economic development of society. As a result, in order to make the best possible use of the capacities of the sports industry, it is necessary that educational and research programs in universities and physical training institutions pay special attention to these aspects and prepare students to face the challenges and opportunities in this industry. This approach can lead to the stable and balanced growth of the sports industry and the improvement of students' knowledge and skills in this field.

Conflict of Interest:

The authors report no conflicts of interest in this work.

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