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Spor Bilimleri Araştırmaları Dergisi'nin temel amacı, Spor Bilimleri alanına ilişkin güncel gelişmeleri bütüncül ve kapsayıcı bir biçimde inceleyerek bu doğrultuda ortaya çıkan özgün makale ve derlemeleri hedef kitle ile paylaşmaktır.

Kapsam

Spor Bilimleri Araştırmaları Dergisi, 2016 yılında yayın hayatına başlamış olup yılda 3 kez yayımlanan Hakemli bir dergidir. Dergi Türkçe ve İngilizce yazılara yer vermektedir. Spor Bilimleri Araştırmaları Dergisi, Spor Bilimleri alanına ilişkin olarak; Beden Eğitimi ve Spor Öğretimi, Spor Yönetimi, Rekreasyon, Hareket ve Antrenman Bilimleri, Sporda Psiko-sosyal Alanlar ve Spor-Sağlık Bilimleri alanlarında kavramsal veya araştırmaya dayanan, sahasına katkı sağlayacağı düşünülen özgün araştırmaları ve derleme makaleleri yayımlamaktadır.

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Journal of Sport Sciences Research

Aim

The main purpose of the Journal of Sport Sciences Research is to analyze the current developments in the field of Sport Sciences in a holistic and inclusive way and to share the original articles and reviews that emerged in this direction with the target audience.

Scope

Journal of Sports Sciences Research is a refereed journal that began its publication life in 2016 and is published 3 times a year. The journal welcomes articles in Turkish and English languages. Regarding the field of Sport Sciences, the Journal publishes conceptual or research-based original research and review articles in the fields of Physical Education and Sports Teaching, Sports Management, Recreation, Movement and Training Sciences, Psycho-social Fields in Sports and Sports-Health Sciences.

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The Journey of Female Athletes: Overcoming Barriers and Exploring Motivations - An In-Depth Examination of Emotional Experiences

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Abstract

This study explores the motivations, challenges, and emotional experiences of seven female athletes involved in various sports disciplines at Nevşehir Hacı Bektaş Veli University. The research gathers data through individual interviews with successful female athletes who offer in-depth insights into their experiences. The study employs a phenomenological qualitative research design. The focus of the study is on the phenomena of female athletes' sports motivations, barriers, and emotional experiences, with the data analyzed using traditional content analysis. Key themes include intrinsic and extrinsic motivations, societal challenges, emotional responses to gender stereotypes, and the role of family and social support systems. To further explore the athletes' emotions, NRC (National Research Council) sentiment analysis was used, which analyzes eight primary emotions and polarity intensity mapping to examine emotional tendencies. Despite facing societal and gender-based barriers, the athletes demonstrated resilience and expressed positive emotions such as joy, trust, and empowerment. The study emphasizes the need to develop targeted strategies to help female athletes overcome challenges and increase their long-term participation in competitive sports. The findings aim to contribute to discussions on gender equality in sports and provide valuable insights into how elite female athletes navigate gendered expectations in the sports world.
Keywords: Female athletes, Motivational factors, Sentiment analysis, Societal barriers, Sports psychology

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INTRODUCTION

Motivation plays a crucial role in encouraging young women to participate in physical activities. However, gender norms and societal barriers often hinder their involvement. Historically, these perceptions have restricted women's participation in sports, framing it as an activity primarily for men. Despite progress in female representation, ingrained gender norms continue to limit women's ability to express themselves freely within the sports community. Female athletes face not only physical challenges but also significant social and cultural obstacles, which impact both their motivation and how society perceives their participation (Sherry et al., 2016).

Women's involvement in sports is influenced by two key motivational factors: intrinsic and extrinsic motivation. Intrinsic factors include health, fitness, and personal growth, while extrinsic factors relate to social acceptance, achievement, and family support (Samara et al., 2015). Recognizing the importance of increasing female participation, the World Health Organization, through its 2018-2030 Global Action Plan on Physical Activity, urges countries to promote physical activity among women, the elderly, and marginalized groups (Ni & Yu, 2023). Understanding the factors that influence female university students' engagement in sports is essential for enhancing their motivation and fostering a healthier lifestyle (Ni & Yu, 2023).

Social-ecological theory emphasizes that human behavior is shaped by environmental factors, highlighting the significant role of external influences alongside internal ones. Therefore, research on sports participation should not only consider individual factors but also examine changes in both the natural and social environment (Hillsdon et al., 2002). The physical environment plays a crucial role in individuals' willingness to engage in sports, with spatial accessibility positively correlated with enthusiasm for physical exercise (Jiang, 2019). Additionally, family, school, community, and peer environments significantly influence university students' physical activity behaviors. For example, a study on factors affecting young students' participation in physical activity found that school-related influences had the greatest impact, followed by family, community, and personal factors (Yangyang et al., 2023). Women's participation in sports is often analyzed through four key dimensions: personal factors, interpersonal relationships, social environment, and policy factors. Furthermore, research indicates that interpersonal relationships, policy support, and socialization play a critical role in encouraging women to participate in sports (Abadi & Diane, 2020).

Research on women's sports participation highlights that it is constrained by socio-cultural, economic, and individual barriers, with various strategies proposed to address these challenges. O'Reilly et al. (2018) analyzed the obstacles to women's sports participation in Canada, finding that participation rates remained consistently lower due to work-family balance, media representation, and insufficient funding. Similarly, Hopkins et al. (2022) explored the factors influencing young womens' engagement in sports, emphasizing the significance of personal factors and family support. Vasudevan and Ford (2022) identified gender-based stigmas and a lack of information as the most common barriers to women's participation in strength training, while also noting that social support and expectations of weight loss served as key motivators

for continued involvement. Samara et al. (2015) examined the challenges faced by female university students in Saudi Arabia, highlighting inadequate sports facilities and insufficient institutional support as major limitations. Additionally, Zhang et al. (2024) applied the Self-Determination Theory framework to women's sports participation, demonstrating that autonomous motivation has a strong positive effect, with identified regulation emerging as the most influential factor.

Moreno-Vitoria et al. (2024) found that both intrinsic and extrinsic factors significantly influence adolescent women' sports participation, with gender stereotypes playing a notable role. White et al. (2005) highlighted the critical importance of social support and self-efficacy in sustaining women's engagement in physical activity. Similarly, Abbasi (2014) identified socio-cultural barriers as key limitations to women's physical activity levels and emphasized the need to address these challenges. Peng et al. (2023) suggested that the factors shaping young adult women's participation in physical activities are complex and interconnected, underscoring the importance of considering socio-cultural influences. Joseph et al. (2015) examined individual, societal, and environmental barriers affecting African American women's physical activity participation, stressing the need to understand and mitigate these obstacles. Additionally, Duffey et al. (2021) advocated for a multi-stakeholder approach to increasing adolescent women's involvement in sports.

While research on female athletes' motivation and barriers exists, studies exploring various sports disciplines in Turkey remain limited. Additionally, societal barriers affecting women have not been fully addressed, highlighting the need for further investigation. In this context, this study aims to examine the personal experiences, motivations, and challenges faced by female athletes at Nevşehir Hacı Bektaş Veli University. It explores the reasons behind their participation in sports, the impact of societal pressures and gender norms, their emotional experiences, and their perceptions of gender-based attitudes and equal opportunities in sports.

METHOD

Research Model

This study adopted a phenomenological research approach to explore female athletes' sports experiences, motivations, challenges, and the emotional and social dimensions of these experiences. Phenomenological research seeks to understand individuals' life experiences and distill them into a universal explanation (Creswell, 2013). The phenomenon investigated in this study encompasses the motivations, challenges, and emotional and social aspects of female athletes' sports experiences. Key components of this phenomenon include female athletes' individual experiences in sports participation, the influence of gender norms, sources of motivation, and the barriers they encounter. To examine these aspects, semi-structured interviews were conducted with successful female athletes from the Faculty of Sports Sciences at Nevşehir Hacı Bektaş Veli University. The collected data were recorded and analyzed using traditional content analysis. Research questions were developed through a literature review and consultations with experts. To gain a deeper understanding of the emotional aspects of

participants' experiences, NRC Sentiment Analysis and Polarity Intensity Analysis methods were employed. The NRC lexicon categorizes emotional expressions in texts, while Polarity Intensity Analysis measures the strength of emotions. The combination of these methods provided a comprehensive perspective on the emotional dimensions of participants' experiences, offering deeper insight into the role of sports in the lives of female athletes.

Research Groups

This study's participants include seven female athletes actively engaged in various sports disciplines at the Faculty of Sports Sciences at Nevşehir Hacı Bektaş Veli University. The selection criteria focused on athletes who actively participate in sports, have excelled in their respective disciplines, and can provide in-depth insights into their experiences. This approach facilitated the collection of detailed information regarding their perceptions of gender roles and their sports experiences. To ensure confidentiality, participants were assigned coded names. Aslı began her athletic journey in track and field before transitioning to basketball. Esra plays volleyball, holds a coaching certificate, and provides volleyball training in schools. Leyla specializes in football (soccer) and plays for Fenerbahçe Sports Club. Merve practices skiing, influenced by family and geographical conditions, and holds a specialized coaching certificate. Sıla competes in taekwondo, while Dilara, after previous experience in athletics, now practices tennis and competes internationally. Lastly, Dilek transitioned from aikido and judo to football.

In Turkey, as in many other areas, women encounter various barriers in sports. This study focuses on female athletes to gain deeper insight into these obstacles, explore their sports motivations, and understand the challenges they experience throughout their athletic journeys. Additionally, the study aims to highlight the social and emotional aspects of women's sports experiences. Rather than applying specific selection criteria for sports disciplines, the research included athletes from various fields to examine how different sports impact women differently. This approach provides a more comprehensive understanding of the challenges female athletes face across diverse sports disciplines.

Additionally, the participants' levels of achievement vary. For instance, one football participant plays for Fenerbahçe Sports Club, while another, specializing in volleyball, holds a coaching certificate and teaches the sport in schools. The skiing participant has obtained an expert coaching certificate. Other participants have achieved success at the university level in their respective sports and remain actively engaged in their disciplines. This diversity enables an exploration of how different sports impact female athletes from multiple perspectives. The selection of participants from various sports disciplines aims to provide a broader understanding of the role of sports in women's lives. While the limited number of participants may be considered a constraint in capturing extensive data depth for a phenomenological study, qualitative research allows for in-depth data collection even with a small sample size.

Data Collection Tools

This study collected data through semi-structured interviews, with questions developed based on a comprehensive literature review of women's experiences in sports. With participants' consent, individual interviews were recorded using an audio device.

Ethics Approval

During the research process, informed consent was obtained from all participants, and their personal information was kept confidential to ensure anonymity. The study was approved by the Ethics Committee of Nevşehir Hacı Bektaş Veli University (Approval No. 2100072605, dated 01.12.2021), ensuring compliance with ethical standards throughout.

Collection of Data

This study employed a semi-structured interview technique as a qualitative data collection method to explore participants' personal experiences with sports, including their emotional and social aspects. In qualitative research, particularly phenomenological studies, semi-structured interviews provide a systematic yet flexible approach, allowing participants to openly share their thoughts. This method enables the exploration of unique perspectives while addressing specific topics. Key themes in this study include motivations for starting sports, challenges in a male-dominated field, and the emotional and social impacts of sports experiences. This approach not only allows participants to express their experiences in their own words but also enables the researcher to gather in-depth insights on specific subjects.

The research questions were developed following a comprehensive literature review and consultations with qualitative research experts. Before the main study, two pilot interviews were conducted in March 2022 to assess the accuracy and effectiveness of the questions. The data from these pilot interviews were excluded from the final research but played a crucial role in refining the questions. Subsequently, individual interviews were conducted in April and May with students from the Faculty of Sports Sciences at Nevşehir Hacı Bektaş Veli University who excelled in various sports disciplines. With participants' consent, the interviews were recorded using an audio device and later transcribed. The average interview duration was 25 minutes. The longest interview lasted 40 minutes (first interview), while the shortest lasted 15 minutes (sixth interview). The remaining interviews lasted 35, 30, 30, 25, and 20 minutes. During the interviews, the focus was on participants' motivations for starting sports, the challenges they faced in their athletic journeys, and their experiences with societal gender norms.

In phenomenological research, audio recordings play a crucial role in deeply understanding participants' life experiences and emotional responses. The detailed transcription process preserved the nuances of their narratives, allowing for a more comprehensive interpretation. During analysis, recurring patterns, themes, and meanings in participants' sports experiences were identified, with particular focus on the deeper emotional and social significance they attributed to their engagement in sports.

Analysis of Data

The interview data were analyzed using traditional content analysis techniques, which involved systematically coding, categorizing, and thematizing the transcripts (Lapadat & Lindsay, 1999). Thematic analysis, a widely used method in qualitative research, facilitates the identification of key themes and patterns in data from individual interviews and focus groups (Embregts et al., 2020; Nardi et al., 2020). Transcribing audio recordings into written form was a critical step, enabling researchers to perform coding and categorization effectively (O'Brien et al., 2014). Coding involved assigning labels to text segments based on their content, which

were then organized into categories (Neale, 2016). In this study, different colors were used to code the interviews, helping to categorize data and identify similar patterns. Categorization grouped these coded segments into broader themes, providing a structured analysis (Lapadat & Lindsay, 1999). Thematization then identified overarching themes emerging from these categories, offering deeper insights into the data (Chung et al., 2022; Nardi et al., 2020). This systematic approach allowed researchers to extract key findings and insights (Embregts et al., 2020; Keikelame & Swartz, 2016). Additionally, to better understand participants' emotional experiences and present them more concretely, sentiment analysis and polarity intensity analysis were conducted using Python 3.11.

Traditional Content Analysis: The data were coded based on key themes, and participants' experiences were classified in detail. Figure 1 presents an overview of the categories that make up these themes.

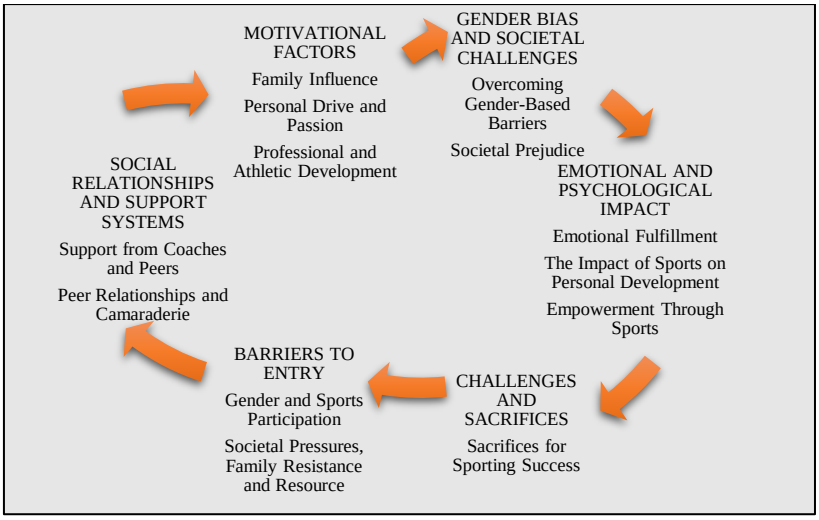

Figure 1. Themes and categories

Sentiment Analysis: The NRC (National Research Council) Word-Emotion Lexicon was used to analyze interview data on participants' sports experiences. This lexicon classifies English words into eight emotions and includes a basic bipolar sentiment—positive and negative. Positive sentiment encompasses anticipation, trust, surprise, and joy, while negative sentiment includes anger, fear, sadness, and disgust. Earlier lexicons categorized words based on sentiment score ranges, but their limited size restricted sentiment extraction. In contrast, the NRC Emotion Lexicon provides a more comprehensive classification, allowing for better categorization of words and phrases across eight distinct emotions (Wang et al., 2020).

Polarity Intensity Analysis: Beyond sentiment analysis, polarity (whether a sentence was positive or negative) and intensity were examined. This analysis assessed whether positive emotions (e.g., trust, joy) dominated participants' experiences and how they managed negative emotions (e.g., anger, fear).

FINDINGS

NRC Word-Emotion Lexicon

Figure 2 shows that Trust and Anticipation are the most dominant emotions among participants, with Joy generally high and Disgust and Anger at low levels. The high Joy scores suggest that participants experience positive emotions in sports despite challenges. Esra, Leyla, and Dilek exhibit the highest positive emotions, while Merve maintains a positive experience despite elevated Anger and Fear scores. In contrast, Sıla and Dilara have balanced sports experiences with low negative emotions.

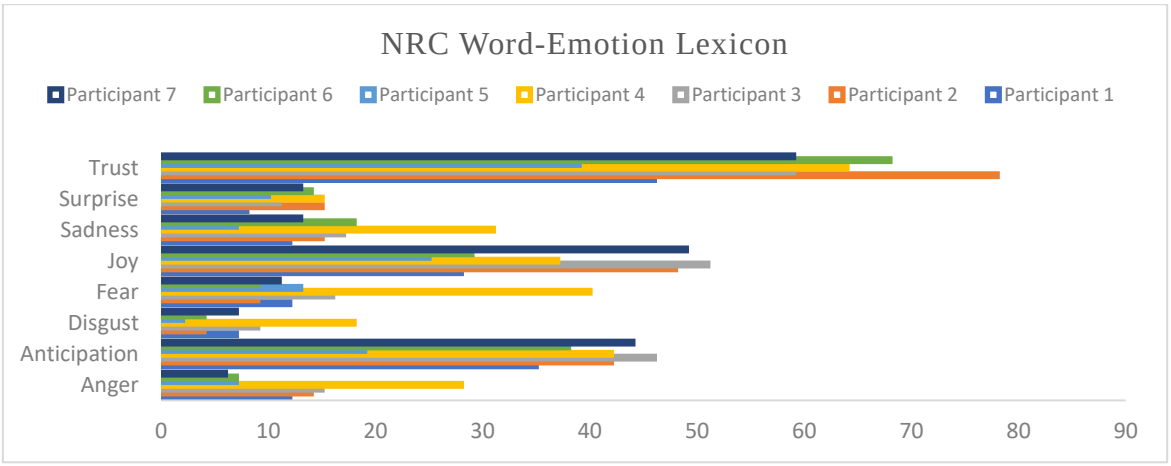

Figure 2. Sentiment analysis results related to participants

Trust is the dominant emotion among all participants, indicating that they maintain a positive and confident attitude even when facing challenges. This trust, likely supported by relationships with coaches, family and teammates, suggests they either genuinely feel supported or choose to project confidence and resilience. Anticipation is also significant, reflecting a hopeful outlook and belief in future success, which may arise from deep optimism or a deliberate focus on positivity despite setbacks. Joy consistently scores high, showing that despite some moderate levels of Fear and Anger, participants derive significant satisfaction and emotional fulfillment from their sports experiences. This suggests they focus on the positive aspects of their journey or consciously prioritize joy over frustration. Disgust remains universally low, supporting the idea that participants either experience few negative reactions or choose not to let negativity overshadow their experiences. Overall, the analysis shows that while difficulties exist, participants maintain an optimistic outlook, projecting confidence and resilience, whether these feelings are internalized or strategically adopted. In this section, the data related to the eight emotions included in the NRC emotion analysis are presented in detail under specific subheadings (Anger, Anticipation, Disgust, Fear, Joy, Sadness, Surprise, Trust).

Anger: Leyla shares frustration with sexist remarks like, "*Can women play football? Why wear shorts and play with men?*" These comments angered her, but she continued playing football with support from her family. "*It really got on my nerves, but I continued because my father always supported me".* This example reflects how Leyla's reaction to gender-based prejudice

sparked anger, yet it also highlights their resilience. Despite societal pushback, their ability to keep going indicates a strong, determined attitude, where anger, rather than demotivating them, becomes a driving force.

Anticipation: Aslı describes excitement and forward-looking anticipation about sports as a feeling of freedom. Experiences with the friend who introduced her to basketball reignited her passion for the sport. "*Basketball and not just basketball, but sports in general, represent freedom for a woman*". Aslı's anticipation for the future in sports shows a deep connection between empowerment and participation. Their perspective suggests that sports open up opportunities, not just for physical activity but for personal liberation.

Disgust: Leyla experienced disgust at society's prejudices about women playing football. The community questioned her involvement in football, reflecting broader societal bias. "*Many still view women playing football with prejudice, especially men who think football is a man's game*". The disgust felt by Leyla reveals how entrenched societal views can act as a significant barrier. This example highlights both the emotional toll of such attitudes and the participant's rejection of these prejudices.

Fear: Dilara explains that in her community, women often fear participating in sports due to traditional norms and societal expectations. This fear is common among women who aspire to pursue sports but face resistance from their surroundings. She shares, *"There aren't many expectations for women, so when I step on the court, I feel like I'm on a stage, a place where I need to prove myself".* Dilara's fear is deeply rooted in societal expectations that limit women's roles in sports. Her experience highlights the internal pressure many female athletes face to validate their presence and abilities in environments where they are not traditionally expected to succeed.

Joy: Esra expresses deep joy about involvement in sports, describing it as a passion and love. Experiences with the team and the camaraderie they built brought immense happiness. *"Now it's something entirely different. It could be described as a passion or even love; there's a certain attachment".* For Esra, joy is not just an emotion but a state of being in sports. Her emotional connection with her team shows how sports can enhance personal fulfillment and provide a sense of belonging.

Sadness: Dilek talks about sadness when thinking about women who don't participate in sports due to societal expectations or lack of opportunity. She reflects on how women miss out on the benefits of sports. *"Of course, it's a sad situation when women don't play sports, like housewives, for example".* Dilek's sadness stems from societal limitations that prevent many women from experiencing the physical and emotional benefits of sports, highlighting a broader societal issue.

Surprise: Initially, people were surprised to see women playing football, as it was viewed as a male-dominated sport. Over time, however, this surprise diminished as women's football gained more visibility. Leyla says, *"That's a completely wrong perspective, but as women's football becomes more popular, people are getting used to it and it's no longer surprising".*

The initial surprise at seeing women in a male-dominated sport reflects shifting attitudes. This transition from surprise to acceptance marks the growing normalization of women's participation in sports.

Trust: Sıla places a lot of trust in her coach and teammates, describing them as a family that provided constant support. This deep trust was foundational to her sporting journey. *"My coach and team became like a family to me, and this support was vital in keeping me engaged in sports".* Sıla's trust in her team highlights the importance of a supportive network. This sense of belonging and security was critical to maintaining her commitment to sports, illustrating the power of trust in overcoming challenges.

The examples provided under the headings of the eight basic emotions highlight the participants' diverse emotional experiences and how these emotions shape their perspectives on sports and gender equality. Despite societal challenges, their passion for sports, trust in their support systems, and anticipation of future success reveal their resilience and optimism. These emotional responses reflect both their internal attitudes and the external pressures they navigate, highlighting their ability to maintain a positive outlook despite obstacles.

Polarity Intensity Map

The Polarity Intensity Maps reflect participants' emotional experiences in sports, displaying scores ranging from high positive intensity (e.g., joy, pride, fulfillment) to high negative intensity (e.g., frustration, sadness, societal challenges). These maps illustrate the complex range of emotions athletes experience. Positive polarity is associated with personal achievements, team cohesion, and pride, while negative polarity is linked to societal challenges, gender-based discrimination, and the pressure on female athletes to constantly prove themselves. Overall, participants tend to focus on the positive aspects of their sports experiences, emphasizing personal growth and success. Participants like Esra and Dilara exhibit strong positive emotions, characterized by joy, pride, and trust, while Leyla and Merve display a more balanced polarity, reflecting both satisfaction and frustration.

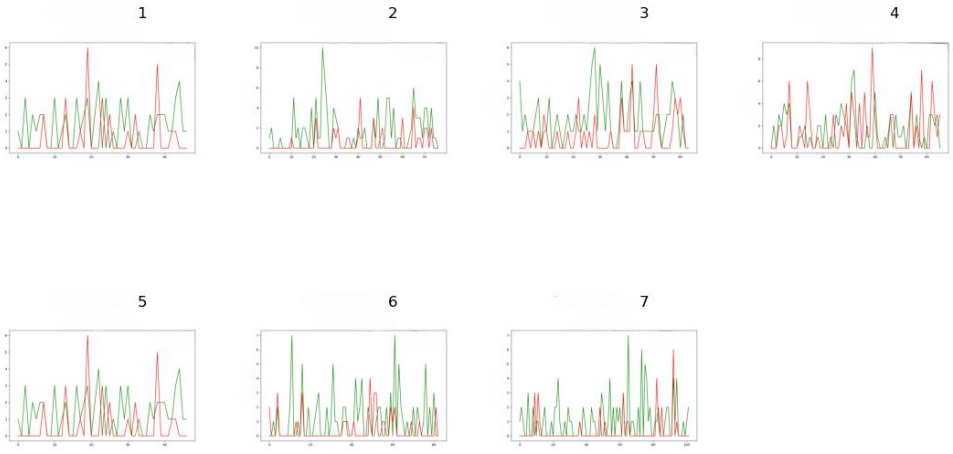

Figure 2. Positive and negative polarity

Figure 3 presents the positive and negative emotion scores of the participants. Red represents negative scores, while green represents positive scores. The vertical axis indicates polarity

scores, while the horizontal axis represents the chronological order of participants' responses to the semi-structured questionnaire.

Aslı (1): "*Achieving success after success is a beautiful feeling; it's a great sense of accomplishment".* This statement scored highly, suggesting that Aslı finds success deeply fulfilling, reflecting a High Positive Polarity. She also highlights societal pressures, stating, *"For women, there aren't many expectations, so when I step on the court, I feel like I'm on a stage, a place where I need to prove myself".* Similarly, she notes, *"When you step on the court, if you think of it from a male perspective, it's expected—they're stereotypically associated with sports, and higher performance is often expected from them".* These statements reflect societal pressures and the burden female athletes face in constantly needing to prove themselves (High Negative Polarity).

Esra (2): *"It could be described as a passion or even love; there's a certain attachment. What brought me here were the successes I achieved with my team".* This statement reflects a deep connection with sports, emphasizing how success and camaraderie foster positive emotions (High Positive Polarity). Although Esra describes mostly positive experiences, she also hints at negative emotions stemming from initial discouragement from her family, as reflected in her statement: *"I was a bit overly attached to sports; I remember crying just from looking out the window because they wouldn't let me go to practice"* (High Negative Polarity).

Leyla (3): *"Some male players even acknowledge that our training is more intense than theirs and say, 'You're even better than us,' it makes me incredibly happy and proud".* This statement conveys a sense of pride and validation, highlighting the achievement of overcoming gender stereotypes in football (High Positive Polarity). In contrast, the statement, *"Why would a woman go to practice? Why wear shorts and play with men?"* reflects the gender-based discrimination the participant has faced, serving as a source of frustration and anger (High Negative Polarity).

Merve (4): *"It taught me to be self-sufficient. For example, if you earn money, it teaches you how to manage it. It also helps you learn how to handle difficult situations without relying on your mom, dad, or a guardian".* This statement highlights Merve's personal growth and independence gained through sports, reflecting a High Positive Polarity. However, despite these positive experiences, Merve also faces gender-based challenges, as reflected in her statement: *"Being a female athlete is difficult from this aspect... everything is generally designed for men"* (High Negative Polarity).

Sıla (5): *"I've had the honor of becoming a national athlete three to four times. It's a great feeling to be recognized in a different field".* This statement conveys a sense of pride and accomplishment, reflecting a High Positive Polarity. In contrast, *"As you know, women frequently face discrimination and violence, which we constantly see in the news"* highlights the societal struggles women face, linking to broader social issues (High Negative Polarity).

Dilara (6): *"We are very strong, we can do anything. Why not?"*. This statement reflects confidence and empowerment, demonstrating a High Positive Polarity. Although Dilara places

less emphasis on negative emotions in her responses, the societal pressures faced by female athletes remain in the background (High Negative Polarity).

Dilek (7): *"I feel very proud when I see women involved in football because I think we're doing a very tough sport".* This statement reflects a strong sense of pride and accomplishment (High Positive Polarity). Like other participants, Dilek acknowledges societal barriers and gender-based expectations, which contribute to negative polarity, although not as intensely expressed as in other cases (High Negative Polarity).

Participants' high positive emotion intensities center on personal achievement, team camaraderie, and empowerment. Many experience joy and pride when discussing their sports successes, such as winning competitions or reaching personal goals, which contribute to a sense of fulfillment. Supportive relationships with coaches, teammates, and family members serve as key sources of positivity. Empowerment, especially in overcoming societal challenges and breaking gender stereotypes, is also significant, as participants express pride in their resilience and success in a male-dominated field. Together, these elements drive the strong positive emotions in their experiences.

Motivational, Emotional and Societal Dynamics in Female Sports Participation: Key Themes and Insights

The findings are categorized into six themes: Motivational Factors, Gender Bias and Societal Challenges, Emotional and Psychological Impact, Social Relationships and Support Systems, Challenges and Sacrifices, and Barriers to Entry.

Motivational Factors (Theme 1): Sports motivations are influenced by individual and environmental factors, including social surroundings, family, interests, geography, and physical conditions. Childhood experiences, family support, peer influence, and energy channeling all play crucial roles. For example, Merve started skiing under the influence of her father, stating, *"My father was the first to direct me to skiing; he used to do it when he was young".* Similarly, Dilara found motivation through her brother and cousin's involvement in sports, stating, *"My cousin was into athletics, and my brother was into cycling; I started doing sports with them".*

Family Influence (Category 1): Family is a central influence in participants' initial involvement in sports, often providing early exposure and continued support. Aslı, introduced to sports by a friend, saw it as a means of freedom and self-expression, using it to challenge societal norms, describing sports as *"freedom for a woman".* For Merve, her father's involvement in skiing inspired her participation, stating, *"My father was the first to direct me to skiing".* The sport's regional popularity also influenced her interest. Dilara was motivated by her older siblings and cousins involved in cycling and athletics, saying, *"I was inspired by them and started athletics to be with them"* highlighting the importance of familial support in her sports journey.

Personal Drive and Passion (Category 2): While family influence is important, personal passion and internal motivation often drive sustained participation in sports. Many participants

express a deep personal connection with their sport, making it an intrinsic part of their identity. Esra's involvement is rooted in a passion and emotional connection with her team, describing it as "*a passion or even love*" highlighting the joy she derives beyond physical activity. Sıla, initially channeling childhood hyperactivity, developed a passion for taekwondo, crediting her coach as a "*father figure*" who guided and motivated her. Dilek, originally managing hyperactivity through martial arts, shifted to football to challenge societal expectations, stating, "*I shifted to football to prove that women can play and be just as good as men"* demonstrating her determination to break gender stereotypes.

Professional and Athletic Development (Category 3): This category explores athletes' career progression, the path to professional levels, and the role of coaches in their journey. Participants' experiences highlight that an athlete's career is influenced not only by physical skills but also by psychological resilience and social support. Goals such as becoming a national athlete, receiving coach support, and overcoming career challenges are crucial factors. For example, Sıla described her journey to becoming a national athlete, stating, *"I became a national athlete four times and competed internationally after ranking in the top eight at the Turkish Championship".* Dilek emphasized that her coach's unfair treatment led her to switch sports, stating, *"My coach constantly belittled me during matches, so I quit football and turned to a different sport".*

Gender Bias and Societal Challenges (Theme 2): Many participants faced gender-based barriers and societal prejudices when engaging in sports. However, through determination, support from family, and a desire to challenge traditional gender roles, they demonstrated resilience and found empowerment. For them, sports became a tool for building confidence and independence.

Overcoming Gender-Based Barriers (Category 1): Many participants reported encountering societal gender norms and stereotypes when they first began playing sports, often facing dismissive or sexist comments from peers, family, or the community. Leyla experienced sexist remarks as a female football player, such as, *"Can women play football? Why wear shorts and play with men?"* Despite these challenges, her determination strengthened, particularly with her father's support. Similarly, Dilek faced scrutiny for playing football, a traditionally male-dominated sport. Motivated to prove women's capabilities, she stated, *"People ask, can a woman play football? Of course, we can"* highlighting her resilience in challenging gender stereotypes.

Societal Prejudice (Category 2): Beyond gender-based barriers, many participants also encountered societal prejudices that reinforced traditional gender roles, limiting women's involvement in sports. Dilara encountered resistance from her family and society when she pursued athletics, as many questioned its purpose and worth. She recalls questions like, *"Why do you run in the cold? Why put yourself through this?"* reflecting societal prejudice she had to overcome through determination. Sıla also faced pressure to conform to traditional roles, with expectations that women focus on family life rather than physical activities. Despite this, she found confidence and independence through sports, stating that *"People assume women*

should stay at home, but sports gave me confidence; I realized I could do more". Her experience highlights the empowering impact of sports in breaking societal expectations.

Emotional and Psychological Impact (Theme 3): Sports provide participants with emotional fulfillment, personal development, and empowerment. Beyond physical benefits, sports foster joy, discipline, self-confidence, and independence, shaping personal growth and resilience while helping individuals overcome societal challenges.

Emotional Fulfillment (Category 1): For many participants, sports provide not only physical benefits but also emotional and psychological fulfillment, becoming a source of joy and satisfaction. Esra describes her involvement as *"a passion and even love"* highlighting the emotional bond with her teammates and the camaraderie they share, which brings her a sense of belonging. Similarly, Leyla balances societal prejudices with the joy of playing football; although sexist remarks angered her, her achievements brought her a sense of fulfillment and success, helping her overcome these challenges.

The Impact of Sports on Personal Development (Category 2): Sports significantly impact personal development through factors like discipline, dedication, self-confidence, and social connections. They provide mental training, instill valuable life skills, enhance social participation, and boost self-confidence. Sıla emphasized the importance of sports instilling discipline and dedication: *"Taekwondo occupies a large part of my life; the discipline of sports has brought structure to my life".* Merve noted that sports expanded her social circle and boosted her self-confidence: *"Thanks to sports, I gained self-confidence and can now easily adapt to any environment".*

Empowerment Through Sports (Category 3): Sports have significantly impacted participants' confidence, independence, and self-worth. Merve expresses her personal growth and independence by stating, *"Being able to stand on my own feet gives me confidence".* Similarly, Dilara emphasizes that sports are *"an integral part of my identity"* providing her with a sense of purpose and empowerment. The emotional and psychological impact of sports has played a crucial role in shaping her self-worth and confidence.

Social Relationships and Support Systems (Theme 4): Support from coaches, peers, and teammates plays a pivotal role in participants' sports journeys, offering not only practical guidance but also emotional and psychological encouragement. This support fosters deep friendships and social bonds, contributing to their sense of belonging, motivation, and empowerment.

Support from Coaches and Peers (Category 1): Sıla's development as an athlete was significantly influenced by the support from her coach, whom she describes as a father figure, providing both practical training and emotional encouragement. She explains, *"My coach was like a father to me, guiding me and supporting me through every step of my journey".* This supportive relationship was crucial in her continued participation in sports. Aslı's involvement in basketball was reignited by a friend. The social connections she formed through sports

became a source of motivation. She shares that sports gave her a sense of freedom and empowerment, helping her challenge societal expectations.

Peer Relationships and Camaraderie (Category 2): Sports provide physical activity and foster social bonds, creating emotional connections with teammates. Esra found joy and fulfillment in the emotional bonds she built through sports, highlighting their role in creating social connections beyond physical activity. Dilara also emphasized the significance of friendships formed through sports. She explains, *"I've built strong friendships through sports, and they have become an integral part of my support system".* These friendships were essential to her emotional and social growth, giving her a strong sense of community.

Challenges and Sacrifices (Theme 5): Many participants highlighted the personal sacrifices they made to achieve sporting success, such as missing family events and dedicating significant time to training, emphasizing that while balancing personal life and sports posed challenges, the emotional and social rewards of their athletic pursuits made these sacrifices worthwhile.

Sacrifices for Sporting Success (Category 1): Participants often discuss the sacrifices they've made to pursue their athletic ambitions, such as missing family events and dedicating most of their time to training. Sıla shares her perspective on these sacrifices. She explains, *"I missed out on family time, and I rarely saw my friends outside of sports, but it was all worth it for the love of the game".* Merve faced challenges in balancing personal life and sports, emphasizing the sacrifices athletes make to succeed and the discipline and persistence required. She acknowledges the *"tough times"* she experienced but emphasizes that the emotional and social rewards of sports outweighed these challenges.

Barriers to Entry (Theme 6): Despite their passion for sports, many participants faced significant barriers to entry, often stemming from logistical challenges or societal constraints. Dilek encountered difficulties when trying to break into football, a sport traditionally dominated by men. She explains how she had to constantly prove herself to her male peers and coaches, stating, *"Football reflects who I am, and it shows how determined and competitive I am".* Despite these barriers, her passion for football kept her motivated. Logistical barriers, such as limited access to training facilities and transportation issues, posed obstacles for Dilara. However, she overcame these challenges through persistence and determination. She reflects on how these obstacles pushed her to work even harder in pursuit of her passion for athletics".

Gender and Sports Participation (Category 1): The intersection of gender roles and sports participation poses a major challenge for women, as sports are traditionally male-dominated and associated with traits like strength and aggression. This undervaluation of women's participation underscores the resilience needed to challenge stereotypes and advance gender equality in sports. For example, Dilek faced sexist attitudes in football, with men questioning if women could play: *"They say, can a woman play football? A woman can do anything she wants".* Dilara felt sidelined as a woman in sports: *"Men are given prominence, and as a woman, there is a constant sense of being pushed to the background".* The study reveals that despite progress in promoting gender equality in sports, disparities persist, especially in rural areas, where women face restrictive social norms and economic barriers. For instance, Sıla

noted equality in taekwondo: *"In taekwondo, we are completely equal. We train with the men and we support each other".* Dilara highlighted rural disparities: *"In rural areas, women's opportunities to engage in sports are very limited; some are not even sent to school".* Women's participation in sports challenges societal perceptions. Female athletes are not only showcasing their skills but also resisting gender norms, driving broader social change.

Societal Pressures, Family Resistance and Resource Limitations (Category 2): Women face challenges in sports due to societal pressures, family resistance, and limited resources. Traditional gender roles, expectations, and cultural norms make it harder for women to navigate the athletic field. Sıla experienced this firsthand, stating, *"My family would go somewhere, but I would always be at practice".* She also recalled that her family was initially hesitant to send her to practice due to transportation issues, explaining, *"Since I was young, my family was a bit reluctant to send me".*

DISCUSSION and CONCLUSION

Our findings show that external factors (family, coaches, and peers) and intrinsic motivations, such as overcoming challenges, play a dominant role in encouraging female athletes' participation. Despite societal pressures and gender-based discrimination, participants experience positive emotions in sports, which lead to personal growth, empowerment, and the creation of a supportive community. Family and social support are essential in helping female athletes overcome these challenges. Research indicates that sports motivation is influenced by external factors such as social status, family and peer support, relationships with coaches, and access to sports facilities. In particular, peer support significantly enhances commitment to sports activities (Huang et al., 2019). Intrinsic factors, however, play a crucial role in sustaining long-term sports participation (Kaman et al., 2017). Families are key influencers in shaping young women's attitudes toward sports (Hayoz et al., 2017; Pope & Kirk, 2012). External factors, such as peer influence and family socioeconomic background, also impact motivation for sports participation (Joseph et al., 2015). Coaches who value athletes and promote personal development are significant motivators for sports involvement (Rosario, 2023).

Families can both support and hinder an athlete's professional journey (Esin & Bayköse, 2023). Positive family dynamics, such as encouragement, significantly impact the development of female athletes and children's involvement in sports, as well as their long-term athletic careers (Lundy et al., 2019; Wheeler, 2011). Furthermore, family support helps promote women's participation in sports by countering societal pressures and stereotypes. While boys are often encouraged to engage in sports to reinforce their masculinity, women are sometimes discouraged in order to preserve their femininity, leading to lower participation rates for women compared to men (Koca, 2006). Women's sports experiences often foster a strong sense of emotional support and positive reinforcement, shaped by social, cultural, and structural factors. This process highlights the importance of team spirit and strengthens social connections. Studies show that women who have familial or community connections encouraging sports participation develop a stronger sense of belonging within the sports community (Sutton & Knoester, 2021). This socialization process creates a supportive

environment that enhances women's sports experiences and fosters positive expectations for future participation. Additionally, policies promoting gender equality in sports play a vital role in increasing women's participation and support, offering more opportunities for women at various levels (Hanlon et al., 2019). Furthermore, networks and mentorship programs tailored for women in sports leadership help them overcome challenges and build confidence in their roles (Kraft et al., 2020).

Research shows that sports not only provide physical health benefits but also offer emotional satisfaction, increased self-confidence, and opportunities to build social connections (Eime et al., 2013). Sports are linked to psychological benefits, including improved self-esteem, enhanced social skills, and reduced anxiety. These benefits contribute to the overall well-being of young women and motivate them to remain active in sports. In our study, participants reported that sports significantly boosted their confidence. Moreover, participation in sports is strongly linked to self-esteem development. Engaging in physical activities improves self-esteem, while participation in sports enhances perceived competence, further contributing to higher self-esteem (Grandiere Perez et al., 2022; Singh et al., 2022).

Sport develops women's emotional resilience (Akelaitis & Malinauskas, 2018; Karagün, 2014). Female athletes demonstrate higher self-confidence than their male counterparts, highlighting how sports empower women (Bostancı et al., 2019). Women are more motivated by performance and ego-related factors compared to men (Kilpatrick et al., 2005). Women's participation in sports is shaped by the interaction of emotional factors, societal expectations, and barriers. Women's higher emotional intelligence strengthens their coping skills (Skurvydas et al., 2022; Yiyi et al., 2022). Emotional regulation affects athletes' performance (Kopp & Jekauc, 2018; Wagstaff, 2014). Due to societal pressures, women often experience emotional challenges such as anxiety and frustration (Dakic et al., 2023; Roh & Chang, 2022). Coping strategies, such as seeking social support and engaging in emotional communication, help women participate in competitive sports. However, as competition levels rise, reliance on these strategies tends to decline (Carratalá-Bellod et al., 2022).

Sport enhances women's self-confidence, shapes future aspirations, and challenges societal norms. Female athletes experience increased self-esteem and a sense of accomplishment through their connection with sports (Guddal et al., 2019; Singh et al., 2022; Yigiter, 2014). Research highlights the contextual factors influencing athletes' confidence, which vary by sports discipline (Chun et al., 2022; Koehn et al., 2013). Participation in sports contributes to the development of positive future expectations and creates an empowerment cycle for women (Daniels & Leaper, 2006). By engaging in sports, women challenge societal norms, overcome barriers, and inspire others. The visibility of female athletes promotes a culture of empowerment by challenging traditional gender roles (Beshārat & Pourbohlool, 2011; Sabiston et al., 2016). Women's participation in sports inspires younger generations to engage in physical activity, further extending its impact (Ferguson et al., 2014; Mosewich et al., 2013).

Women's participation in sports has historically faced societal resistance, hindering efforts to challenge gendered attitudes and norms. A primary reason for the marginalization of women in sports is the male-centered sports culture (Lusted & Fielding-Lloyd, 2017). Additionally,

cultural and religious factors play a significant role; in conservative regions, such restrictions severely limit women's participation in physical activities (Laar et al., 2019; Laar et al., 2022). These restrictions further challenge discussions on women's rights and equality. Social norms and stereotypes place emotional pressure on women, fueling concerns about their performance and acceptance in sports (Farzaneh et al., 2021; Roh & Chang, 2022). In patriarchal societies, cultural expectations can heighten emotional distress for women (Farzaneh et al., 2021). These challenges can discourage women from engaging in sports (Asghar, 2024). However, women are actively confronting cultural barriers and expanding their presence in sports (Laar et al., 2022). Sports empower women to advocate for equality, build self-confidence, and develop resilience (Pan et al., 2022; Parvathy, 2020). For female athletes, sports go beyond physical activity, they provide emotional fulfillment, shape identities, and challenge societal norms (Burton, 2015).

Despite the challenges they face, female athletes' sports experiences significantly enhance their happiness and overall satisfaction. Sports provide inner joy, emotional well-being, and meaning in life, boosting motivation and creating positive expectations for the future. Negative emotions often stem from sexist attitudes and societal pressures. Some participants reported experiencing anger and anxiety due to gender-based barriers and discrimination. However, negative emotions such as disgust were minimal, indicating that participants generally maintain a positive outlook. NRC emotion analysis indicates that female athletes' experiences are predominantly shaped by positive emotions like trust, anticipation, and joy, though struggles against gender norms also emerge. Overall, female athletes exhibit resilience and optimism in the face of challenges. Trust emerges as the dominant emotion, rooted in supportive relationships with coaches, family, and teammates. Anticipation reflects their hope for future success, while joy highlights their satisfaction despite occasional negative emotions like fear and anger. The emotional impact of societal pressures and gender-based biases is limited, as participants' resilience and empowerment are linked to their efforts to overcome gender stereotypes. This study emphasizes that female athletes' experiences involve a balance of personal motivations, societal barriers, emotional fulfillment, and support systems, with family and peer support playing a crucial role in sustaining participation. Gender discrimination creates emotional hurdles, but sports empower women to overcome obstacles, challenge stereotypes, and pursue their passions, fostering strength, self-confidence, and independence. However, societal pressures, family resistance, and resource limitations further highlight the resilience female athletes demonstrate in overcoming these barriers.

Limitations and Future Research Recommendations

A key limitation of this study is its small sample size, which may not fully capture the experiences of female athletes across diverse cultural and socioeconomic backgrounds. Future research should include a more diverse demographic representation, employ longitudinal studies, and explore interventions aimed at increasing social support and reducing gender bias.

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Women Football Coaches' Perceptions of Fair Play: A Metaphorical Journey from UEFA A, B and C Licensed Coaches

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Abstract

This study aims to deeply examine the perceptions and attitudes of women football coaches towards the concept of Fair Play through the use of metaphors. The research involved gathering qualitative data from 41 women football coaches holding UEFA A, B, and C licenses through an open-ended questionnaire. The participants described Fair Play using metaphors associated with core values such as justice, balance, honesty, and empathy, revealing the multidimensional nature of the concept. The study demonstrates that Fair Play is not only a sporting principle but also an ethical value that supports social change. In this context, strategic recommendations for the promotion of Fair Play have been proposed. These include fostering discipline, restructuring athlete education based on Fair Play principles, and implementing awareness-raising campaigns in society. This research presents a multidimensional analysis of women football coaches' metaphorical perceptions of Fair Play. It highlights that Fair Play is not merely a value in sports but also a concept grounded in universal values such as justice, equality, and empathy. This underscores the importance of women coaches' leadership roles in establishing a sustainable framework for sports ethics.
Keywords: Fair play, Women football coaches, Metaphor

Kadın Futbol Antrenörlerinin Fair Play Algıları: UEFA A, B ve C Lisanslı Antrenörlerin Metaforik Yolculuğu

Öz

Bu çalışma, kadın futbol antrenörlerinin Fair Play kavramına yönelik algı ve tutumlarını metaforlar aracılığıyla derinlemesine incelemeyi amaçlamaktadır. Araştırma, UEFA A, B ve C lisanslarına sahip 41 kadın futbol antrenöründen açık uçlu bir anket aracılığıyla nitel veriler toplanmıştır. Katılımcılar Fair Play'i adalet, denge, dürüstlük ve empati gibi temel değerlerle ilişkilendirilen metaforlar kullanarak tanımlayarak kavramın çok boyutlu yapısını ortaya koydular. Çalışma, Fair Play'in sadece bir spor ilkesi değil aynı zamanda toplumsal değişimi destekleyen etik bir değer olduğunu ortaya koyuyor. Bu bağlamda Fair Play'in tanıtımına yönelik stratejik önerilerde bulunulmuştur. Bunlar arasında disiplinin geliştirilmesi, sporcu eğitiminin Fair Play ilkelerine göre yeniden yapılandırılması ve toplumda farkındalık artırıcı kampanyaların uygulanması yer alıyor. Bu araştırma, kadın futbol antrenörlerinin Fair Play'e ilişkin metaforik algılarının çok boyutlu bir analizini sunmaktadır. Fair Play'in sadece sporda bir değer olmadığını, aynı zamanda adalet, eşitlik, empati gibi evrensel değerleri temel alan bir kavram olduğunu vurguluyor. Bu, spor etiği için sürdürülebilir bir çerçeve oluşturmada kadın antrenörlerin liderlik rollerinin önemini vurgulamaktadır.
Anahtar Kelimeler: Fair play, Kadın futbol antrenörleri, Metafor

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INTRODUCTION

Fair play, as one of the ethical cornerstones of sports, is not merely a set of rules but also a powerful tool for promoting justice, honesty, and respect among individuals and communities. Particularly in sports like football, which appeal to large audiences, the concept of fair play influences not only on-field success but also shapes societal relationships and cultural transformation (Loland, 2024). The rapidly growing global influence of women's football underscores the importance of ethical practices in this domain. Research indicates that fair play practices in women's football not only enhance technical and tactical success but also promote gender equality (Knijnik, 2024).

The educational dimension of fair play lies in fostering a system where athletes exhibit ethical behavior, becoming role models both on and off the field. Building such a system is a fundamental responsibility for coaches (Nguyen et al., 2024). Within this context, a thorough examination of how women football coaches internalize the concept of fair play and integrate it into their coaching practices can provide significant insights into the development of women's football and sports ethics.

The rise of women's football presents a notable area for exploring the opportunities and challenges encountered by women in leadership roles as coaches. Integrating the concept of fair play into their teams not only establishes codes of conduct on the field but also fosters players' moral development and their responsibility to serve as examples within society. For instance, According to Loland (2024) emphasizes that fair play plays a central role in creating a sports culture that prioritizes ethical gameplay alongside physical performance (Loland, 2024). Similarly, Knijnik (2024) argues that fair play acts as a form of resistance, challenging traditional gender roles within the context of women's football (Knijik, 2024).

The objective of this research is to explore the perceptions of fair play among women football coaches holding UEFA A and B licenses through a metaphorical approach. The study aims to uncover how these coaches conceptualize and implement the notion of fair play. Additionally, it seeks to evaluate the contribution of these perceptions to the development of women's football and sports ethics. A metaphorical analysis of fair play will not only provide a theoretical perspective but also enable a deeper understanding of the practical experiences and emotional connections of women coaches with this concept.

In this context, examining the concept of fair play from the perspective of women football coaches highlights that sports serve not only as a field of competition but also as a platform for education and the transmission of values. The findings of this study are expected to contribute to the reinforcement of ethical values in women's football and to foster a more inclusive culture in the sport.

Fair play, as a fundamental element of sports ethics, embodies the principles of fairness, honesty, and mutual respect. Emphasizing the social dimension of sports, this concept extends beyond the physical performance of individuals, underscoring their responsibility to develop

ethical values. According to Loland (2024) argues that fair play is not merely about adherence to rules but also about ensuring that sporting competition occurs within a moral framework Loland, 2024). This perspective reinforces the transformative impact of sports on individuals and societies alike.

In the context of women's football, fair play is viewed as a mechanism of resistance against gender inequality and stereotypes. The ability of women football coaches to instill fair play values in their players and integrate them into overall team dynamics plays a pivotal role in shaping behaviors both on and off the field. According to Knijnik (2024) highlights that women's football provides a platform to challenge societal biases and enable greater visibility for women through sports (Knijnik, 2024). The adoption of a fair play approach by coaches can be seen as a catalyst for this process.

The educational dimension of fair play also gains significance within this framework. Coaches not only need to embody these ethical principles themselves but also impart them to their players, reflecting not only sporting success but also moral leadership. According to Nguyen et al., (2024) assert that fair play strengthens a team's moral atmosphere and serves as the foundation for long-term athletic success.

Understanding the role of fair play in women's football and the approaches coaches take toward this concept reveals not only individual ethical perceptions but also the power of sports in driving social transformation. In this context, the influence of women football coaches on fair play represents a cornerstone that supports the development of both ethical values and sports culture.

Fair play, as one of the most enduring ethical principles in sports, is recognized as a norm that promotes fairness, honesty, and respect. The historical origins of the concept can be traced back to ancient times, when individuals engaged in sports within the framework of fair competition and honorable conduct. While the Olympic Games of Ancient Greece showcased early examples of fair play, its modern interpretation emerged during the 19th century in Britain. This period emphasized the role of sports as an educational tool and highlighted its impact on character development (Dillenburg, 2024).

Fair play is regarded as one of the foundational pillars of the modern Olympic Movement. Under the leadership of Pierre de Coubertin, the revival of the Olympic Games embraced fair play not merely as a model for individual behavior but also as a tool for fostering peace in international relations. Coubertin believed that the values embodied by the Olympics could contribute to the moral development of both individuals and societies (Kelmendi et al., 2024). Within this context, fair play has evolved into a principle that encourages not only athletic excellence but also cultural solidarity and ethical leadership.

The concept of fair play gained significant momentum during the 20th century, as sports organizations and federations began addressing it more comprehensively. International bodies

such as FIFA and UEFA launched various awards, campaigns, and educational programs to promote fair play principles. UEFA's "Respect" campaign, for example, aimed to instill the value of fair play among all football stakeholders (Fitzpatrick & Benedikter, 2024).

The rise of women's football has provided a new framework for evaluating fair play in the context of ethical values. Women footballers and coaches exemplify fair play not only on the field but also as advocates for social equality and justice. According to Knijnik (2024) emphasizes that women's football challenges traditional gender norms, demonstrating how fair play can serve as a tool for justice and equity. The leadership practices developed by women football coaches around fair play reveal its dual role as a hallmark of sports ethics and an instrument for societal change.

In the context of women's football, fair play occupies a vital place in the ethical leadership approaches of coaches. Women football coaches go beyond promoting fair competition by embodying the societal values of sports as role models for their players. According to Nguyen et al., (2024) highlight the critical role of fair play in the moral development of athletes, emphasizing the significant contribution of women football coaches to this process. This perspective positions women's football not merely as a sport but as a platform for social transformation.

The historical evolution of fair play reveals how ethical norms have been embedded within the sports world and how these norms contribute to societal progress. In women's football, the implementation of fair play principles strengthens not only athletic success but also the broader understanding of social equality and justice. Therefore, communicating both the historical and contemporary significance of fair play to wider audiences is essential for ensuring the sustainability of sports ethics.

The adoption of fair play principles by women football coaches transcends individual ethical perceptions. These values shape future athletes through the cultural norms they establish within their teams and the role models they present to society beyond the field. Leadership grounded in fair play transforms sports from a mere physical contest into a platform for social change (Dubón-Huezo & Juarez-Artiga, 2024).

According to Nguyen et al., (2024) women coaches provide not only tactical training but also a model of ethical leadership for their players. This leadership ensures the internalization of fair play values among young athletes and contributes to the evolution of women's football into a value-driven system that resonates with broader audiences (Nguyen et al., 2024). According to Knijnik (2024) highlights that women's football challenges traditional gender norms, leveraging fair play as a tool for justice and equality (Knijnik, 2024). Women coaches teach their players that fair play is not merely a set of rules but a way of life, encouraging athletes to embody these principles in their behavior both on and off the field.

According to Loland (2024) underscores the vital role of women coaches in extending ethical values to wider audiences through their leadership. This influence positions women's football not only as a domain for sporting excellence but also as an instrument for societal transformation (Loland, 2024).

By embracing and imparting fair play values, women football coaches create an impact that extends beyond the sport itself, fostering societal change. This leadership approach not only ensures fair competition but also strengthens individuals' ethical development and the understanding of social equity. Fair play principles contribute to the growth of women's football while enabling women coaches to make a broader societal contribution as role models. In this context, women football coaches are key actors who transform fair play from an ethical value into a powerful tool for social change through sports.

METHOD

Research Model

This study employs a descriptive research design to examine women football coaches' perceptions of the concept of Fair Play. Descriptive research provides an effective methodological framework for understanding and explicating the current states of individuals, groups, or events. The study adopts a qualitative research design, utilizing open-ended questionnaires to collect data from 41 women football coaches holding UEFA A, B, and C licenses.

A phenomenological approach was employed to explore how participants conceptualize Fair Play and the metaphors they use to describe it. Accordingly, an open-ended questionnaire was designed to allow participants to articulate their perceptions freely. The data collected were analyzed using content analysis, leading to the identification of themes that represent various dimensions of Fair Play. Throughout the research process, participants' responses were meticulously examined, revealing that Fair Play is predominantly associated with fundamental values such as justice, balance, honesty, and empathy. The selection of this methodological approach aims to provide a multidimensional understanding of how women football coaches construct meaning around the concept of Fair Play.

Research Groups

The study was conducted with a working group consisting exclusively of women football coaches, without employing a specific sampling method. This approach was chosen for several reasons, including its cost-effectiveness, the ease of accessing data, and the expectation of a high participation rate.

Table 1. Demographic information of the study group

Age Range	***f***
18-25	10
26-30	19
31-35	7
36-40	3
41+	2
Coaching Experience	
1-5	16
6-10	13
11-15	6
16-20	3
21+	3
Coaching Classification	
UEFA A	3
UEFA B	17
UEFA C	21
Total	**41**

According to Table 1, the majority of participants fall within the 26–30 age range, and most have 1–5 years of coaching experience, highlighting a concentration of young and relatively inexperienced coaches. From a classification perspective, the UEFA B license is the most common among participants, followed by the UEFA C license. This distribution indicates that the majority of participants possess mid-level coaching certifications and are at the early stages of their professional careers. These findings emphasize the prominence of emerging coaches within the study group, providing a unique perspective on the adoption and integration of fair play principles in the initial phases of a coaching career.

Data Collection Tools

In this study, data were collected using an open-ended questionnaire designed to allow participants to express their thoughts in detail. Open-ended questionnaires provide participants with the opportunity to freely articulate their ideas without predefined response options (Patton et al., 2015). This approach facilitates an in-depth examination of participants' perspectives, enhancing the richness and scope of the research data.

The open-ended questions used in this study included:

- *"If you were to compare fair play to a living or non-living entity, what would it be? Why?"*
- *"How would you self-assess your adherence to the spirit of fair play in your overall behavior?"*
- *"Based on your observations, what are your thoughts on fair play-oriented behaviors toward women football coaches?"*
- *"If you held a position of authority, what measures would you take to promote the spirit of fair play in your country?"*

These questions were designed to deeply explore participants' perceptions, attitudes, and suggestions regarding fair play. The first question in particular aimed to elicit participants' perceptions of fair play through metaphors, an effective tool for interpreting abstract concepts. Metaphors enable individuals to conceptualize and articulate complex ideas in a more concrete and understandable manner (Lakoff & Johnson, 2008). Their use not only provides a profound insight into participants' thought processes but also facilitates a nuanced understanding of multifaceted values like fair play.

The open-ended questionnaire was developed with the input of three field experts during its design phase. Expert opinions played a critical role in ensuring the content validity of the data collection tool and aligning the questions with the study's objectives. Consulting experts to improve validity is recommended to ensure clarity, appropriateness, and accurate measurement of targeted concepts (Creswell & Poth, 2016). Based on their feedback, the questions were refined for scope, linguistic structure, and relevance.

The data collection process was conducted online, with participation being entirely voluntary. This method provided participants with easy access and facilitated a seamless data collection experience.

Ethichs Approval

Ethical approval was obtained from Karamanoğlu Mehmetbey University Rectorate Social and Human Sciences Scientific Research and Publication Ethics Committee for this research (Date: 23.10.2024- Number: 222102).

Analysis of Data

The study employed content analysis, a systematic method for identifying key themes, categories, and patterns in unstructured or open-ended data (Miles et al., 2014). This approach enabled an in-depth exploration of participants' responses, facilitating a deeper understanding of the study's core concepts (Yıldırım & Şimşek, 2011).

A thematic coding process was applied to organize the collected data, with each response segmented into meaningful analytical units. Using an inductive analysis approach, themes and codes emerged directly from the data rather than being predetermined (Patton et al., 2015). Responses were structured around key themes related to *Fair Play*, with similar codes categorized accordingly. To streamline data management and analysis, women football coaches were designated as Participant Football Coaches (PFC).

To ensure an adequate research sample, data saturation served as a guiding principle. This occurs when additional data collection yields no new themes or insights, indicating that further responses would not significantly alter the findings (Saunders et al., 2018). As themes and patterns became repetitive without introducing new categories, data saturation was deemed to have been reached, confirming that the sample size was sufficient.

To enhance the validity and reliability of the study, expert opinions were consulted, and a transparent data analysis process was maintained. Direct participant quotations were incorporated to reinforce accuracy. Ethical considerations were upheld by safeguarding participants' identities and ensuring that their responses were handled with care. These methodological steps were implemented to strengthen the scientific rigor and credibility of the research findings.

FINDINGS

Based on the data obtained from women football coaches, the findings are presented regarding their metaphorical perceptions of the concept of Fair Play, their self-assessments of Fair Play-compliant behaviors, their perceptions of Fair Play-oriented behaviors toward women football coaches, and their views and suggestions for promoting the spirit of Fair Play.

Metaphorical Perceptions of Fair Play

The study first asked women football coaches which concepts they associated with Fair Play and the reasons for these associations. The metaphors developed by women football coaches regarding Fair Play are presented in Table 2.

Table 2. Metaphorical Themes of Fair Play by Women's Football Coaches

Sub-Themes	Metaphor	*f*
Balance and Justice	Scale	3
	Fair	3
	Lion	2
	Representation	2
Reflection and Honesty	Mirror	4
	Empathy	4
	Self-Reflection	3
Relationship and Connection	Bond	2
	Children	2
	Sibling	2
	Friendship	1
Naturel Elements	Water	2
	Sun	2
	White	2
	Sparrow	1
	Bird	1
Human Values	Conscience	1
	Virtue	1
	Kindness	1
	Humanity	1

According to Table 2, the metaphors developed by women football coaches about Fair Play are categorized under five sub-themes: Balance and Justice, Reflection and Honesty, Relationship and Connection, Natural Elements, and Human Values.

Balance and justice; the view that Fair Play ensures balance and preserves justice is addressed under the sub-theme of Balance and Justice. For example, (PFC21) stated, "A scale because it symbolizes balance," while PFC27 highlighted that choosing a celebration that does not humiliate the losing side creates balance and fosters fair competition in future encounters. Similarly, PFC39 compared Fair Play to a living being, saying, "It would be a lion because a lion symbolizes strength and justice," emphasizing justice as a core value.

Reflection and honesty; participants' views on Fair Play being based on mutual reflection, honesty, and empathy are examined under the sub-theme of Reflection and Honesty. PFC8 remarked, "Fair Play is like a mirror because it reflects oneself; you act the way you want others to act towards you." PFC9 supported this view, stating, "Fair Play is like a mirror because it reflects what we do. How we want to see ourselves should guide how we act towards others or situations." PFC4 emphasized empathy, saying, "You should play with the mindset that you should treat your opponent the way you want to be treated."

Relationship and connection; the idea that Fair Play helps build strong bonds and friendships among people is explored under the sub-theme of Relationship and Connection. For instance, PFC29 remarked, "It would be a bond because Fair Play could be described as a communicative bond between two people." PFC37 highlighted the importance of opponents, stating, "What I always tell my players: without opponents, we don't exist; thank goodness for our opponents." PFC40 likened Fair Play to siblinghood, saying, "Even if you fight, you help them up when they fall," emphasizing the value of friendship.

Natural elements; the sub-theme of Natural Elements relates metaphors about Fair Play to nature. For example, PFC1 stated, "I would compare it to water. Wherever it reaches, it brings life and beauty," illustrating the nourishing effect of Fair Play. PFC3 added, "It’s like the sun. Without the sun, the world cannot turn," highlighting Fair Play as a fundamental necessity. PFC11 described Fair Play’s connection to nature by saying, "If it were an inanimate object, it would be an invisible butterfly. While we know its meaning, whether we practice it from our hearts is another matter."

Human values; lastly, the sub-theme of Human Values captures metaphoric expressions associating Fair Play with human virtues, purity, and goodness. PFC33 stated, "White, because it represents purity and truth," while PFC26 said, "Children. They are honest," symbolizing innocence and honesty.

The metaphors developed by women football coaches reveal diverse aspects of Fair Play, including its role in ensuring balance and justice, its reflective and empathetic nature, its power to forge connections, its representation of human values, and its purity as associated with natural elements. These metaphorical expressions enrich the understanding of Fair Play's multidimensional significance.

Self-assessment on fair play-compliant behaviors; the study examined women football coaches' perspectives on their self-assessment regarding Fair Play-compliant behaviors. Findings

indicate that coaches regard Fair Play as a fundamental value in the educational process and exemplify it through their own behavior, serving as role models for their students. Fair Play is recognized not just as a sporting principle but also as a moral and human value. Coaches prioritize concepts such as respect for opponents, empathy, and justice, integrating these values into their lives and aiming to instill them in their athletes.

Coaches emphasize that fostering Fair Play in students is a cornerstone of the educational process. For instance, PFC26 stated, "Fair Play is definitely the first thing I instill in my students," underscoring its role at the start of training. Similarly, PFC39 remarked, "A coach is reflected in their players. I always teach my players Fair Play first and behave accordingly," highlighting the importance of leading by example. PFC30 added, "I try to teach children how to play morally before football," emphasizing the moral foundations of Fair Play in sports education.

Coaches also highlight that Fair Play is a justice-oriented concept intertwined with moral values. PFC8 noted, "I've always valued winning fairly in my sports life," emphasizing its foundation in fairness, while PFC22 stated, "I think of the concept of justice, values, tolerance, goodwill, sincerity, and ethical behavior," linking Fair Play closely with morality and tolerance. Similarly, PFC6 stated, "It's not just about competition; fairness as a person is equally important," emphasizing Fair Play as a concept rooted in human values.

Coaches generally consider themselves to be Fair Play-compliant individuals and express this openly. PFC34 remarked, "I think I comply with Fair Play," reflecting self-perception as honest and morally upright, while PFC9 noted, "Because I'm naturally optimistic, I can put myself in others' shoes," emphasizing Fair Play's connection to empathy. PFC13 added, "I'm calm, virtuous, and understanding," aligning their personality traits with Fair Play values.

Respect for opponents and empathy are emphasized as significant components of Fair Play. PFC18 stated, "I demonstrate Fair Play behaviors towards my opponents before and after the match, regardless of the result," highlighting a respectful approach. Similarly, PFC32 remarked, "I see the person opposite me as an individual, and this should be done not only in competition but also as a person," emphasizing the connection between Fair Play, empathy, and human dignity. PFC2 stated, "Sometimes we get carried away with the competitiveness. But when I think of contributing to the development of what I serve, I realize Fair Play is a significant factor in that development," reflecting Fair Play's integration of respect and empathy.

Coaches express efforts to improve themselves in fully embodying Fair Play. PFC40 noted, "I think it's improvable, but I strive to remain within the framework of Fair Play," highlighting the need for continuous development. Similarly, PFC15 stated, "Sometimes I think I demonstrate Fair Play in certain situations," expressing their ongoing growth process.

Women coaches emphasize their determination to consistently apply Fair Play. PFC12 stated, "Fair Play to the end," showcasing their commitment to this principle, while PFC38 remarked,

"I think I act in accordance with the spirit of Fair Play," indicating their dedication to making Fair Play a lasting behavior. PFC5 added, "I completely exhibit behaviors in line with Fair Play," reflecting its adoption as a life principle.

In summary, women coaches' approaches to Fair Play encompass various dimensions, including education, justice and morality, self-awareness, respect for opponents and empathy, personal development, and the consistent application of Fair Play. Coaches see instilling the spirit of Fair Play in their athletes as a key responsibility, aiming to strengthen both sports ethics and social values. Their understanding of justice and morality focuses on fairness in competition and tolerance, while their self-awareness leads them to identify as Fair Play-compliant individuals. Viewing Fair Play as both a sporting attitude and a human value, coaches are committed to practicing it consistently and continuously improving within this framework. These comprehensive approaches demonstrate the adoption of Fair Play as both an educational tool and a way of life.

Women football coaches' perceptions of fair play behaviors toward them; the study examined women football coaches' views on Fair Play-oriented behaviors directed toward them. Coaches expressed diverse opinions and experiences regarding the demonstration of Fair Play behaviors. Some participants reported that Fair Play is widely practiced in the sports community and expressed satisfaction with the positive attitudes they encountered. For example, PFC1 stated, "I think Fair Play is widely practiced in many places," while PFC2 remarked, "Fair Play behaviors toward us on the field feel great," highlighting the positive effects of such attitudes. Similarly, PFC40 emphasized, "I believe there are plenty of Fair Play-oriented behaviors in women's football," drawing attention to an optimistic outlook.

However, some coaches believed that Fair Play is not fully implemented in the context of gender equality. PFC12 stated, "I don't think there is Fair Play toward women coaches. Women remain in the background," pointing to gender discrimination. Similarly, PFC16 remarked, "We see that Fair Play behaviors toward women football coaches are almost nonexistent," echoing a critical perspective. PFC36 elaborated further, "I think women face significant material and moral discrimination solely due to their gender. In some statements, women coaches are seen as weaker and inadequate, which creates pressure and attempts to establish authority over them. Therefore, Fair Play behaviors are not adequately demonstrated yet," emphasizing the impact on women.

Coaches also noted that societal perceptions of women influence Fair Play behaviors. PFC15 stated, "I think women coaches are judged regardless of their coaching knowledge, experience, or skills," indicating that women are evaluated more on their gender than their professional competence. PFC27 added, "While we strive to exist here through our profession, a maternal perception is formed because of our gender," highlighting the influence of societal roles on women coaches.

Finally, the view that Fair Play is a value dependent on personal attitudes was frequently expressed. PFC19 stated, "Fair Play doesn't work differently for men or women; it comes down

to the individual," emphasizing that Fair Play is independent of gender and reliant on individual attitudes. PFC21 supported this idea, saying, "It varies by person." Similarly, PFC25 remarked, "Fair Play doesn't differ between men and women; it depends on the individual's attitudes," underlining its basis in personal values.

In summary, women football coaches' perceptions and experiences regarding Fair Play demonstrate diversity. While some noted the prevalence of Fair Play behaviors in the sports community and their positive effects, others emphasized the incomplete application of these values in the context of gender equality and the discrimination faced by women coaches. Additionally, views emerged that Fair Play depends on individual attitudes rather than societal perceptions or gender roles. These findings highlight the need to address Fair Play from both personal and societal perspectives concerning women football coaches.

Suggestions for improving fair play behaviors; ın the study, women football coaches shared their opinions on the steps needed to cultivate a Fair Play spirit in individuals if they were given authority. Their suggestions for fostering and institutionalizing the spirit of Fair Play in society included a wide range of strategies, such as discipline, education, rewarding behaviors, equal opportunities, and raising awareness. These comprehensive approaches aim to ensure that Fair Play is embraced not only on the sports field but also across society.
Coaches emphasized the importance of discipline and enforcement. PFC31 stated, "I would impose stricter penalties," arguing for stronger measures against coaches who violate rules. Similarly, PFC35 noted, "I would not allow coaches with three penalties in the same season to continue coaching," highlighting the need to prevent repeated violations.

Coaches stressed the critical role of education and awareness in teaching Fair Play from an early age. PFC24 remarked, "Educating individuals at a young age is very important. Parents also need to be informed," emphasizing the involvement of families. PFC21 added, "Fair Play should be taught starting in elementary school," underscoring the importance of early education. PFC11 suggested, "I would organize seminars for coaches to teach Fair Play to their students," while PFC17 stated, "I would launch social media campaigns to raise awareness," highlighting the role of modern tools in awareness efforts.

Coaches frequently emphasized that Fair Play should be an inseparable part of sports. PFC3 stated, "Sports = Fair Play," emphasizing the intrinsic connection between the two. PFC22 noted, "Positive behaviors in victory and defeat should become habitual," pointing to the sustainability of Fair Play at all levels of sports. Similarly, PFC21 commented, "I would want Fair Play to be applied in every situation."

Support for women and equal opportunities were highlighted as contributing factors to strengthening Fair Play in society. PFC18 stated, "Women football coaches should be supported, and opportunities should be provided instead of criticism," while PFC19 added, "If equal opportunities are provided for women coaches, the spirit of Fair Play will also strengthen."

Sports psychology and media education were also identified as significant factors in promoting and sustaining the spirit of Fair Play. PFC32 noted, “I would ensure training on sports psychology for athletes,” emphasizing the importance of psychological support for athletes. PFC36 remarked, “I would provide training for broadcasters to strengthen the language of Fair Play in the media,” highlighting the media's role in fostering Fair Play values.

Women football coaches' suggestions for fostering the spirit of Fair Play and making it permanent in society encompassed discipline, education, awareness, equal opportunities, and media. They emphasized the need for effective use of disciplinary and enforcement mechanisms, the importance of starting education at an early age, and the inclusion of families in the process.

The use of social media and awareness campaigns was seen as a valuable tool, reflecting the importance of modern approaches to raising societal consciousness. Furthermore, support for women and equal opportunities were highlighted as critical for strengthening Fair Play, while the role of sports psychology and media in disseminating Fair Play values was also emphasized. These suggestions demonstrate the need to internalize Fair Play not only on sports fields but also in every aspect of society.

DISCUSSION AND CONCLUSION

Metaphorical perceptions of Fair Play demonstrate that participants have transformed it from an abstract concept into a tangible and meaningful framework. It is well-known that metaphors serve as an important cognitive tool in the process of understanding complex and abstract concepts (Lakoff & Johnson, 2008). In this context, metaphors such as "scale," which emphasize justice, highlight the ethical and moral dimensions of Fair Play. Similarly, the metaphor of "mirror" suggests that individuals' behaviors should find reciprocation, indicating that Fair Play is built on mutual reflection and honesty.

These findings align with the ethical behavior norms present in the sports ethics literature (Simon, 2016). Additionally, metaphors such as "water" and "sun" reflect Fair Play's representation of sustainability and positive value creation in sports. Metaphors like "child" and "friendship," which emphasize connection and relationships, support the view that women football coaches' professional ethics differ from male coaches in terms of professionalism and tolerance (Tuzer & Göksel, 2023). These findings illustrate that Fair Play is perceived not only as a sporting principle but also as a concept integrated with nature and human values.

Participants' self-assessments regarding their Fair Play-compliant behaviors indicate a high level of personal awareness and their adoption of Fair Play as both a personal and professional value. These results support studies that argue Fair Play is an applicable value not only in physical competitions but also in education and other aspects of social life (Culpan & Wigmore, 2010). However, evident issues of gender inequality and the limited exposure of women

football coaches to Fair Play behaviors highlight ongoing gender discrimination in the sports community.

Critiques of gender discrimination in the sports literature emphasize the need for greater support for women in sports management, coaching, and officiating (Claringbould & Knoppers, 2012). The experiences of women football coaches in this context reveal that the spirit of Fair Play must be supported by structural equality mechanisms, not just individual attitudes.

Coaches' recommendations for promoting the spirit of Fair Play include starting education at an early age, organizing awareness campaigns, and increasing equal opportunities for women. Findings that Fair Play should become a part of education align with literature emphasizing the role of sports in strengthening individuals' ethical values (Hellison, 2003). In the educational context, it is argued that athletes should develop not only physical skills but also ethical decision-making abilities (Arnold, 1994).

Women football coaches' determination to instill the spirit of Fair Play in their athletes highlights the importance of being role models in sports education. This finding aligns with Acording to Bandura's (1977) social learning theory, which suggests that the behaviors of coaches provide observable and learnable models for athletes (Bandura, 1977).

Recommendations regarding discipline and enforcement emphasize that Fair Play should be reinforced not only as an individual value but also as an institutional norm. The sports management literature highlights the role of effective sanctions against violations of fair play principles in preventing unethical behaviors (Chelladurai & Madella, 2006). Strengthening disciplinary mechanisms and disseminating the principles of sports ethics can contribute to the widespread adoption of Fair Play both on and off the field.

Participants also noted that Fair Play should be promoted through the media. The influence of social media in raising awareness is widely recognized in the literature (Hutchins & Rowe, 2012). Women coaches' suggestions for social media campaigns underline the role of modern communication tools in enhancing awareness of sports ethics. These recommendations suggest that Fair Play should be advocated not only as a physical activity but also on digital platforms.

The experiences of women football coaches in the context of gender equality highlight the need for Fair Play to be internalized at an individual level, independent of societal perceptions. However, gender inequality remains a barrier to the broader adoption of Fair Play in the sports community. Studies examining the relationship between gender equality and sports ethics emphasize the importance of creating an equitable sports culture (Knoppers & Anthonissen, 2008). In this regard, addressing Fair Play alongside gender equality would be a significant step in strengthening the ethical values of the sports community.

CONCLUSION

In conclusion, the findings of this study have provided a deep understanding of how Fair Play is perceived and embraced by women football coaches. Coaches view Fair Play not only as a sporting principle but also as a personal value and a societal norm. However, structural issues such as gender inequality pose significant barriers to the widespread adoption of Fair Play. This situation highlights the need for policies promoting gender equality in the sports community. The findings align with literature suggesting strategies such as introducing Fair Play through early education, promoting it at a societal level through awareness campaigns, and increasing equal opportunities for women. Comprehensive and holistic policies are required to ensure that Fair Play is embraced both at the individual and institutional levels.

Future research could explore perceptions of Fair Play across different sports and societal contexts, enriching the knowledge base in this area. Additionally, evaluating the impact of initiatives aimed at promoting the spirit of Fair Play could lead to more effective approaches in sports ethics education.

Conflict of interest: As the authors of this article, we declare that there is no personal or financial conflict of interest within the scope of this study.

Declaration of Contribution of Researchers
Research Design- MAH, GT, Collection of Data- MAH, statistical analysis- MAH; Preparation of the manuscript, MAH; GT.

Ethichs Approval
Ethichs Committee: Karamanoğlu Mehmetbey University Rectorate Social And Human Sciences Scientific Research And Publication Ethics Committee
Date/ Protocol Number: 23.10.2024- 222102

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Bibliometric Analysis of Emotions in Sports

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Abstract

This study explores the historical development of the concept of emotions in sports and related topics. For this purpose, the bibliometric features of research on emotions in sports were analyzed using the Biblioshiny interface in the R programming language. Emotions in sports were identified through publications in the Web of Science (WOS) database, visualized, and interpreted using bibliometric analysis. This study yielded information on emotions in sports, including the beginnings of research on this topic, author contributions, the most frequently used words on the subject, and citation indices by country. According to the results obtained from the WOS database, there were 1,030 articles published between the years 1985-2024 authored by a total of 3,104 researchers, the most productive among them being Martinent. The most widely used words on the subject were "sports", "performance", and "stress". In recent years, the most frequently studied topics related to emotions in sports were interpersonal violence, emotional labor, science, and multidimensional perfectionism. We believe that this study will be of assistance to researchers wishing to analyze emotions in sports as well as shed light on related research topics.
Keywords: Sport, Emotion, Bibliometrics, Biblioshiny, WOS

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INTRODUCTION

Throughout history, the specific emotions underlying human behavior have been a subject of curiosity. More recently, emotions have been interpreted as the fundamental component that forms the basis of human behavior, allowing the individual to reflect his/her inner world (Erkuş & Günlü, 2008). Emotions play an important role in an individual's life and motivations (Matsumoto et al., 2013) and serve a critical function in an individual's taking action, directing his or her behavior (Akçay & Çoruk, 2012). In addition, emotions are considered the major basis for relationships between people, determining how individuals will behave in the face of events and their reactions in accordance with their chosen behavior, and play a regulatory role in social relationships (Konrad & Handl, 2003).

Emotions, which constitute an influential component in human life and direct the individual's behavior, are also of major importance in the sports environment. Competitive situations, such as those created by the sports environment, can affect an individual's emotional state (Güler, 2019). Sports, a critical element in socialization, allow individuals to express their emotions through the games, movements, and challenges involved therein (Şahan, 2008). Emotions have played a key role in research in the field of sports psychology. For example, emotions have been linked to motivation (Izard, 1993), decision-making (Schwarz, 2000), attention (Eysenck et al., 2007), perception (Phelps et al., 2006), and performance (Erez & Isen, 2002). Emotions have been interpreted as the reactions of the athlete to the events he/she experiences in the sports environment (Ağça, 2019). When the relationship between athletes' emotions and performance is examined, the importance of emotions emerges yet again. Indeed, studies have indicated that emotions strengthen the individual's communication with teammates (Ağça, 2019) and that emotions such as anger and happiness are associated with increased performance (Rathschlag & Memmert, 2014; Woodman et al., 2009). Furthermore, a decrease in anxiety level has been found to improve performance (Zaichkowsky & Kamen, 1978), cognitive anxiety has been shown to negatively impact performance, which somatic anxiety also does by affecting fine motor skills (Lavallee et al., 2004), and positive emotions enhance performance, while negative emotions impair performance (Moen et al., 2019).

In light of the above findings, the relationship between emotions and performance has clearly been demonstrated. From a theoretical perspective, the most widely accepted model of this relationship is the Individual Zone of Optimal Functioning (IZOF). This model addresses the functionality of emotions, declaring emotions to be functional for performance within a certain zone of intensity (Hanin, 2000). Arguing that the intensity of emotions may vary according to individual differences, IZOF is concerned with an emotion being at a minimum or maximum level, rather than the specific domain in which the individual experiences the emotion (Robazza, 2006). Drawing attention to individual differences, Hanin states that while a given emotion may be functional for a certain athlete, improving his/her performance, the same emotion may not be functional for another athlete (Hanin, 2000). This situation requires athletes to know themselves and understand their individualized emotional states. The IZOF model also considers that negative emotions may be necessary for performance as well, while acknowledging that they are functional when at a low level (Hanin, 2000; Robazza, 2006).

The present study examined the importance of emotions guiding the behaviors of individuals in their daily lives within the context of sports. With this objective in mind, we aimed to bring a holistic perspective to past, present, and future literature on the concept of emotions in sports based on our bibliometric analyses conducted on this topic.

METHODS

Study Design

In this study, a bibliometric analysis was performed of articles regarding emotions in sports according to descriptive information obtained from the Web of Science database via the R application. The Web of Science (WOS) database was chosen because, in addition to its extensive data network representing numerous different disciplines, it assists researchers in obtaining in-depth information concerning their research topic and provides opportunities for visualization, mapping, and multi-dimensional analysis. The criterion-based sampling technique was used to determine the article group that will be the subject of this research. The basic criterion employed in this method is articles scanned in the Web of Science database focusing on the topic of emotions in sports. The selection criteria in the study are, accordingly, detailed in line with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol depicted in Figure 1.

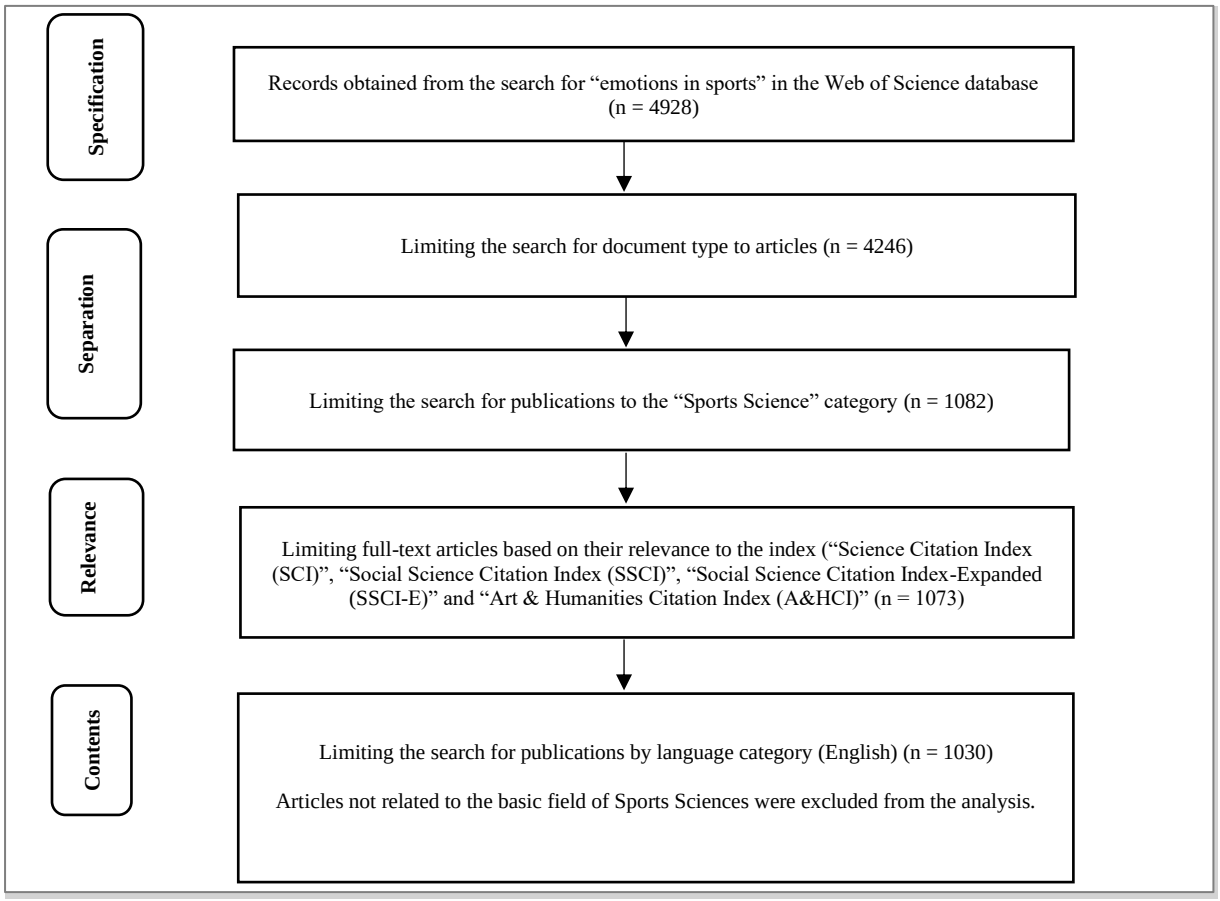

Figure 1. PRISMA flowchart

As shown in Figure 1, a total of 4,928 records resulted from the initial searches pertaining to emotions in sports. Bibliometric analysis was conducted using 1,030 studies

obtained by considering the criteria determined by the researcher (document type, category, index, language). Both descriptive and evaluative bibliometric methods were employed in this study. While the descriptive bibliometric method aims to reveal distribution and trends in the literature on the topic based on authors and their numbers, languages, publication years of the articles, subject content, etc., the objective of the evaluative bibliometric approach is to reveal the relationships between the variables in the relevant literature (Osareh, 1996).

Data Analysis Technique

The primary objective of this study was to uncover field-specific relationships based on the term "emotions in sports" by employing bibliometric analyses predicated on the social network analysis method. The latter approach enables researchers to determine the main sources and individuals in a categorized field, revealing the association between the variables and presenting this relationship visually (Freeman, 2004; Güzeller & Çeliker, 2018; Newman, 2001).

Bibliometrics, which is capable of performing numerous analyses, was utilized for the social network analysis discussed in the study. The data was converted and uploaded to the R data frame using bibliometrics. The studies that met the data inclusion criteria and were covered within the scope of the study were transferred to bibliometrix, an extremely useful and widely employed program compatible with the Biblioshiny program, via the R programming language (Moral-Muñoz et al., 2020). Thanks to this software, the literature on the subject of emotions in sports could be displayed.

RESULTS

In this section, basic information pertaining to the topic of emotions in sports discussed in this study is summarized.

Table 1. Basic information

Data	Results	Authors	Results
Time period	1985-2024	Total number of authors	3104
Sources	108	Documents with one author	70
Publications (document)	1,030	Documents with multiple authors	3034
Mean number of publications per year	7.99	Number of documents per author	0.33
References	34,674	Number of authors per document	3.01

According to the information presented in Table 1, research in the WOS database on emotions in sports covers a period starting in 1985 and continuing until the present (ending on the date that our analysis was conducted, September 10, 2024). A total of 108 sources and 1,030 publications related to the concept of emotions in sports were found for the specified period. The mean annual number of publications for this period is 7.99, with 34,674 sources referenced in the articles themselves. In terms of authors, a total of 3,104 researchers have worked on this subject, while the analysis revealed that the numbers of single-authored and multiple-authored articles were 70 and 3,3034, respectively. In addition, the mean number of articles per author was determined to be 0.33 while the number of authors per article averaged 3.01.

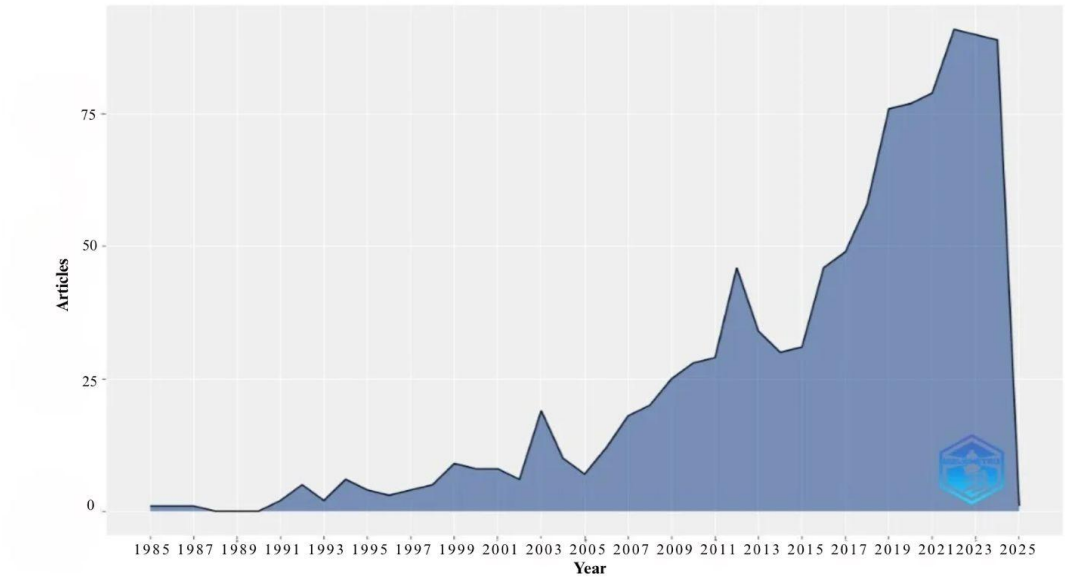

Figure 2. Scientific productivity graph

Figure 2 shows the number of articles specific to "emotions in sports" published each year between 1985 and 2024. While the subject of emotions in sports exhibited fluctuations in popularity throughout this period, since 2015 there has been a notable increase in the number of studies published on this topic, which reached its peak in 2022.

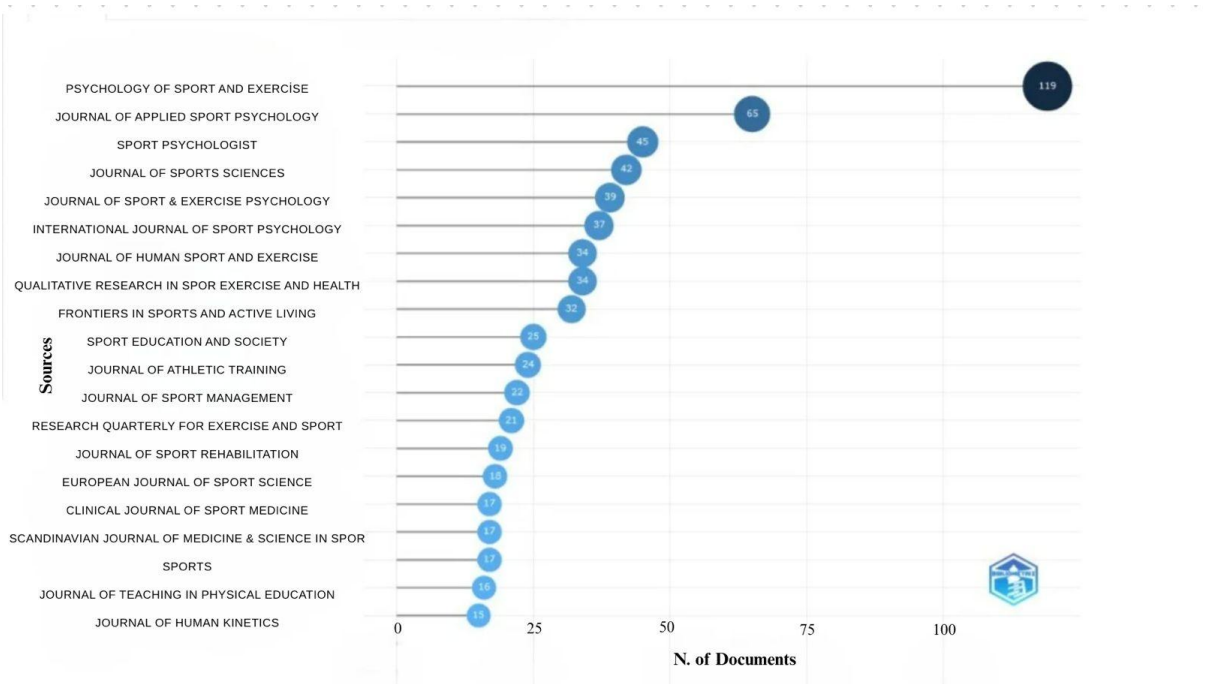

Figure 3. Relevant journals and publication numbers

Figure 3 provides a list of the journals that have published the most on the subject of emotions in sports, including the number of articles for each. According to this list, the journal with the most publications on this topic is "Psychology of Sport and Exercise", with 119 articles. The journal with the second largest number of relevant publications is the "Journal of Applied Sport Psychology", while "Sport Psychologist" ranks third.

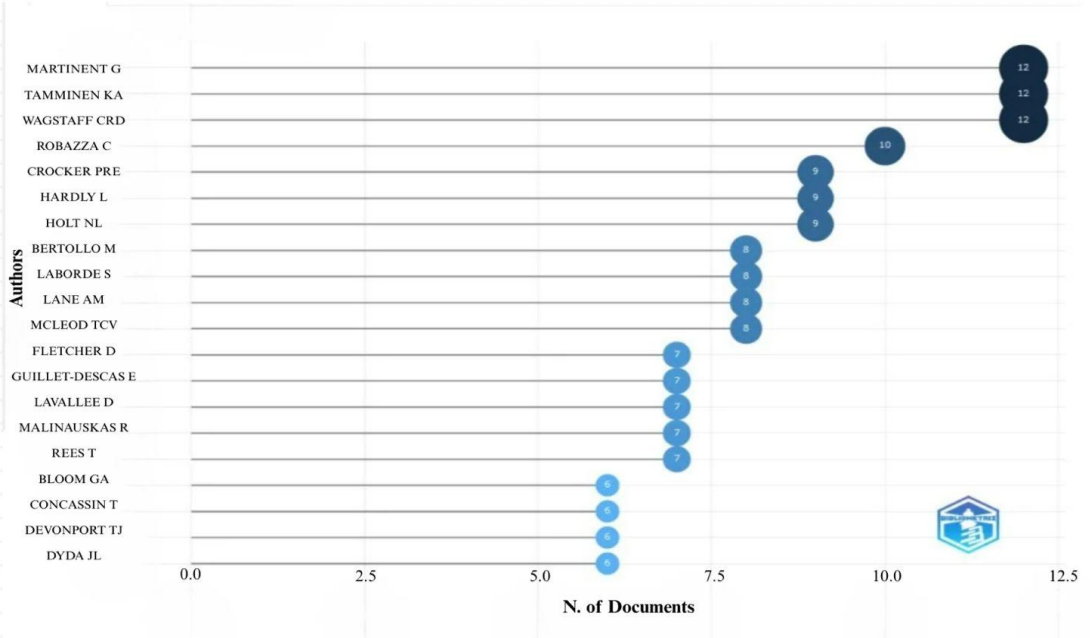

Figure 4. Authors' publication numbers

The authors with the greatest number of articles on the topic of emotions in sports, with twelve publications each, are Martinent, Tamminen, and Wagstaff, followed by Robazza with ten. Based on the number of their publications, these researchers may be considered major contributors to this subject.

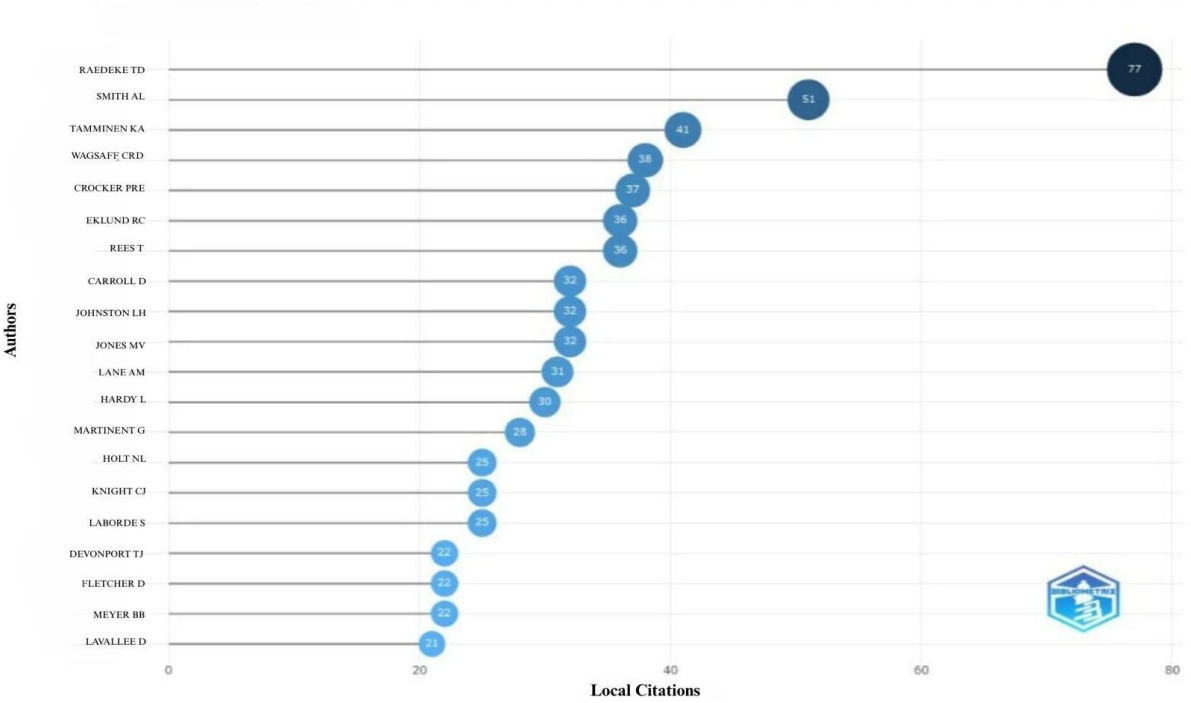

Figure 5. Authors' citation counts

According to Figure 5, Raedeke is the most cited author, with a total of 77 citations. The author with the second highest ranking based on number of citations is Smith (51), followed by Tamminen (41) in third place and Wagstaff (38) in fourth.

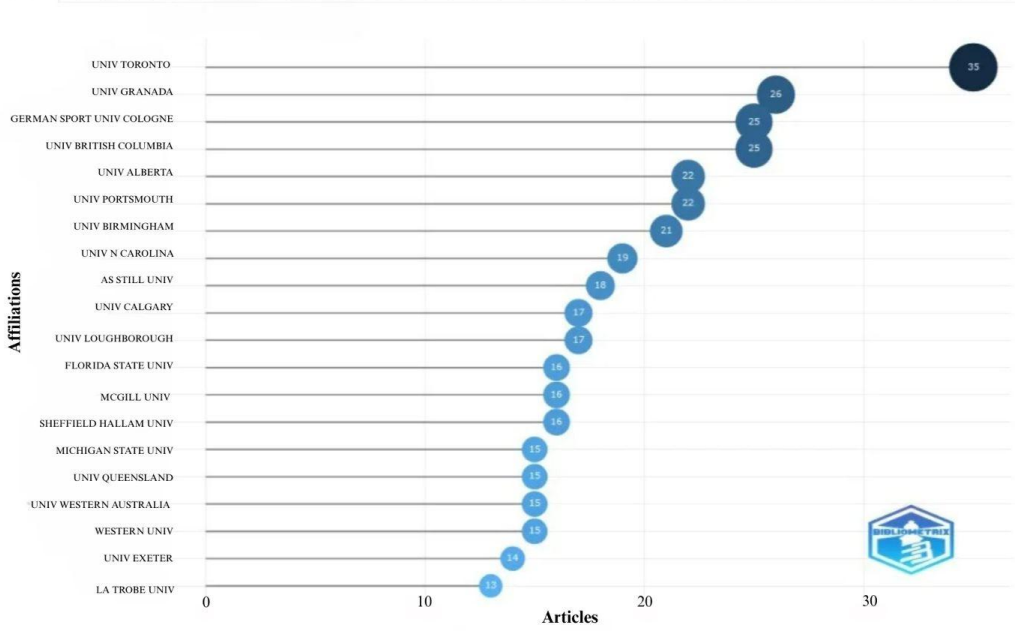

Figure 6. Publication numbers of institutions

Concerning the number of publications on emotions in sports, the University of Toronto ranked highest, with 35 publications, while the University of Granada placed second (26). The German Sport University Cologne and the University of British Columbia share third place with 25 publications each.

Figure 7. Most frequently used words

As shown in the distribution of the most frequently used words (in order of preference) on the topic of emotions in sports (Figure 7), "sport" ranked first with 13%, followed by "performance" (9%) and "stress" (4%).

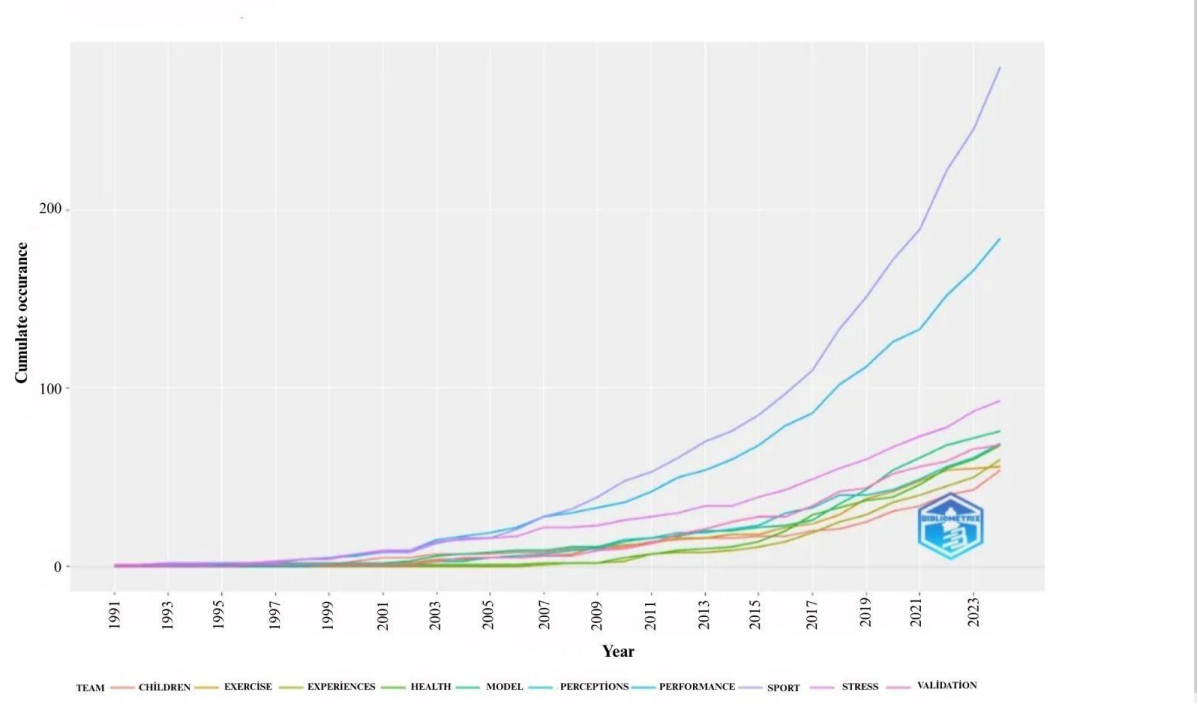

Figure 8. Word usage by year

Figure 8 depicts the cumulative occurrences of the ten most frequently employed words by year for the period between 1991-2024. According to this data, the word with the greatest increase in usage is "sport", followed by "performance", with "stress" in third place.

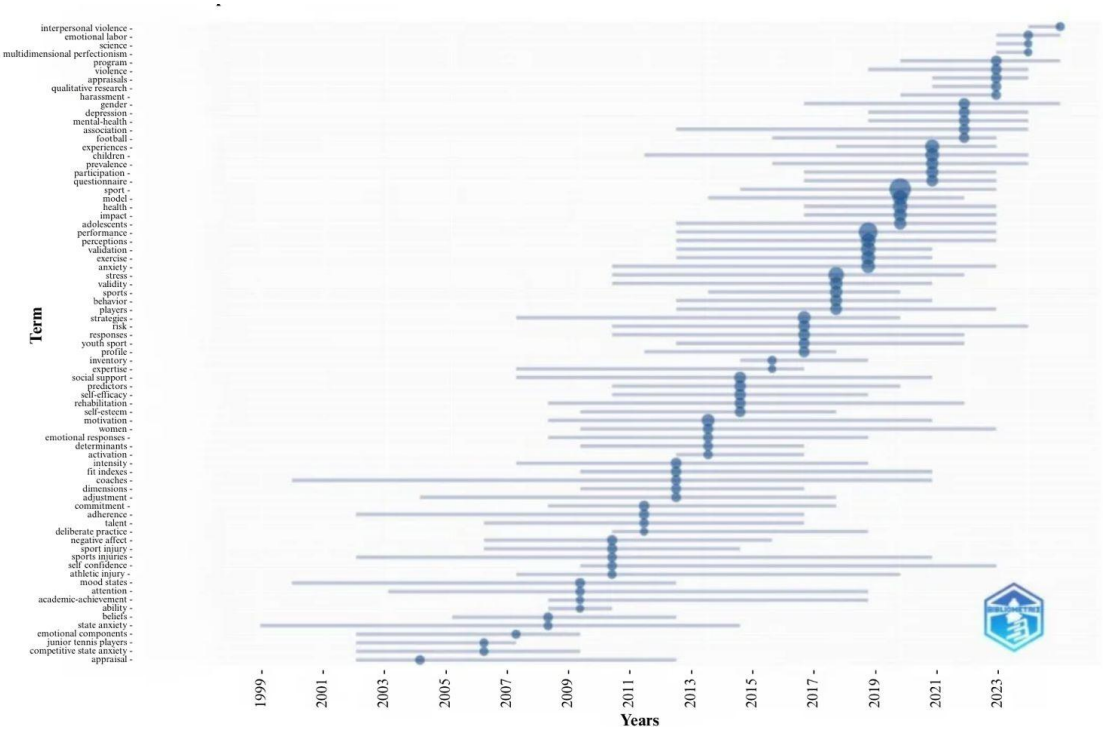

Figure 9. Concentration of terms used by year

As shown in Figure 9, which presents the concentrations of words/terms employed on the subject of emotions in sports by year, "sport", "model", "impact", "adolescents", and "performance" were used extensively in 2018 and 2019. In more recent years, there has been concentrated use of the terms "interpersonal violence", "emotional labor", and "science".

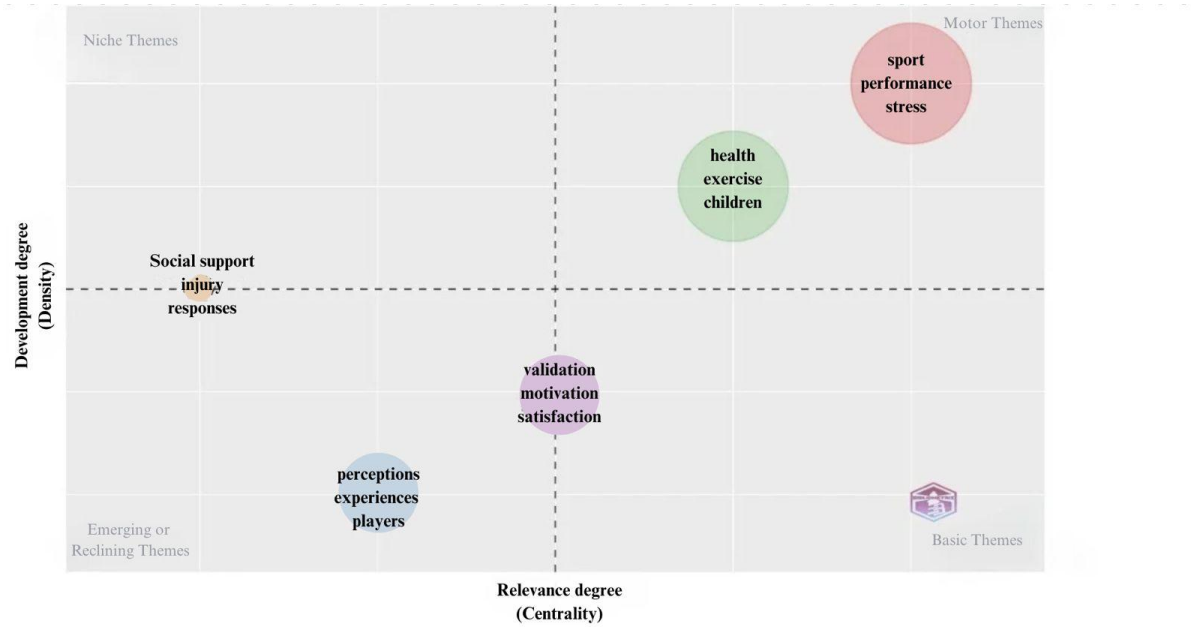

Figure 10. Thematic map

Figure 10 presents a thematic map of the sphere of emotions in sports showing the main areas in which the analysis was conducted as well as areas that were used less. According to this figure, the themes in the upper right quadrant (sport, performance, stress, health, exercise, and children) are considered motor themes in this field and are developed, whereas those represented in the lower left quadrant (perceptions, experiences, player, social support, injury, and responses) are underdeveloped, original themes.

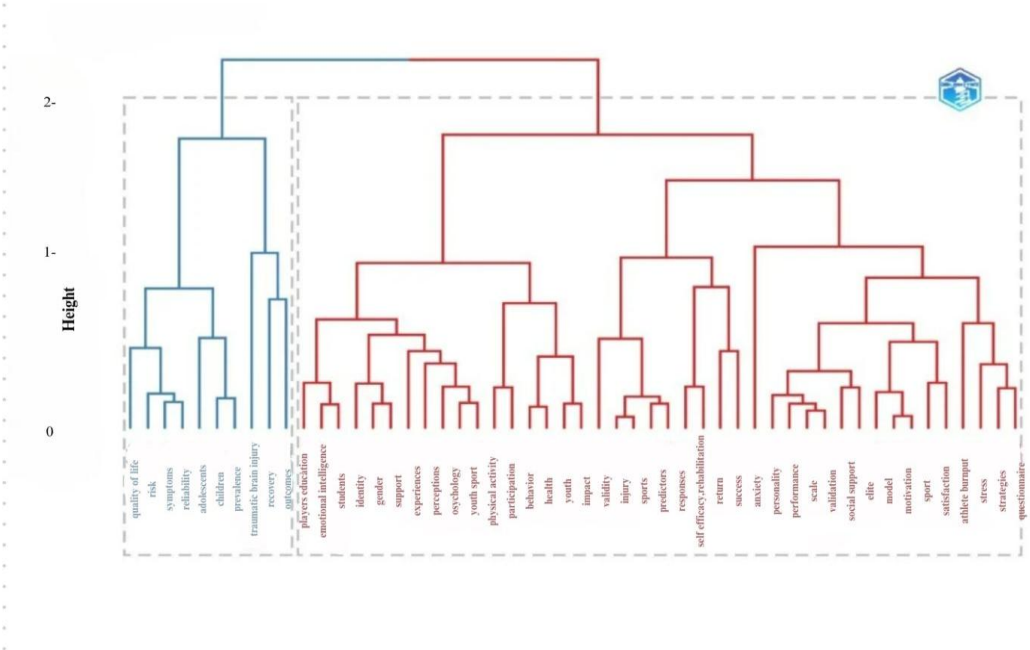

Figure 11. Differential hierarchical clustering of emotions in sports

Hierarchical clustering, which aims to separate observations into different subgroups according to their similarities, is represented by two types. Unifying hierarchical clustering allows the observation to form a cluster with the observation closest to it. In the second type, separating hierarchical clustering, the observation, which is initially considered a single cluster, is

separated into independent clusters until it forms a single observation (Özkan, 2008). As depicted in Figure 11, the cluster, which was initially considered "emotions in sports", is first divided into two different clusters and then further divided into different clusters within itself. The factors of the first cluster, formed as a result of the separation of emotions in sports into two clusters, are revealed to consist of such units as "quality of life", "risk", "symptoms", and "recovery". The second cluster exhibits a wider similar observation structure and is comprised of more subclusters; units such as "sport", "stress", "success", "exercise", and "players" are prominent. In light of these data, the first cluster can be interpreted as focused on the issue of emotions in sports in the form of general health, while the second cluster addresses the role of emotions during participation in sports/competitions.

DISCUSSION AND CONCLUSION

The data obtained within the scope of this study utilizing bibliometric analysis was visualized in order to reveal the structure of research on emotions in sports and its development over time. Studies accessed in the WOS database were included in the research. A search was conducted for the term "emotions in sports" in the database in question, uncovering 4,928 studies between the years 1985-2024. Based on criteria determined by the researcher, 1,030 articles were obtained using the Biblioshiny interface via the R programming language.

As exhibited in the scientific productivity graph for "emotions in sports", the research conducted showed fluctuating progress starting in 1985, with a sharp increase after 2015 and a peak in 2022, the most productive year on the subject. With today's technology, all of the factors necessary for an athlete to deliver optimal performance in the sports environment can be taken into consideration. Of these factors, perhaps the most consequential is the athlete's emotions. With the emergence of the understanding that athletes' emotions are of critical significance, together with developments in science stressing the importance of emotions, studies in this area have proliferated. From this point on, we can conclude that the value accorded to sports, athletes, and their emotions is on the rise and will carry even greater weight as of 2022.

The journals "Psychology of Sport and Exercise", "Journal of Applied Sport Psychology", and "Sport Psychologist" hold the top three places in the ranking of journals publishing on the subject of emotions in sports. The journal in first place, "Psychology of Sport and Exercise", is the official journal of the European Sports Psychology Federation, is scanned in major international indices, enjoys a speedy publication process and high visibility, covers a broad spectrum of topics in the fields of sports, psychology, and health, and is open to the use of various methodological approaches, all of which may contribute to its high ranking. The journal that placed second, "Journal of Applied Sport Psychology", has a high number of issues published per year, is open-access, and also incorporates methodological diversity. The journal ranked third, "Sport Psychologist", which also allows for various methodological approaches and has a high number of annual publications, focuses on providing psychological services to coaches and athletes, and is designed to be open to practitioners such as coaches with training in sports psychology, as well as sports psychology experts.

The authors who contributed most to the subject of emotions in sports, by publishing the most extensively, were Martinent, Tamminen, and Wagstaff, in that order. Martinent has conducted research in many different fields such as applied psychology, health psychology, sports science, exercise psychology, emotions, and emotion definition, a fact which may explain his top ranking. Tamminen, on the other hand, completed his undergraduate studies in psychology and his master's and doctoral studies in sports sciences. Considering that he received his training at different universities, it is expected that he would have experience with various research methods, together with a wider perspective. In addition, he is a consultant on sports psychology in various disciplines such as football, hockey, curling, volleyball, basketball, and dance. These factors may have contributed to his second-place ranking on the list of the most-published authors on this topic. Wagstaff's active work in the field, being both involved in sports and working with athletes as a practicing psychologist, has been of service to the research he has conducted on the subject. Concerning the authors with the most citations, the top rankings are held by Raedeke and Smith. These researchers' broad field of study and more active role in collaborative work, as well as publishing in different countries such as Turkey, Japan, the United States, and Sweden, may have increased the visibility of their research. Considering this situation, they may have taken the top two places in the citation ranking as a result of more authors from different countries accessing their research.

Further information uncovered within the scope of this research is word usage by year, specifically, the terms employed under the rubric of "emotions in sports" and their usage status. By the year 2024, the most widely used word is revealed to be "sport", followed by "performance" and "stress". Studies have clearly stated that the emotional states of athletes affect their performance (Asakawa, 2004; Fournier et al., 2007). The effect of emotions in the sports environment may have emerged as a research topic as a result of the acknowledgment of this situation by researchers, which would explain the increased prevalence of the words "sports" and "performance". In addition, considering how positive and negative emotions both affect performance, the stress conditions of athletes are also studied, and related terms are widely used in searches.

According to the thematic map, in which the themes considered basic within the sphere of "emotions in sports" are presented together with relatively less developed themes, the motor themes are "sport", "performance", "stress", "health", and "exercise", whereas "social support" and "injury" represent less developed themes compared to the motor themes. This situation may be due to the fact that words such as "performance" and "stress" have an immediate and direct effect on the field. On the other hand, the terms "social support" or "emotional state", which are thought to affect athletes during the preparation process for the sports environment, will not have a clear impact on performance, while the subject of injury is less studied, remaining in the background of this field.

In summary, this study provided information concerning research on emotions in sports between the years 1985-2024 scanned in the WOS database, including the leading authors in the field, the status of the words/terms used, and the core journals involved. Upon performing a literature review, no research on "emotions in sports" was found using the bibliometric method with the WOS database, which thus adds to the originality of the present study. In addition, since this research includes basic information on the field of emotions in sports and

identifies important sources that can be accessed, this study can be considered a useful information guide for researchers.

There are limitations to the present research. For example, the search, which was limited to articles on emotions in sports, only utilized the Web of Science database, with English as the sole language selected for the articles. We recommended that future research be conducted more comprehensively by employing different databases and performing a wider source search, to include books, conferences, and magazines.

Conflicts of Interest: There is no financial or personal conflict of interest on the part of the authors in this study.

Authors' Contribution: The authors contributed equally to all phases of this research. Research Design - AMÖ; FÇ, Data Collection - AMÖ; FÇ, Statistical Analysis - AMÖ; FÇ; NBU, Manuscript Preparation - AMÖ; FÇ; NBU.

Ethical Approval: Bibliometric research does not require ethical committee approval.

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The Acute Effects of Different Rest Intervals on 20-Meter Sprint Performance After Sled Push Training*

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Abstract

This study examined the effects of varying rest periods on 20 m sprint performance following a single sled push with 50% of body weight (BW). Eighteen male participants from Istanbul Gelisim University voluntarily took part. On the first day, participants performed an 18 m sled push with 50% BW, followed by 10 and 20 m sprints conducted randomly after 15 seconds, 1-minute, and 3-minute recovery times. On the second day, participants performed three sprints at the start, followed by sled pushing and recovery periods of 5, 7, and 9 minutes in random order, after which 10 and 20 m sprint times were measured. The analysis revealed a significant decline in 20 m sprint performance after 15 seconds of rest compared to baseline ($p < 0.001$, $\eta^2 = 0.317$). However, performance improved significantly with 3 minutes of rest, returning to levels close to baseline ($p > 0.05$). The results indicated that a single sled push with 50% BW did not acutely enhance sprint performance via the post-activation potentiation (PAP) effect. Furthermore, it was observed that the 18 m sled push exercise had no detrimental impact on 20 m sprint performance after recovery periods of 3, 5, 7, or 9 minutes. In conclusion, coaches can incorporate a 3-minute recovery period following sled pushing with 50% BW as part of a complex training method, ensuring sufficient recovery for subsequent sprint exercises.

Keywords: Post-activation potentiation, Rest interval, Sprint, Sled pushing

* This study was presented as a paper at the 5th International Athletic Performance and Health in Sport Congress.

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INTRODUCTION

Running speed is a fundamental component of physical performance in many team sports, such as football, basketball, and rugby (Kawamori et al., 2014). When analyzing match performance in team sports (e.g., football, basketball), it is evident that most sprints consist of short runs of 10–20 meters lasting 2–3 seconds (Loturco et al., 2019; Spencer et al., 2005). This highlights the importance of acceleration ability—the capacity to rapidly increase running speed over short distances—as a critical variable for team sports (Monahan & Egan, 2023). Various training methods are used to develop sprint and acceleration abilities during physical preparation and competition phases. These methods can be categorized into two main groups: sprint-specific and non-sprint-specific training (Moran et al., 2017). Sprint-specific training includes exercises that closely mimic the mechanics and direction of sprinting (e.g., horizontal movements).

In contrast, non-sprint-specific training combines resistance and plyometric exercises applied in different movement patterns across all directions, predominantly vertical (Cahill et al., 2019). Recent studies investigating the effects of sprint-specific and non-sprint-specific training on sprint performance have indicated that sprint-specific training may be a more effective method, particularly for improving short-distance acceleration ability (Petrakos et al., 2016; Rumpf et al., 2016). Sled push and pull exercises involving horizontal movements with added weights are among today's most commonly used sprint-specific training methods (Nick et al., 2021). The mechanical theory behind weighted sled training is primarily based on adding an external load to the sprint movement, increasing the ground reaction force (GRF) during each step's ground contact phase. Repeated application of this increased GRF during training triggers specific adaptations within the neuromuscular system, producing more excellent horizontal ground reaction force. This, in turn, is theorized to enhance stride length and improve sprint performance under unloaded conditions (Cronin & Hansen, 2006). In line with this, a recent systematic review and meta-analysis found that resisted sled training is more effective for developing the acceleration phase, which occurs over short durations and distances, compared to the maximum speed phase of running (Alcaraz et al., 2018).

Post-activation potentiation (PAP) is defined as a phenomenon characterized by an acute performance enhancement following a maximal or near-maximal preload activity (e.g., 90% back squat lift) (Lizana et al., 2022). Within the context of this phenomenon, it is suggested that both fatigue and a state of readiness co-occur after a preload activity. However, as fatigue subsides more quickly than readiness, a temporary improvement in performance due to the continued state of readiness is observed (Rassier & Macintosh, 2000). Research has shown that the optimal balance between fatigue and readiness is influenced by muscle strength-to-mass ratio, recovery time, individual muscle fiber distribution, power-to-strength ratio, and training status (Seitz & Haff, 2016). They apply plyometric (explosive) exercises combined with biomechanically similar high-intensity exercises after a preload, called complex training (Ebben, 2002). From a physiological perspective, complex training is based on the principle of post-activation potentiation (Lizana et al., 2022; Matusiński et al., 2021).

From a mechanical perspective, complex training combines maximal strength and explosive exercises requiring rapid force production within a single training process. This allows athletes to train across a broader range of the force-velocity spectrum (Pareja-Blanco et al., 2021). In this context, studies examining the effects of both post-activation potentiation (PAP) and weighted sled push exercises on sprint performance have gained attention in recent years. Considering the variability of PAP effects among individuals, identifying training approaches that optimize this phenomenon has become an important research area (Seitz & Haff, 2016). PAP is believed to vary based on factors such as the load applied, recovery durations, and the type of exercise performed (Wilson et al., 2013). Exercises like weighted sled pushes, which are biomechanically similar to sprinting and have the potential to enhance horizontal force production, are thought to induce PAP effects, particularly in short-distance sprints (Alcaraz et al., 2018; Petrakos et al., 2016). However, the literature has no consensus regarding the acute effects of sled push exercises with different loads and recovery durations (Wilson et al., 2013). For instance, a study by Rodríguez-Rosell et al. (2022) indicated that sled pushes with 40% of body weight significantly improved sprint performance, while Grimes et al. (2021) observed no significant changes in sprint performance with sled pushes at 50% and 100% of body weight (Grimes et al., 2021; Rodríguez-Rosell et al., 2022). Therefore, optimizing the mechanical loading parameters and recovery durations of sled push exercises to enhance sprint performance is crucial. Understanding how different recovery durations influence the balance between fatigue and readiness plays a significant role in interpreting their impact on sprint performance (Rassier & Macintosh, 2000). Based on this premise, our study aimed to investigate the acute effects of a single sled push at 50% of body weight on 20-meter sprint performance across different recovery durations.

Hypothesis H1: Sprint performance will decrease following a sled push exercise at 50% body mass with a 15-second recovery period.

Hypothesis H1: Sprint performance will improve following a sled push exercise at 50% body mass with recovery periods of 3, 5, 7, and 9 minutes.

METHOD

Research Model

This study was structured within an entirely experimental design framework, utilizing a crossover model based on repeated measures.

Research Groups

The study included 18 voluntary participants between 18 and 35 years of age who were students at Istanbul Gelişim University (Table 1). The participants had no health issues, were physically active, and had no injuries.

Table 1. Descriptive statistics

Descriptive Statistics	*N*	*M*	*SD*
Age	18	21.13	2.13
Height (cm)	18	177.6	1.6
Weight (kg)	18	72.5	2.5

N: Number of participants, SD: Standard Deviation, M: Mean

Data Collection Tools

Height measurements were conducted using a stadiometer (Holtain, UK) with an accuracy of ±0.1 mm, mounted on a wall. The height of the stadiometer's headpiece from the floor was verified using a 60 cm standard aluminum rod. Body weight measurements were conducted with an electronic laboratory scale with an accuracy of ±0.1 kg, following recommended procedures in the literature. Kinematic measurements were performed using the Smartspeed system. Timing gates for the Smartspeed device were positioned at 10 and 20 meters, 1.5 meters apart, and aligned parallel (Sinclair et al., 2021). Data collected by the Smartspeed photocell system were recorded via its mobile software.

Ethics Approval

Before starting, the approval of the Ethics Committee of Istanbul Gelişim University, dated October 30, 2024, and numbered 2024-15-87, was obtained.

Collection of Data

The study was conducted in the laboratories and sports facilities of Istanbul Gelişim University. Before measurements began, all participants were verbally and visually informed about the study. They were then familiarized with the exercises and protocols used during the study. Prior to training, participants performed a warm-up routine that included a 5-minute run at 6.5 km/h, followed by ten repetitions of lunges, good mornings, three-way lunges, spiderman crawls, bear crawls, skipping, knee drives, and two dynamic warm-up exercises of their choice. Finally, participants performed progressively increasing sprints at 20%, 40%, 60%, and 80% intensity, completing the warm-up protocol. On the first day of the study, participants' height, weight, and maximal sprint speeds were measured in three trials. The highest value was recorded if the trials exceeded the statistical reliability thresholds (CV > 90%, ICC > 70%). Participants then performed an 18-meter sled push exercise at 50% body mass, followed by 10- and 20-meter sprints after 15 seconds, 1 minute, and 3 minutes of recovery. On the second day, participants completed three sprints to establish reliability values. Afterward, recovery periods of 5, 7, and 9 minutes were applied following the sled push, and 10- and 20-meter sprint times were measured. A 10-minute recovery period was provided after each sled push and sprint session.

Analysis of Data

Mean, standard deviation, and coefficient of variation (CV) were reported for each sprint variable. The Shapiro-Wilks normality test confirmed the variables' normal distribution, allowing for parametric tests in statistical analysis. Levene's test for homogeneity of variances verified the suitability for ANOVA analysis. Repeated measures ANOVA was used

to assess temporal changes, with Bonferroni post-hoc comparisons identifying specific time points of change. Cohen's η^2 effect sizes were reported, categorized as small ($\eta^2 \geq 0.01$), medium ($\eta^2 \geq 0.06$), or large ($\eta^2 \geq 0.14$). P-values less than 0.05 were considered statistically significant. All statistical analyses were performed using the R programming language.

FINDINGS

The repeated measures ANOVA analysis of the results obtained at different time intervals (0 min, 15 sec, 1 min, and 3 min) revealed statistically significant differences in the 20-meter sprint test. A Post Hoc Comparison was conducted to identify the specific time intervals where these differences occurred. The Post Hoc Comparison results indicated that the sprint times at 15 seconds differed significantly from the 20-meter baseline values. Additionally, the sprint times recorded at 3 minutes differed significantly from those at 15 seconds.

Table 2. ANOVA analysis results for repeated measures

Status	Sum of Squares	df	Mean Square	F	p	η^2_p
0.min-15.sec-1.min-3.min differences						
10m	0.100 [a]	3 [a]	0.033 [a]	2.219 [a]	0.093 [a]	0.085
20m	0.234 [a]	3 [a]	0.078 [a]	11.151 [a]	< .001 [a]	0.317
0.min-5.min-7.min-9.min differences						
10m	0.019 [a]	3 [a]	0.006 [a]	1.962 [a]	0.127 [a]	0.076
20m	0.015 [a]	3 [a]	0.005 [a]	1.288 [a]	0.285 [a]	0.051

Table 3. Descriptive values and Post Hoc comparison results

			95% GA			
		Mean	Upper	Lower	SD	CV
Sprint 10m	1 min later	1.831	1.932	1.731	0.257	0.140
Sprint 10m	15 sec later	1.834	1.874	1.794	0.101	0.055
Sprint 10m	3 min later	1.766	1.805	1.727	0.099	0.056
Sprint 10m	5 min later	1.756	1.801	1.711	0.114	0.065
Sprint 10m	7 min later	1.748	1.795	1.700	0.122	0.070
Sprint 10m	9 min later	1.728	1.778	1.678	0.127	0.074
Sprint 10m	Baseline	1.769	1.797	1.742	0.099	0.056
Sprint 20m	1 min later	3.141	3.211	3.071	0.179	0.057
Sprint 20m	15 sec later	3.200	3.258	3.142	0.147	0.046
Sprint 20m	3 min later [β]	3.084	3.121	3.047	0.094	0.031
Sprint 20m	5 min later	3.063	3.112	3.013	0.127	0.041
Sprint 20m	7 min later	3.062	3.109	3.015	0.119	0.039
Sprint 20m	9 min later	3.048	3.094	3.002	0.117	0.038
Sprint 20m	Baseline [Ψ]	3.083	3.119	3.046	0.131	0.042

[Ψ] Sprint times at 15 seconds are statistically significantly different from the 20m baseline values.
[β] Sprint times at 3 minutes are statistically significantly different from those at 15 seconds.

The temporal changes in 10-meter sprint times for 0 min, 15 sec, 1 min, and 3 min are presented in Figure 1, while the temporal changes in 20-meter sprint times for the same intervals are shown in Figure 2. Furthermore, the temporal changes in 10-meter sprint times

for 0 min, 5 min, 7 min, and 9 min are presented in Figure 3, and the temporal changes in 20-meter sprint times for the same intervals are shown in Figure 4.

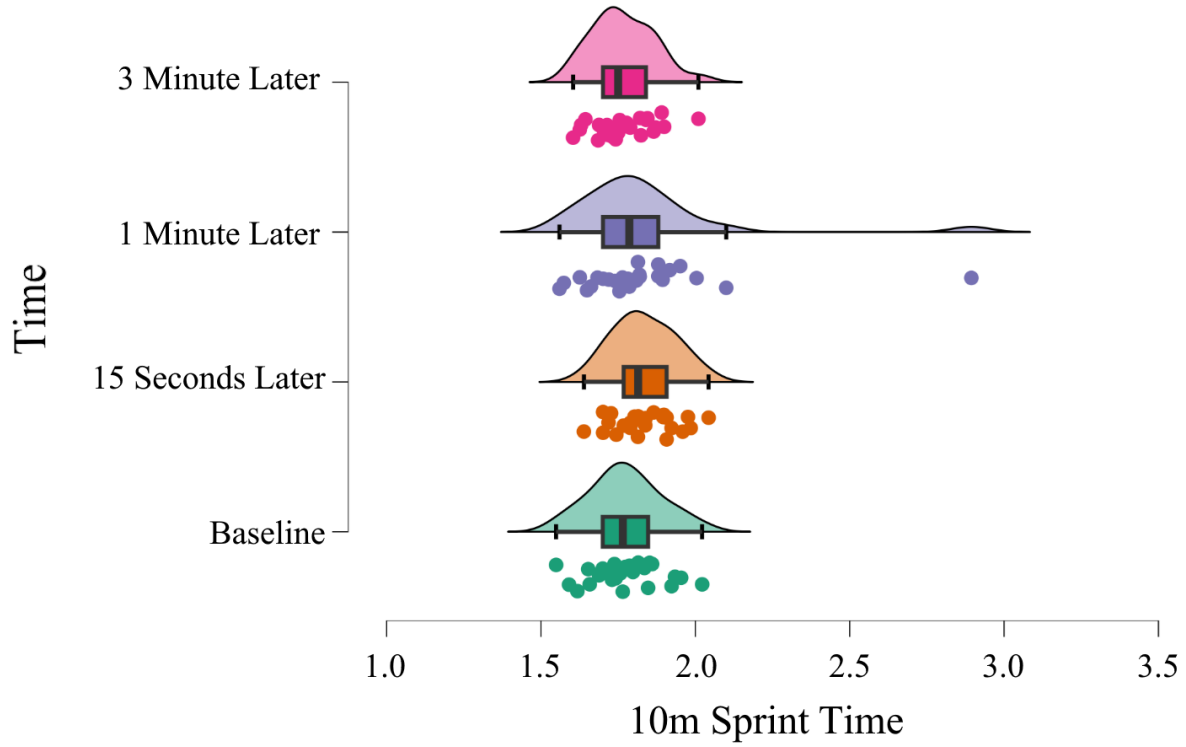

Figure 1. Temporal changes in 10-meter sprint times 0.min-15.sec-1.min-3.min

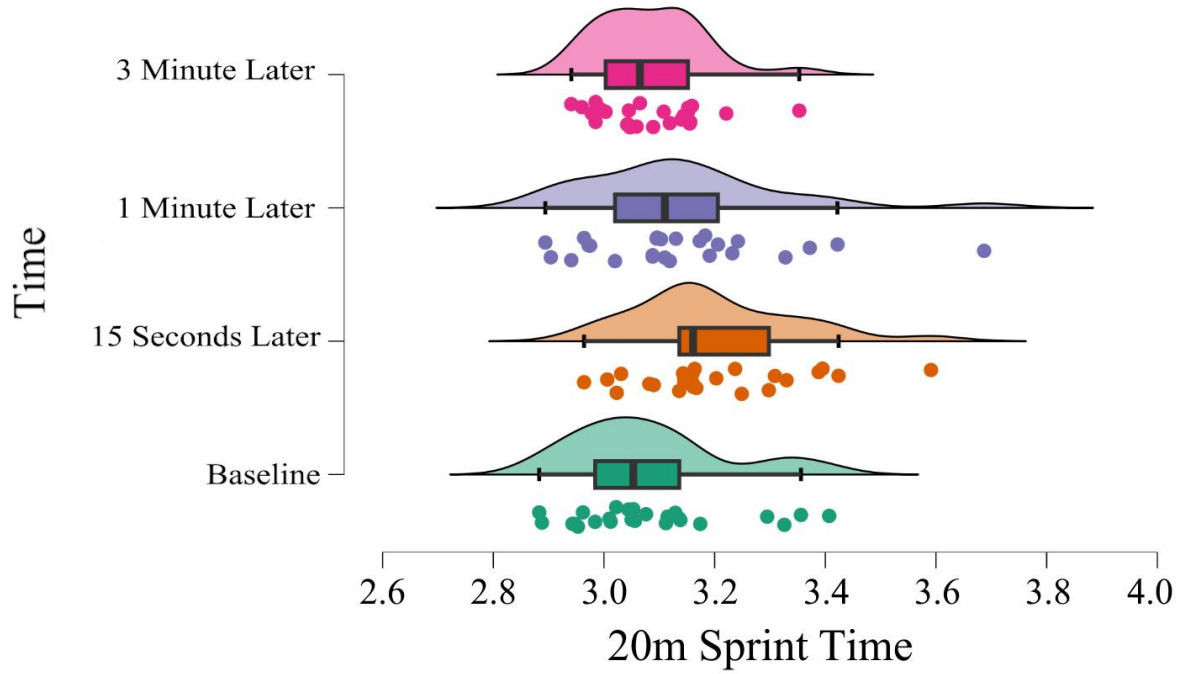

Figure 2. Temporal changes in 20-meter sprint times 0. Min- 15. Sec- 1. Min- 3. Min

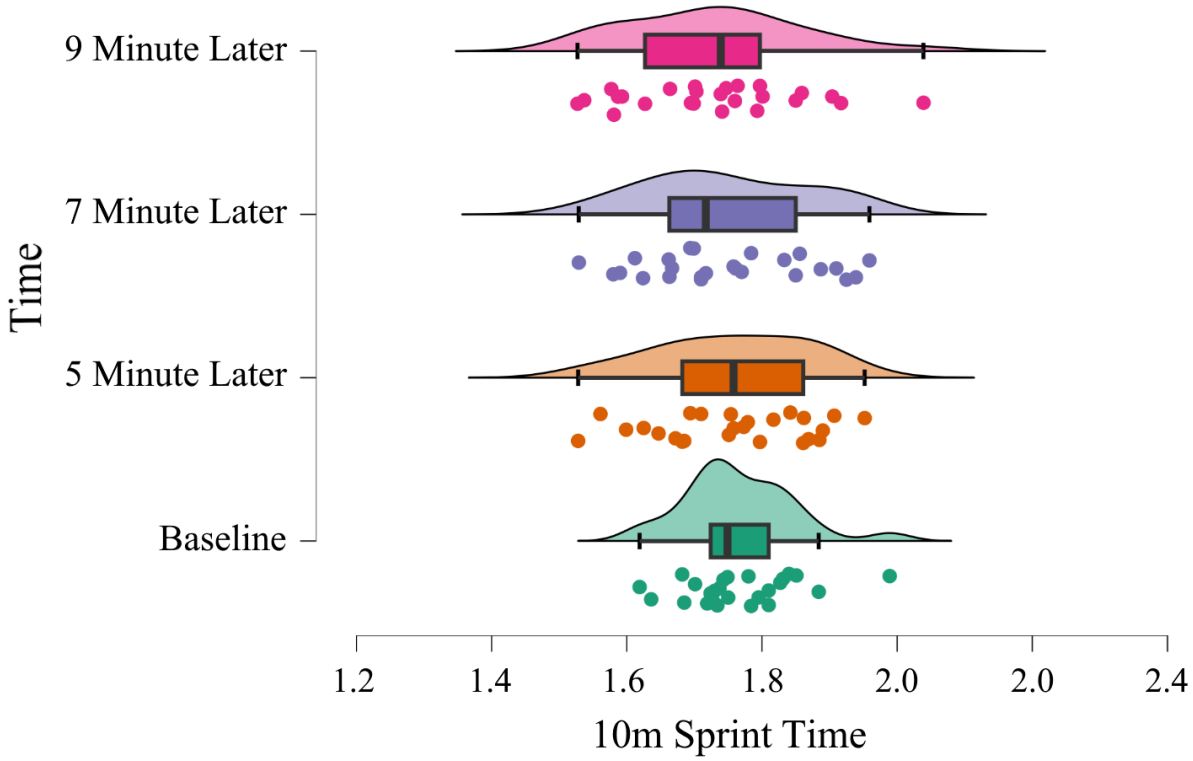

Figure 3. Temporal changes in 10-meter sprint times 0. min- 5. min- 7. min- 9.min

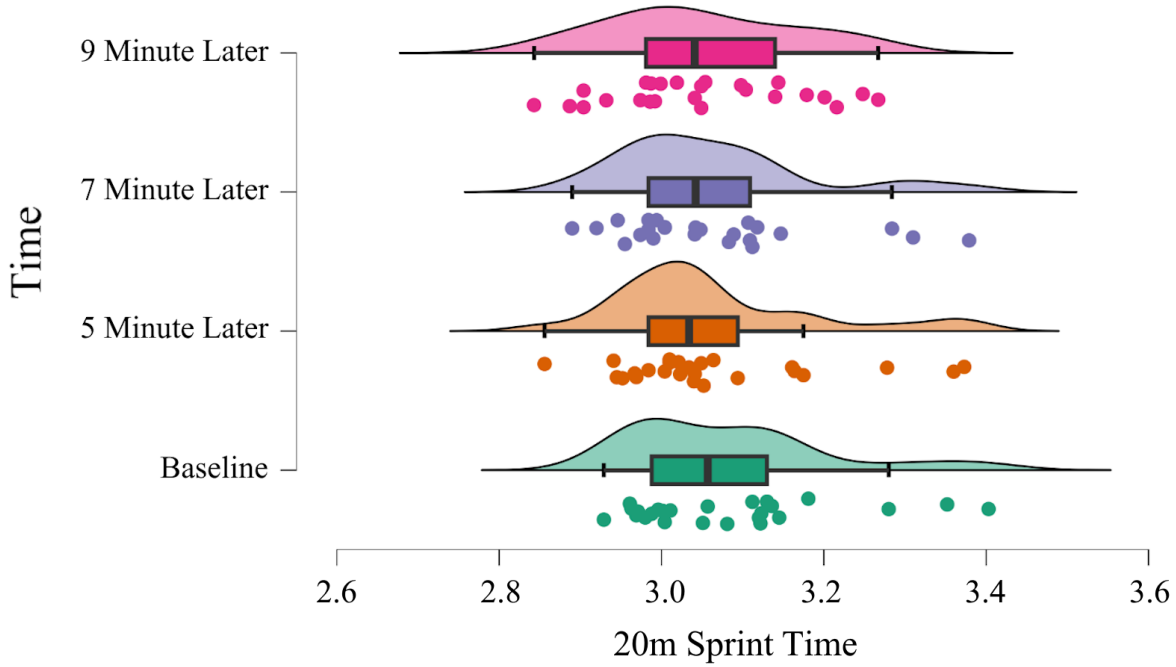

Figure 4. Temporal changes in 20-meter sprint times 0. min- 5. min- 7. min- 9. min

DISCUSSION and CONCLUSION

This study investigated the effects of different recovery durations on 20-meter sprint performance following a single sled push exercise at 50% body mass. (1) The 18-meter sled push exercise at 50% body mass negatively impacted the 20-meter sprint performance after 15 seconds of recovery, aligning with our hypothesis. (2) In contrast to our hypothesis, no significant differences were observed in 20-meter sprint performance following recovery periods of 3, 5, 7, and 9 minutes after the sled push.

These findings suggest that the sled push exercise at 50% body mass does not induce an acute performance enhancement based on PAP (post-activation potentiation) effects in sprint time. However, the results also indicate that the exercise does not negatively affect 20-meter sprint performance after recovery periods of 3, 5, 7, and 9 minutes. Our findings are consistent with previous studies that reported no significant acute performance differences in sprint performance after sled push exercises at 50% and 100% body mass (Grimes et al., 2021). In contrast, a recent study by Rodríguez-Rosell et al., (2022) found that using moderate loads (40% body mass) during sled push exercises led to the most significant improvements in subsequent sprint performance. Furthermore, other studies have shown that the potentiation effect is influenced by various factors (Tillin & Bishop, 2009; Xenofondos et al., 2010). For example, research indicates that PAP responses can be affected by individuals' proportions of type II muscle fibers and strength levels (Ruben et al., 2010; Seitz et al., 2014). Athletes with a higher proportion of type II fibers, more sensitive to the myosin light chain phosphorylation mechanism, will likely exhibit a more excellent PAP response.

Moreover, athletes with more resistance training experience have been shown to exhibit significantly more significant PAP effects compared to less experienced athletes (Seitz & Haff, 2016). For instance, a study on inexperienced young basketball players found no significant PAP effects on sprint performance during the first 10 weeks of a resistance/sprint training program. However, PAP effects became evident after completing the program (Tsimachidis et al., 2013). Similarly, a study investigating the role of strength level on the PAP effect reported that individuals with higher strength levels exhibited a significant improvement in 10-meter sprint performance following a conditioning activity performed with a flywheel resistance training device (Sañudo et al., 2020). These findings suggest that PAP responses may vary depending on athletes' training history and experience levels. Based on this, it can be inferred that our study's lack of a PAP effect may be related to the participants' experience levels.

PAP effects have also been shown to depend on strength levels and single or multiple sets (Wilson et al., 2013). Wilson et al., (2013) found that PAP effects were more pronounced in stronger individuals following a single preload set (ES = 0.44), while weaker individuals benefited more from multiple sets (ES = 1.19). This suggests that a single preload set may not be sufficient to induce PAP effects in weaker individuals. In our study, the absence of a PAP effect could be attributed to using single sets. Additionally, it has been suggested that determining sled push training intensity based solely on a percentage of body mass may not be optimal, as it does not account for variables such as muscle strength, power, muscle mass,

or sprint speed (Luteberg et al., 2015). Similar sled push loads expressed as a percentage of body mass may lead to different mechanical stimuli among athletes. For example, one athlete pushing the same load might experience a high-force, low-velocity stimulus (high resistance), while another might experience a low-force, high-velocity stimulus (lower resistance) (Petrakos et al., 2016; Murray et al., 2005). This indicates that differences in athletes' force-velocity profiles may result in different training stimuli from the same relative loads, potentially affecting training adaptations. Therefore, the necessity of individualizing sled training loads based on athletes' characteristics has become increasingly evident. Indeed, Cahill et al. (2019) suggested that the load-velocity relationship can serve as an effective approach for determining individualized training loads. It is also hypothesized that optimal recovery following a stimulus is a critical factor in the manifestation of PAP and may help explain the varying effects on subsequent activity performance (Grimes et al., 2021; Mola et al., 2014).

In conclusion, future research should employ experimental designs to determine individual sled loads based on participants' force-velocity profiles to optimize such training programs. Additionally, assessing participants' strength levels beforehand and tailoring the use of single or multiple sets accordingly is recommended. This approach would provide a better understanding of the role of strength levels in PAP effects and help optimize training stimuli based on athletes' characteristics. Additionally, the sample size in this study presents limitations in terms of applying the findings to different athletes or a broader population. Therefore, future research should investigate how the protocol used in the present study would affect larger and more diverse populations. Moreover, the homogeneity of the participants in this study may impose certain constraints on the generalizability of the results to different genders, age groups, or sports disciplines. Finally, it should be noted that this study was limited to an acute protocol. Therefore, future longitudinal studies are needed to examine the long-term effects of PAP responses and to evaluate the contributions of resisted sled push exercises to chronic adaptations in sprint performance.

According to the findings of this study, while 20-meter sprint performance decreased after 15 seconds of recovery following a sled push exercise at 50% body mass, no significant changes were observed after recovery periods of 3, 5, 7, and 9 minutes. Therefore, if athletes or coaches wish to use sled push exercises at 50% body mass as a conditioning activity before sprint training, a recovery period of at least 3 minutes is recommended.

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Examination of Agility and Speed Performance Parameters in Male Football Players Aged 17-21*

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Abstract

This study is to conduct a comparative assessment of agility and speed performance levels among male football players aged 17 to 21. A total of 78 participants were included, comprising professional players from Gençlerbirliği Sports Club (n=28) and amateur players from the Faculty of Sports Sciences at Lokman Hekim University (n=50). Anthropometric measurements, including height and body weight, were documented, and physical performance was evaluated by the 30-meter sprint and Arrowhead agility assessments. Independent sample t-tests were employed to compare the groups, and Pearson correlation analysis was performed to investigate correlations among variables. The results indicated that professional players surpassed amateur players in both tests, with statistically significant differences ($p<0.05$). Furthermore, reduced standard deviations in the professional group signified greater consistency in physical performance. These disparities are ascribed to systematic training regimens, enhanced nutritional methods, and talent acquisition methodologies prioritized at the elite level.
Keywords: Physical performance, Agility, Speed, Football

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INTRODUCTION

Football is a globally celebrated sport that demands a combination of technical, tactical, physical, and motor skills (Yüksel & Koçak, 2024). The game is characterized by intermittent periods of high- and low-intensity activity, including acceleration, deceleration, jumping, and rapid changes of direction (Ersöz, 2016; Mohr et al., 2005). Key physical attributes essential for successful football performance include strength, balance, speed, and agility (Gökhan et al., 2015; Little & Williams, 2005). These attributes directly influence on-field performance, facilitating the execution of tactical manoeuvres and offering a competitive advantage during matches.

Among these attributes, speed and agility are widely recognized as critical performance components in football. Speed enables players to move swiftly and implement tactical decisions effectively, while agility supports rapid directional changes and adaptive responses during gameplay (Forster et al., 2023; Sheppard & Young, 2006). Speed refers to the capacity to perform movements in the shortest possible time, which aids players in outmanoeuvring opponents and creating scoring opportunities (Solak, 2021; Özdemir, 2009). During a typical match, players may cover over 10,000 meters, alternating between walking, jogging, and sprinting, which underscores the importance of speed (Şahbaz, 2003). Agility, in contrast, is a multifaceted ability that integrates both biomechanical and cognitive components. It involves rapid changes in direction in response to external stimuli and is enhanced through training programs that target both physical and perceptual skills (Forster et al., 2023; Komarudin et al., 2022).

Regular assessment of speed and agility is essential for monitoring the progress of young athletes, identifying individual strengths and weaknesses, and informing training interventions. Numerous studies have investigated the impact of these parameters on the performance of young football players. For example, Little and Williams (2005) reported a strong relationship between speed and agility, particularly at the elite level. Similarly, Pojskic et al. (2018) identified speed and agility as key predictors of football-specific performance in elite youth players. Within the national context, Köklü et al. (2015) found significant associations between 10- and 30-meter sprint times and agility test results in young footballers. These findings suggest a close interrelationship between speed and agility, both of which can be enhanced through structured training.

Anthropometric characteristics, particularly height, body weight, and body mass index (BMI), also play a role in physical performance. However, findings in the literature regarding their influence are inconsistent. Gil et al. (2007) reported no significant relationship between BMI and performance indicators, emphasizing the need to consider more specific parameters such as body composition and muscle mass. Similarly, Reilly et al. (2000) advocated for the inclusion of detailed physiological assessments beyond basic anthropometric data. Nationally, Hazır et al. (2010) examined the associations between agility, body composition, and anaerobic power in young footballers, underlining their relevance to performance. Internationally, Sedeaud et al. (2014) noted that a BMI range of 20–22 kg/m² is associated with better speed

and agility outcomes. These results highlight the importance of optimal body composition in supporting physical performance.

Identifying differences in physical performance between elite and amateur players is crucial for developing training programs and refining talent identification strategies. Professional footballers generally display more consistent and higher-level performance due to systematic training, optimized nutrition, and structured talent development pathways (Boone et al., 2012; Izzo et al., 2018). In contrast, amateur players often rely more on innate abilities, leading to greater variability in performance (Kaplan et al., 2009). Accordingly, comparative analyses of speed and agility in young footballers provide valuable insights into individual development needs and support the creation of evidence-based coaching methods.

This study aims to conduct a comparative analysis of speed and agility performance among male football players aged 17 to 21. By examining professional athletes from Gençlerbirliği Sports Club and amateur players from Lokman Hekim University Faculty of Sports Sciences, the study seeks to identify performance differences and explore the relationship between these attributes and anthropometric characteristics. The findings aim to inform evidence-based training and coaching strategies, drawing on both national and international research, to optimize agility and speed development in young footballers.

METHOD

Research Model

This research follows a comparative design approach, blending descriptive, correlational, and causal-comparative designs within a quantitative design. The primary objective is to assess the physical performance levels of male footballers aged 17 to 21, focusing on agility and speed metrics, while also determining the association between these attributes and anthropometric factors including height, weight, and body mass index. The descriptive aspect aims to establish the prevailing physical performance characteristics of the participants by measuring variables like height, weight, agility (assessed by the Arrowhead agility test), and speed (assessed using the 30-meter sprint test). Concurrently, a correlational analysis examines the interaction between these variables for the purpose of establishing their interdependence. A causal-comparative design is employed to compare the performance outcomes of two groups—football players from Gençlerbirligi Sports Club (GSC) and Lokman Hekim University Faculty of Sports Sciences (FSS)—to identify potential group differences that may influence agility and speed performance. The comprehensive design of this study facilitates a thorough analysis of general performance trends and unique distinguishing features among groups, aligning with the study's objective to provide specialized training methodologies (Creswell and Clark, 2007). All participants received essential information regarding the study, and consent was sought prior to data collection through completion and signing of an "Informed Consent Form."

Research Groups

Purposive sampling was used in the selection of the participants for this study. As a non-probability sampling method, purposive sampling entails the selective choice of participants who share characteristics or experiences that are useful to the aims of the study. In this study, a total of 78 volunteer footballers were selected, comprising 28 professional players from Gençlerbirliği Sports Club and 50 amateur players from the Lokman Hekim University Faculty of Sports Sciences. Gençlerbirliği Sports Club, being a professional football club, was selected because of its established reputation and status as a major stakeholder that actively engages in scientific research activities, thus being consistent with the aims of the study. Additionally, the inclusion of amateur players from the Faculty of Sports Sciences, representing diverse regional teams, broadened the sample to encompass a wide range of athletic groups. The sample was established based on certain inclusion criteria, namely being an active footballer and falling within the 17–21 age category, aligning with the research questions and objectives of the study.

Data Collection Tools

The study involved measuring the height and body weight of 78 volunteer football players. The volunteers had a typical 10-minute warm-up comprising low-intensity acceleration runs and other staggered running exercises to assess their physical performance development levels, followed by the Arrowhead agility drill test and 30-meter sprint testing. The tests were performed at 72-hour intervals.

Height Measurement

The height of the volunteers involved in the study was assessed using a tape measure affixed to the wall, with the zero-mark positioned at ground level. Athletes engaged in the measurement without footwear. The acquired values are documented in "cm" (Santos et al., 2014).

Body Weight Measurement

The body weights of the participants were assessed using a digital indicator scale. Volunteers engaged in the measure wearing only shorts and t-shirts. The acquired values are documented in "kg" (Santos et al., 2014).

Arrowhead Agility Test

In the Arrowhead Agility Test, the participants commence by positioning themselves behind a clearly designated starting line. At the commencement of the test, they must run at top speed for 10 meters to get to the center of a cone-course. At this decision point, the participant executes a pivoting action in the shape of a 90-degree turn about its rear tip, moving towards a cone positioned laterally at a 5-meter distance, either to the right or left, depending on which trial. Following this first turn, the participant moves another 5 meters towards a cone positioned at a farther distance, necessitating a further 90-degree change in direction. Upon arriving at the farthest cone, the subject makes a 180-degree turn and runs about 10 meters back to the starting line, hence having covered one trial of a total distance of around 35-37 meters (Rago et al., 2020). The time for each trial, from initiation to completion, is measured systematically with accurate timing devices. To consider the test valid, participants are required to complete a total of four trials, two with right turns and two with left turns—to allow proper assessment of agility

in both directional axes. The subjects' best performance times, that is, their fastest recorded scores from these tests, are then recorded for analysis and evaluation purposes in the field of sport science research or training.

30-Meter Speed Test

In the 30-meter speed test, the photocell and reflectors are positioned approximately 2 meters from the starting line and 30 meters apart, facing each other. Participants received the requisite information to complete the 30-meter distance in the minimal time and at maximum velocity prior to the test. We performed the assessment using an electronic stopwatch apparatus. The timing commenced when the volunteers activated the initial sensor, and the elapsed time between the 0 and 30-meter sensors was recorded in the system with an accuracy of 0.01 seconds (Kumar, 2006). The sprint commenced when the volunteer activated the photocell at the starting line by moving forward, without any backward motion, at the instant chosen by the participant within the designated area 1 meter behind the starting point and concluded upon the completion of the run. Participants completed the test twice, with a 3-minute interval, and their best times were recorded in seconds for assessment.

Ethics Approval

The study was conducted in accordance with ethical standards outlined in the Declaration of Helsinki and approved by the Lokman Hekim University Scientific Research Ethics Committee with decision number 2024-11/1.

Data Analysis

The data analysis in this research was done using the IBM Statistics 26.0 statistical package at a significant level of $p<0.05$. The analysis started with the use of descriptive statistics to summarize the central tendency, variability, and distributional properties of the variables under measurement, which were height, body weight, 30-meter speed test results, and Arrowhead agility test scores (right and left foot). Then, normality tests were conducted through the examination of kurtosis and skewness values to establish if the data was normally distributed, hence guiding the selection between parametric and nonparametric statistical methods. As prescribed by George and Mallery (2019), measures of skewness and kurtosis between -2.00 and +2.00 indicate normality; this criterion was met for the right and left foot measurements in the Arrowhead agility test and the 30-meter speed test, and thus parametric analysis was justified. To analyze the difference between the groups of participants—Gençlerbirligi Sports Club (GSC) and Lokman Hekim University Faculty of Sports Sciences (FSS)—independent samples t-tests were conducted on the 30-meter sprint test and the Arrowhead agility test (right foot and left foot measurements) as part of relational analysis. They were conducted to determine whether there were statistically significant differences in the performance results of the two groups. Besides, for analyzing the correlation between the parameters, i.e., speed, agility, height, body weight, and body mass index, Pearson Product-Moment Coefficient analysis, or Pearson's correlation, was employed. This parametric correlation technique was chosen due to the proven normality of the data, which allowed for both the direction and strength of linear relations between variables to be ascertained. All analyses followed the prescribed significance level ($p<0.05$), thereby providing strong statistical inference within the context of the study (George and Mallery, 2019).

FINDINGS

The descriptive statistical findings of the measured characteristics of the participants are given in Table 1.

Table 1. Descriptive statistical results of the assessed attributes of the subjects

Variables	Mean		SD		Min.-Max.	
	FSS	GSC	FSS	GSC	FSS	GSC
Height (cm)	177.44	176.78	8.533	5.965	160-203	167-190
Body weight (kg)	73.00	65.37	12.445	8.567	48-104	54-99
BMI (kg/m²)	23.08	20.88	2.880	2.116	16,61-28,40	17.90-27.45
30-meter speed test (s)	5.48	4.34	0.565	0.193	4.27-6.78	4.07-4.87
Arrowhead agility test-right foot (s)	9.68	8.77	0.669	0.267	8.71-11.25	8.32-9.20
Arrowhead agility test -left foot (s)	9.61	8.93	0.703	0.335	8.73-11.36	8.26-9.50

Note: FSS = Faculty of Sports Sciences; GSC = Gençlerbirligi Sports Club; BMI: Body Mass Index
S: second; cm: centimeter

Table 1 indicates that the mean height of GSC (professional) and FSS (amateur) players in the study was virtually same; however, the height variability among amateur players was greater, whereas professionals demonstrated a more consistent height distribution. The data revealed that amateur performers were 7.63 kg heavier than their professional counterparts in terms of body weight. Simultaneously, for similar reasons, it can be elucidated that FSS participants (23.08) have a higher average BMI than GSC participants (20.88), and that professional football players demonstrate a more delicate and agile physical profile than amateur athletes. According to the averages of 30-meter speed test results, professional football players demonstrate enhanced speed, and the standard deviation values (GSC 0.193 vs. FSS 0.565) indicate that the performances of professional players are more consistent. The GSC group exhibited enhanced performance in the right foot Arrowhead agility test, achieving an average time of 8.77 seconds (SD: 0.27; Min–Max: 8.32–9.20), in contrast to the FSS group's average of 9.68 seconds (SD: 0.67; Min–Max: 8.71–11.25). Likewise, the GSC group attained superior outcomes in the left foot agility assessment. The GSC group had an average time of 8.93 seconds (SD: 0.33; Min–Max: 8.26–9.50), whereas the FSS group had an average of 9.61 seconds (SD: 0.70; Min–Max: 8.73–11.36).

Table 2 displays the results of the independent sample t-test performed between the groups for the 30-meter speed and arrowhead agility evaluations.

Table 2. Results of intergroup independent sample t-test for 30-meter speed and Arrowhead agility assessments

Variables	Groups	N	$\acute{X}$	s	t	p
30-meter speed test (s)	FSS	50	5.488	0.565	10.311	0.001
	GSC	28	4.348	0.193		
Arrowhead agility test-right foot (s)	FSS	50	9.682	0.669	6.836	0.001*
	GSC	28	8.778	0.267		
Arrowhead agility test-left foot (s)	FSS	50	9.615	0.703	4.829	0.001*
	GSC	28	8.932	0.336		

***p<0.05**

All test results in Table 2 indicate that professional players (GSC) surpass amateur footballers (FSS) in speed and agility. All three tests produced p-values of 0.001 ($p < 0.05$), indicating statistically significant differences across the groups. The 30-meter sprint test unequivocally indicated that GSC athletes had superior speed, finishing the test in markedly reduced times relative to the FSS group ($p < 0.05$). Likewise, the outcomes of the Arrowhead agility assessments demonstrated the preeminence of the GSC group. In the right foot agility test, the GSC group reported an average time of 8.78 seconds, but the FSS group averaged 9.68 seconds—a statistically significant difference ($p < 0.05$). A comparable trend was noted in the left foot agility assessment, wherein GSC players exhibited superior speed (8.93 seconds) relative to the FSS group (9.62 seconds), with a statistically significant difference ($p < 0.05$). Furthermore, the GSC group demonstrated reduced standard deviation scores across all assessments, signifying greater uniformity and consistency in performance among professional athletes.

Table 3. The results of the correlation analysis about measurements of GSC players

Variables		1	2	3	4	5
1- 30-meter speed test (s)	r	1	-			
2- Arrowhead agility test right foot (s)	r	0.380**	1			
3- Arrowhead agility test left foot (s)	r	0.292*	0.682**	1		
4- Height (cm)	r	-0.095	0.364	0.297	1	
5- BMI (kg/m²)	r	0.027	-0.040	-0.027	0.052	1

***p<0.05, **p<0.01**

The correlation analysis in Table 3 indicates a moderate positive and statistically significant correlation between the 30-meter sprint test and the Arrowhead agility test executed with the right foot ($r = 0.380$; $p < 0.01$). A small positive and statistically significant correlation was observed between the 30-meter sprint test and the Arrowhead agility test executed with the left foot ($r = 0.292$; $p < 0.05$). A small negative but statistically non-significant correlation was found between the 30-meter sprint test and height ($r = -0.095$; $p > 0.05$). The correlation between body mass index (BMI) and the 30-meter sprint test was negligible and statistically non-significant ($r = 0.027$; $p > 0.05$).

Table 4. The results of the correlation analysis of the measurements performed by FSS players

Variables		1	2	3	4	5
1- 30-meter speed test (s)	r	1	-			
2- Arrowhead agility test right foot (s)	r	0.472**	1			
3- Arrowhead agility test left foot (s)	r	0.549**	0.957**	1		
4- Height (cm)	r	-0.488**	-0.576**	-0.588**	1	
5- BMI (kg/m²)	r	0.078	-0.353**	-0.337*	0.194	1

***p<0.05, **p<0.01**

The results shown in Table 4 demonstrate a positive and moderate association ($r = 0.472$) between the 30-meter speed test and the Arrowhead right foot agility test. The association is statistically significant ($p<0.05$). A strong and positive correlation ($r = 0.549$) found between the speed and Arrowhead left foot agility evaluations. The speed test and height demonstrate a moderately negative and statistically significant connection ($r = -0.488$). Taller athletes need additional time to complete the 30-meter speed test. The speed test and BMI exhibit a negligible

and statistically insignificant correlation ($r = 0.078$; $p > 0.05$). Nonetheless, because of the low r value, the impact of BMI on speed performance appears to be considerably constrained in practice. The Arrowhead right and left foot agility tests demonstrate a robust positive connection ($r = 0.957$). Significant inverse correlations were seen between BMI and agility evaluations (right foot: $r = -0.353$; $p < 0.01$; left foot: $r = -0.337$; $p < 0.01$). This suggests that an increase in BMI is associated with a decrease in agility.

DISCUSSION

This study aimed to identify the specific distinctions between professional (GSC) and amateur (FSS) football players aged 17 to 21 by analysing their physical attributes and performance indicators. Anthropometric variables, including body weight, height, and body mass index (BMI), as well as measurements of performance such as speed (30-meter sprint) and agility (Arrowhead Agility Test), were examined to evaluate inter-group differences and the correlations among these characteristics.

In this context, the mean heights of GSC (professional) and FSS (amateur) players were found to be quite similar; however, the height distribution was more extensive among amateur players, whereas professional players displayed a more uniform height range. The FSS group exhibited a greater mean body weight than the GSC group. Consequently, FSS participants exhibited a higher average BMI (23.08) than GSC participants (20.88), thus indicating the thinner and more agile physiques of professional athletes as contrast to amateurs. This study indicates that amateur players may have increased fluctuation in muscle mass or body fat percentage, whereas the physical consistency of professionals is likely shaped by systematic training, elevated match intensity, and performance maintenance requirements. According to the average outcomes of the 30-meter sprint test, professional athletes exhibited enhanced speed performance. Furthermore, the comparison of standard deviation numbers (GSC: 0.193 vs. FSS: 0.565) indicates that professional players exhibit greater consistency in performance. The GSC group surpassed the FSS group in both right and left foot agility assessments, evidenced by reduced average times and diminished variability. This consistent performance presumably indicates the impact of higher training levels. FSS participants seemed to depend more on physical attributes such height and BMI for their performance results, whereas similar criteria had no influence on GSC participants. This disparity may be ascribed to the differing training intensity or player characteristics between the two cohorts (Table 1).

Numerous studies in the literature corroborate the conclusions of the current research. Gil et al. (2007) found no significant relationship between BMI levels and performance indicators, highlighting that BMI alone is inadequate as a performance predictor for youth football players. They suggested evaluating more specific parameters, including body composition and muscle mass. Likewise, Reilly et al. (2000) emphasized the necessity of assessing specific physiological indicators in addition to basic anthropometric indices. De Giorgio et al. (2018) discovered no significant correlation between BMI and agility, indicating that agility is predominantly affected by motor abilities and training level rather than body composition. A

study by Sedeaud et al. (2014) corroborated our findings, indicating that top runners with BMI values between around 20–22 kg/m² exhibited enhanced speed and agility performance. This further emphasizes that BMI may enhance physical performance alone within an appropriate range and in conjunction with advantageous body composition. Table 2 illustrates that the GSC group, comprising professional athletes, considerably surpassed the FSS group, comprised of amateur players, across all assessed parameters, including the 30-meter sprint and both right and left foot Arrowhead agility tests ($p < 0.05$). Additionally, in the FSS group, a moderate correlation ($r = 0.57$) was noted between right and left foot agility performance, suggesting a level of bilateral consistency, albeit lacking full symmetry. Conversely, GSC players demonstrated a robust and statistically significant association ($r = 0.682$, $p < 0.05$), indicating a more symmetrical and consistent bilateral agility performance.

The data indicate that GSC athletes, due to their consistent and systematic training and professional expertise, have enhanced physical performance in speed and agility. Conversely, the FSS group demonstrated a wider range of performance scores, reflecting a more varied composition among amateur players. The results distinctly highlight the impact of consistent training, physical conditioning, and maybe superior technical abilities on athletic performance. Our findings are corroborated by the research by Little and Williams (2005), who highlighted the integral relationship between speed and agility in football play, observing that this association is particularly evident at the highest level. Pojskic et al. (2018) emphasized the substantial correlation between speed and agility in their study of elite youth football players, finding these characteristics as key predictors of football-specific performance. Pereira et al. (2018) revealed a robust and statistically significant correlation between sprint and agility performance in top footballers ($r = 0.76$, $p < 0.01$), hence further substantiating our findings. These data substantiate the idea that bilateral coordination in professional football players is likely improved through specific training treatments, such as bilateral limb exercises. Negra et al. (2017) observed that although speed and agility are separate skills in young athletes, bilateral performance can be enhanced with structured and professional training methods.

The reduced and more uniform agility test timings observed in GSC players (8.77–8.93 s) may indicate superior bilateral coordination, highlighting the impact of elite-level technical and physical preparation. Little and Williams (2005) similarly showed a robust correlation between speed and agility in football, underscoring the notion that these skills are intricately connected. In contrast to these findings, our study identified a diminished correlation between speed and agility in GSC players relative to FSS players, while a more pronounced bilateral consistency was observed in right and left foot agility performance among professionals (as noted by Negra et al., 2017). This indicates that the two groups may vary in training intensity or playing style. Similar studies in the literature corroborate these findings and provide valuable insights for enhancing the physical performance of young athletes. Köklü et al. (2015) identified significant relationships between 10- and 30-meter sprint timings and agility evaluations in adolescent football players. Buchheit et al. (2010) underscored the strong correlation between agility and sprint speed in young footballers, asserting that agility training is crucial for improving overall player performance. A separate study including 24 football athletes aged 19 to 24 ($n = 12$ football, $n = 12$ futsal) evaluated the combined effects of speed, agility, anaerobic power, and anthropometric parameters. The findings indicated statistically significant disparities favoring

futsal players in the 30-meter sprint and agility assessments; however, no significant variations in agility scores were noted between the two groups (Kartal, 2016). The research conducted by Milanović et al. (2011) and Göral (2015) indicated no significant disparity in agility performance between football and futsal players, implying that both activities may provide comparable agility abilities despite their distinct physical requirements.

Sheppard and Young (2006) indicated that agility performance is affected by both physical capacities and the integration of cognitive processes, such as decision-making ability. Çatalo et al. (2024) highlighted that agility performance, especially in young athletes, is closely associated with multiple physical attributes including strength, speed, and flexibility, and that enhancing these traits through targeted training interventions can markedly improve performance. Brughelli et al. (2008) contended that agility is a complex skill, and that athletes' performance in agility activities may fluctuate based on several physical and technical aspects. Jones and Wilson (2009) emphasized the significance of recognizing the relationship between speed and agility in the formulation of performance enhancement programs, proposing that agility training is essential for augmenting total athletic performance. Kapidžić et al. (2011) corroborated our findings by identifying statistically significant correlations between a 20-meter sprint test and 3- and 7-meter sprint-agility tests in amateur football players, illustrating the interrelation of these abilities. A similar study consistent with our findings was performed by Kaplan et al. (2009), who evaluated running speed and agility performance (utilizing the 10 × 5 m shuttle run) in a cohort of 187 male subjects (108 professional and 79 amateur footballers). Their findings demonstrated statistically significant differences between the two groups, so reinforcing the idea that performance capacity in sprinting and agility activities is affected by competition level and training exposure. Izzo et al. (2018) indicated that professional football players attained greater maximum running speeds (31 km/h) than amateur players (28 km/h), attributing this disparity to specialized speed and agility training at the elite level. Boone et al. (2012) highlighted that the sprint performance of professional athletes is improved through consistent high-intensity interval training (HIIT) and position-specific drills, emphasizing the importance of planned and targeted training in augmenting speed. The limited correlation identified between speed and BMI in the FSS group indicates that amateur players may depend more on innate physical attributes due to the lack of organized and systematic training regimens. The findings substantiate the idea that the physical and performance discrepancies between professional and amateur football players can be attributed to variations in training methodologies, talent identification and selection procedures, and the extent of physical optimization attained through elite-level development systems.

Table 3 indicates a considerable positive and statistically significant association between the 30-meter sprint test and the Arrowhead agility test conducted with the right foot ($r = 0.380$, $p < 0.01$). This research indicates that people with inferior sprint performance typically exhibit constrained agility capabilities as well. A small although statistically significant correlation was identified between the 30-meter sprint and the left foot agility test ($r = 0.292$, $p < 0.05$). The results indicate that speed and agility are complementary motor skills that may collectively impact total sports performance. Sheppard and Young (2006) contended that agility encompasses not just the capacity to alter direction but is also intricately linked to sprint speed and reaction time. Similarly, Lockie et al. (2014) identified substantial connections between

speed and agility in sprinters and team sport players. The present findings are consistent with prior literature. Conversely, while a weak negative correlation was observed between height and sprint performance in this investigation, it lacked statistical significance ($r = -0.095$, $p > 0.05$). A negligible correlation was seen between BMI and sprint performance ($r = 0.027$, $p > 0.05$). The results suggest that sprint performance cannot be sufficiently elucidated by anthropometric measurements alone; rather, factors such as muscle strength, response time, and technical proficiency may exert a more significant influence. In this context, the results of Silva et al. (2013) indicated a negligible influence of height and BMI on sprint performance. The meta-analysis by Nygaard Falch et al. (2019) corroborated an inverse correlation between height and agility performance. The authors noted that taller athletes encounter increased challenges in managing their center of gravity, especially during directional shifts. Mathisen and Pettersen (2015) similarly reported a positive association between height and sprint performance in youth football players ($r = 0.30–0.50$) but observed that this impact tends to decline at the elite level. The data indicate that although greater height may confer a benefit in sprinting throughout an athlete's formative years, its significance diminishes when training and performance variables take precedence in professional settings. De Giorgio et al. (2018) also suggested that increases in height may correlate with diminished agility performance in both right and left foot assessments. Taller athletes may encounter increased challenges in sustaining agility, primarily due to biomechanical constraints associated with balance and center of mass regulation. In contrast, shorter athletes with a lower center of gravity had superior performance in agility testing, highlighting the biomechanical benefits of compact body proportions in activities necessitating swift directional shifts.

The correlation analysis results in Table 4 indicate statistically significant positive associations between the 30-meter sprint test and both the right and left foot Arrowhead agility tests among FSS players ($r = 0.472$ and $r = 0.549$, respectively). This suggests that those with diminished sprint performance typically demonstrate reduced agility performance as well. The significant association identified between the left foot agility test and the sprint test ($r = 0.957$, $p < 0.01$) indicates that both evaluations may depend on analogous neuromuscular elements. This data suggests that agility performance may be sustained at a similar level using the non-dominant foot, underscoring its correlation with overall motor control capability. The favorable connections observed in this study reinforce the concept that agility is a motor ability that evolves concurrently with speed. Consistent with our findings, Lockie et al. (2014) revealed substantial relationships between speed and agility performance in athletes. Additionally, negative and statistically significant correlations were identified between height and both the 30-meter sprint and agility tests (e.g., $r = -0.488$ for height and sprint performance), suggesting that taller individuals may experience disadvantages in acceleration and change-of-direction abilities. Moreover, negative and significant correlations were identified between BMI and agility performance ($r = -0.353$ and $r = -0.337$), highlighting the influence of body composition on agility-related tasks. The lack of a substantial correlation between BMI and sprint performance ($r = 0.078$, $p > 0.05$) indicates that BMI alone may not adequately account for speed capability, necessitating the consideration of extra specific factors such as muscle power or limb strength for precise evaluation.

CONCLUSION

The disparities in physical attributes and performance between amateur and professional footballers can be ascribed to variations in training quality, selection criteria, and physical optimization. The amateur group seems to depend more on inherent physical attributes, whereas professional players gain from honed technical abilities and a well-rounded physical profile developed through elite training regimens. This study finds that professional football players aged 17–21 have enhanced and more consistent agility and speed performance relative to their amateur counterparts. The disparities mostly originate from organized training protocols, enhanced nutritional approaches, and methodical talent identification and development systems utilized in professional settings. The results underscore the necessity of creating personalized training programs that align with athletes' physical ability and developmental requirements. Prioritizing the concurrent enhancement of speed and agility is essential for optimizing performance outcomes in youth athletes.

Recommendations

Training regimens must incorporate bilateral agility drills and speed enhancement exercises according to the athlete's skill level.

Regular performance evaluations must be conducted to monitor progress and enable adaptive training modifications.

The methods of player selection and development must include considerations beyond anthropometric dimensions, such as technical skill, psychological resilience, and motor coordination.

Future study should build upon these findings by examining position-specific performance criteria, broader age demographics, and cross-sport comparisons.

Conflicts of Interest: The authors declare that they have no conflict of interest in relation to this manuscript.

Authors' Contribution: Study Design- SYT, ITK; Data Collection- ITK, Statistical Analysis and Manuscript Preparation- ITK; SYT. All authors read and approved of the final manuscript.

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Recreation Department Students Views on Psychosocial Experiences of Orienteering Sport: A Phenomenological Research

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Abstract

Since orienteering is a nature sport based on orientation and target seeking, and because it involves risk and adventure, individuals who do this sport experience different emotional experiences. The aim of this study is to examine the views of recreation department students on the psychosocial experiences they have gained in orienteering course. In this context, phenomenological design, one of the qualitative research methods, was used in the research. Maximum variation sampling method was used as the sampling method. As the data collection tool, semi-structured interview questions were directed to the participants. After the interviews were completed, the researchers first decided together which coding method they would use. Then, a codebook was prepared through thematic analysis. The findings obtained from qualitative data were divided into three categories: mental experiences, psychological experiences and social experiences. Psychological experiences were also divided into two categories and codes were created under all these themes and categories. As a result, it can be stated that recreation department students who experienced orienteering sport for 12 weeks had a positive effect on psychological and social well-being and contributed to their mental skills. In future studies, the experiences of younger and expert orienteering groups can be investigated.
Keywords: Orienteering, Psychosocial experience, Mental skills, Social skills, Qualitative research

Rekreasyon Bölümü Öğrencilerinin Oryantiring Sporunun Psikososyal Deneyimlerine İlişkin Görüşleri: Fenomenolojik Bir Araştırma

Öz

Oryantiring, yön bulma ve hedef aramaya dayalı bir doğa sporu olması, risk ve macera içermesi nedeniyle bu sporu yapan bireyler farklı duygusal deneyimler yaşamaktadırlar. Bu çalışmanın amacı, rekreasyon bölümü öğrencilerinin oryantiring dersinde edindikleri psikososyal deneyimlere ilişkin görüşlerini incelemektir. Bu bağlamda araştırmada nitel araştırma yöntemlerinden biri olan fenomenolojik desen kullanılmıştır. Örnekleme yöntemi olarak maksimum çeşitlilik örnekleme yöntemi kullanılmıştır. Veri toplama aracı olarak katılımcılara yarı yapılandırılmış görüşme soruları yöneltilmiştir. Görüşme sonrasında katılımcılardan elde edilen veriler kodlanmadan önce araştırmacılar arasında kodlama yöntemi üzerinde uzlaşılmış ve tematik analiz yapılarak bir kod kitabı oluşturulmuştur. Nitel verilerden elde edilen bulgular zihinsel deneyimler, psikolojik deneyimler ve sosyal deneyimler olmak üzere üç kategoriye ayrılmıştır. Psikolojik deneyimler de iki kategoriye ayrılmış ve tüm bu tema ve kategorilerin altında kodlar oluşturulmuştur. Sonuç olarak, 12 hafta boyunca oryantiring sporunu deneyimleyen rekreasyon bölümü öğrencilerinin psikolojik ve sosyal iyi oluş üzerinde olumlu etki bıraktığı ayrıca zihinsel becerilere de katkı sağladığı ifade edilebilir. Gelecek çalışmalarda oryantiring yapan küçük yaş ve uzman grupların deneyimleri araştırılabilir.
Anahtar kelimeler: Oryantiring, Psikososyal deneyim, Zihinsel beceriler, Sosyal beceriler, Nitel araştırma

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INTRODUCTION

Wayfinding is a complex skill (Wolbers & Hegarty, 2010) and includes a locomotion component (involving body movements coordinated with the local and immediate environment), and a navigation component (requiring goal-directed, planned movement through the environment) (Feraco et al., 2021). Wayfinding is the movement towards a target in an unknown area, in a location that is approximately known, without any prior knowledge of that area (Wiener et al., 2009). It is a more complex skill that involves reaching targets by the shortest route and using energy optimally.

Orienteering is a sport characterized by high physical effort, and intense mental demands that increase susceptibility to errors (Gorgulu et al., 2024). Moreover, orienteering is a sport that combines running, and wayfinding, in which goal-seeking plays a fundamental role (Feraco et al., 2021). Orienteering requires psychological skills such as stress control, focus, effective use of memory, and making sudden and correct decisions, as well as the ability to find directions, draw accurate routes, and search for targets. In this context, the fact that orienteering involves risk and adventure in nature encourages individuals to engage in it for recreational purposes. Additionally, orienteering is a nature sport that can be performed both as a competitive activity and a recreational one, as it allows participation from all age groups, ranging from 10 to 55 years old.

The benefits of outdoor sports, outdoor activities, and physical activity for human health are well recognized (Kurtze et al., 2009; Laukkanen, 2010; Mygind et al., 2018; Yıldız et al., 2017). Moreover, parks, outdoor recreation, and green space activities are believed to promote resilience by supporting physical health and recovery (Bell & Simpson, 2009; Cervinka et al., 2014; Pröbstl et al., 2010), facilitating social interaction (Kuo et al., 1998; Mann & Leahy, 2010), supporting mental health(Azara et al., 2018; Buchecker & Degenhardt, 2015; Lackey et al., 2021) and enabling collaborative learning and the development of socio-ecological knowledge (Krasny & Tidball, 2009; Smith et al., 2016).

When the literature is reviewed, the effects of orienteering on individuals—ranging from psychophysiological impacts (Eccles et al., 2002, 2006; Galan et al., 2022), to cognitive skills (Liu et al., 2024; Waddington et al., 2024; Waddington & Heisz, 2023), and social benefits (Leeder & Beaumont, 2023) are widely discussed. It is also important for recreation students to experience orienteering, which has become a rising trend in recent years, and to incorporate it into their professional practice as a recreational activity (Özkavak et al., 2024). Another crucial aspect is the opportunity to experience the mental, cognitive, psychological, and social effects of orienteering, observe potential positive outcomes, and reflect these experiences in their future professional lives. Moreover, the lack of qualitative studies on the emotions individual's experiences during orienteering, as well as the positive social relationships and mental skills they develop, highlights the significance of this research. Although the physical, cognitive and psychological effects of orienteering on individuals have been the subject of research at different levels, the number of qualitative studies examining the effects that emerge because of university students experiencing this sport, especially in the Turkish context, is quite limited. Moreover, examining the potential effects of orienteering on the psychosocial well-

being of individuals is important for a deeper understanding of the multidimensional benefits of this sport.

The purpose of this study is to examine the experiences of recreation students who participated in orienteering activities during the 12-week fall semester in a psychosocial context. In this direction, questions about the psychosocial situations that students encounter while orienteering and the effects of these situations on their individual experiences were sought.

METHOD

Research Model

In order to reveal the perceptions and meanings of recreation department students about their experiences in the orienteering course duration, phenomenological design, one of the qualitative research approaches, was preferred in this study. Phenomenological design is a research approach rooted in philosophy and psychology. Phenomenology is a design that uncovers the common meaning of the lived experiences of several individuals regarding a phenomenon or a specific concept. In this design, the goal is to deeply understand the essence of the experiences of people who have encountered a particular phenomenon (Creswell, 2018).

Research Group

The research group consists of 10 volunteer students studying at the Department of Recreation, Faculty of Sport Science, Kırıkkale University. The maximum diversity sampling method, which is one of the purposeful sampling types, was used to select the students. The data obtained from the students were collected during the 2024-2025 academic year. Four of the students are female, six are male, and three are 4th-grade students, while six are 2nd-grade students. The students' ages range from 19 to 25, and the interview duration varied between 21 and 35 minutes. The students who participated in the research are labeled as "P1, P2, ...". The demographic characteristics, along with the qualitative interview duration of the students participating in the study, are shown in Table 1.

Table 1. Demographic characteristics of the students participating in the study and qualitative interview duration

Participants	Age	Gender	Class	Interview duration
P1	20	Man	2	35 mn.
P2	19	Woman	2	23 mn.
P3	23	Woman	4	21 mn.
P4	24	Man	4	24 mn.
P5	22	Woman	4	29 mn.
P6	23	Man	2	23 mn.
P7	25	Man	2	21 mn.
P8	19	Man	2	32 mn.
P9	19	Man	2	25 mn.
P10	19	Woman	2	22 mn.

When Table 1 is analysed, the age range of the students participating in the study is between 19 and 25 years, 6 of them are male, 4 of them are female and they are studying in the 2nd and 4th grades, and the duration of the qualitative interview varies between 21 minutes-35 minutes.

Data Collection Tools

In the study, the data were collected using semi-structured interview questions developed by the researchers as the data collection tool. The research questions are stated below.

Research questions

1. What are the most significant changes you have noticed about yourself after participating in orienteering?
2. What do you think about the effects of this sport on your social relationships (friendship, teamwork, communication, etc.)?
3. Can you describe the emotions you experienced during or after orienteering?
4. What are the psychological or social reasons that attract you to this sport or keep you going?
5. Which areas of orienteering have been the most mentally challenging for you or the areas where you think you have improved the most?
6. How would you rate the impact of tasks such as map reading and orienteering on your thinking or decision-making processes?
7. Do you think orienteering affects your attention, focus or planning skills? How?
8. What motivated or challenged you the most mentally? Can you tell us about it?

Ethical Approval

Ethics Approval The ethical process of the research was completed with the Decision No. 02 taken at the meeting of the Kırıkkale University Social And Human Sciences Research Ethics Committee held on 11.02.2025 voluntary consent was obtained from all participants.

Role of the Researcher

Reflexivity

In this study, although I am a senior orienteering coach, as well as an academician who teaches orienteering at a state university Faculty of Sports Sciences, we handled the entire process objectively together with my colleagues who conducted the research. In qualitative research, the researcher's values, beliefs, ideology, and perspective on events affect the study. In addition, the researcher should consider his/her position in three dimensions: subject, participants, and context. Within the scope of these three dimensions, the researcher should consider the possible effects on the selection of the research area and research design, the data collection, analysis, and interpretation stages, and state them in the report to be written at the end of the research (Koca, 2017).

The process of ensuring that the researcher's position does not have a harmful effect on the research is called self-reflexivity (Savin-Baden & Major, 2023). In this context, we aimed to ensure the criteria of credibility, reliability, confirmability, and transferability (Guba & Lincoln, 1982) of the qualitative method in an objective manner, without using personal initiative or manipulating the data, in collaboration with the researchers we worked with in the study.

Philosophical Approach of the Researchers

In this qualitative study, as researchers, the problem situation was addressed using an ontological philosophical approach, and the process was carried out from the perspective of the event. Ontology is concerned with the nature and characteristics of reality (Creswell, 2013).

Researchers adopt multiple understandings of reality when conducting qualitative research. If the research is conducted on individuals, qualitative researchers report these differing realities in their studies (Creswell, 2013).

In this context, social constructivism was used as an interpretative framework. In social constructivism, individuals attempt to understand the world they live in. They develop subjective meanings toward certain objects, or objects derived from their experiences. These meanings do not restrict the researcher to only a few categories, or ideas, but rather offer a complex perspective (Creswell, 2013). Therefore, the purpose of the research varies according to how participants interpret events. For this reason, the research problem was approached by adopting an ontological philosophical perspective, and using social constructivism as an interpretive framework.

Analysis of Data

While the codebook was being created by the researchers, a consensus was reached on which coding method to use before beginning the coding process. Prior to coding, the expressions of the participants transferred to the Word document were treated as sentences, and the meaning extracted from each sentence was written in the codebook, thus creating the initial codebook. The codebooks were then examined by the researchers, the same codings were discussed, and the codebook was finalized after a consensus was reached.

FINDINGS

In this study, the aim was to comprehensively reveal the psychosocial experiences of recreation department students while orienteering. For this purpose, the experiences of recreation department students were collected using semi-structured interview questions. While creating the interview questions, the literature was reviewed, and sample questions were prepared in collaboration with the research team. The scope and content of the prepared questions were examined by an expert psychological counselor, one of the authors of the study, who had completed their doctoral education. In addition, the fluency and comprehensibility of the form were reviewed by the entire research team, and the final version was then presented to the participants.

The qualitative questionnaire included 8 questions about the orienteering experiences of the students. During the data analysis process, the procedures of thematic analysis were followed, and three main themes were revealed in accordance with the structure of phenomenological research. These themes were: “Mental Experiences,” “Psychological Experiences,” and “Social Experiences.” Regarding the categories and codes, tables were shared with frequency values, and direct quotations from student experiences and expressions with the highest representation power were provided under Table 2.

Table 2. shows the codebook created from the themes, categories and codes related to student experiences

Themes	Categories	Code
Mental Experiences	Mental Experiences	Attention Focus Improving Memory Visualization Navigation Skill Mathematical Skills Fast Decision Making Creative Problem-Solving Selective Perception
Psychological Experiences	Positive Psychological Experiences	Self-Confidence Motivation Facing Fears Adrenaline Happiness Love Feeling Valued Self-Talk Ego Achievement Curiosity Ambition Passion Excitement Coping With Stress
	Negative Psychological Experiences	Fear Anxiety Helplessness Stres Frustration Anger Panic
Social Experiences	Social Experiences	Collaborate Communication Brainstorming Competition Peer Education

When Table 2 is examined, it is seen that there are 3 themes, 4 categories and codes belonging to the categories regarding students' experiences.

Mental Experiences

Table 3. Recreation department students views on their mental experiences regarding orienteering

Category	Codes	Students										*f*
		P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	
Mental Experiences	Attention		X				X					**2**
	Focus	X	X	X		X		X			X	**6**
	Improving Memory		X	X				X	X		X	**5**
	Visualization		X			X	X					**3**
	Navigation Skill	X		X					X		X	**4**
	Calculation Skill	X						X				**2**
	Effective and Fast Decision Making	X					X		X			**3**
	Problem Solving Skill	X		X		X			X		X	**5**
	Selective Perception						X					**1**

The mental experiences of recreation department students while orienteering were expressed through concepts such as attention, focusing, memory improvement, mental imagery, orienteering skill, calculation skill, effective and fast decision-making, problem-solving skill, and selectivity in perception. Particularly in the orienteering course, it was observed that students placed more emphasis on concepts such as focusing (f:6), memory improvement (f:5), orienteering skill (f:4), attention (f:3), and problem-solving (f:5) when describing their mental experiences (Table 3). Specifically, they stated that they focused on the map while reading it, determining the locations of the target points, and heading toward the target; they engaged their memory intensively; and they developed various strategies while choosing the route. The opinions of the students participating in the study regarding their mental experiences in the orienteering lesson are presented below as direct quotations:

P5, ‘’... In this mental process, while travelling from one target to another target, I was calculating how I should go and mentally preparing myself for it‘’.

P7, ‘’ ... Now, when you see the colour of the maps there, you mentally think about what kind of place it is, for example, directly‘’.

P2, ‘’... You know, since there are names of things in certain regions on the map, after a certain time, the brain starts to adapt this visually‘’.

P6, ‘’... Because when the adrenaline is high, for example, knowing which way they can go shorter, thinking about it ...‘’.

P7, ‘’ ... For example, after I experienced orienteering sport, I started to remember such things. I am more careful, I act more carefully‘’.

P2, ‘’... After doing this sport, I became closer to focusing myself on being more careful and adapting myself to the target‘’.

P5, ‘’... I knew where it was and I could even visualise which tree it was at that moment and immediately go directly there‘’.

P6, ‘’... In orienteering, sometimes you pass by the target maybe 3-4 times but you may not see it. But when you make it continuous, for example, we call it a lantern. For example, you can see the flashlight faster‘’.

P7,‘’ ... Afterwards, as our focus increased and I started to learn the symbols, I started to reach the target more easily ‘’.

P10’’ ... or there is a straight road between the two, I think that I can travel a better way in a shorter time by making a strategy to see which one I can go faster.‘’ by expressing the concepts such as memory, attention and strategy development while orienteering.

Psychological Experiences

Positive Psychological Experiences

Table 4. Recreation department students' opinions on positive psychological experiences of orienteering

Category	Codes	Students										*f*
		P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	
Positive Psychological Experiences	Self-confidence		X	X			X			X		**4**
	Motivation		X						X			**2**
	Facing Fears			X								**1**
	Adrenaline			X		X	X					**3**
	Happiness		X	X	X	X	X	X		X	X	**8**
	Love			X								**1**
	Feeling Valued		X									**1**
	Self-Talk								X	X		**2**
	Ego		X									**1**
	Achievement		X			X	X	X		X	X	**6**
	Curiosity								X			**1**
	Ambition								X			**1**
	Passion		X									**1**
	Excitement		X		X	X	X		X	X		**6**
	Coping with Stress								X		X	**2**

The psychological experiences of recreation department students while orienteering are presented in two categories: positive and negative. When Table 4 is examined, the codes and frequency values containing the opinions of the recreation department students about their positive psychological experiences in the orienteering course are shown. The positive psychological experiences of the students were expressed through concepts such as self-confidence, motivation, facing fears, adrenaline, happiness, love, feeling valuable, inner positive speech, ego, sense of success, curiosity, ambition, passion, excitement, and coping with stress. Specifically, happiness (f:8), sense of success (f:6), excitement (f:6), and self-confidence (f:4) were expressed more frequently. In addition, codes such as adrenaline, struggle, ego, ambition, and coping with stress are noteworthy.

Considering that orienteering is conducted in an unknown terrain and involves potential unpredictable risks, students expressed a wide range of emotions. The underlying reason for expressing emotions such as happiness, excitement, motivation, sense of success, and feeling valuable, particularly from positive emotions, was identified by the students as being an outdoor sport with adventure and risk factors. Additionally, the fact that students felt intense adrenaline and ambition while orienteering, and expressed that their egos were satisfied, was reflected in their tone of voice during the interview. Another noteworthy code is coping with stress. In the spirit of orienteering, it was stated that the ability to compete with time, make the right decisions, and manage the stress caused by these factors improved their ability to cope with stress.

The opinions of the students participating in the research regarding their positive psychological experiences in the orienteering course are presented below as direct quotations:

P10 ‘’... coping with stress was the most important thing for me because I am a very stressful person, especially when I am alone and coping with this stress was a very big thing for me‘’ .

P10 ‘’... I learnt not to give up, in other words, I learnt that I can achieve something if I try for something‘’.

P5‘’... it was in a place I never expected, but when I found it, I felt a sense of relief that it would not take more than my time, that I could finish it first‘’.

P4‘’... an enjoyable sport, as I said, it is a happy and enjoyable sport‘’.

P3‘’ ... brought me more self-confidence, I have a lot of trouble in finding directions, but in this lesson I became more confident in things like finding directions, so I am no longer afraid when doing things‘’.

P9 ‘’,,,, I had a lack of distraction, we were concentrating on a target, and then after finding the target, it creates a happiness in people, of course, it gave a sense of success‘’.

P2‘’... since I am a person who does indoor sports a little more, it satisfies my ego a little more when it is looked at from the outside. Because it is a sport that is in front of people's eyes. Therefore, I feel more egoistic, more elevated‘’.

P6‘’... I mean, for me, the ambition to win, you look at the map like this, on the one hand the adrenaline is high, you are running, there is a certain target, you are trying to find the target. You think about your other competitors, how many seconds it took them to do it, did they find the target before me, it makes you feel good‘’.

P8‘’... First of all, there is an excitement because it is a competition, but you don't feel this excitement after you start, you know, when you run, when you look at the map, I think it improves both visual intelligence because, for example, I have been here for 2 years at the university, but I probably haven't visited all parts of the university, thanks to the map made by our teacher, I also went to the veterinary hospital, I didn't go there much, I had the chance to visit those parts, I went on roads I didn't know, I think it improves visual intelligence by looking at the map, and I think it improves my practical intelligence because I think it is useful for me in that respect, because how can I go shorter and so on. ‘’ with these sentences, the students explained their positive psychological experiences while orienteering.

Negative Psychological Experiences

Table 5. Recreation department students' opinions on negative psychological experiences of orienteering

Category	**Codes**	**Students**										***f***
		P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	
Negative Psychological Experiences	Fear		X	X				X			X	**4**
	Anxiety		X	X	X	X						**4**
	Helplessness		X				X					**2**
	Stres		X		X	X	X	X	X		X	**7**
	Frustration						X		X			**2**
	Anger					X			X			**2**
	Panic								X			**1**

When Table 5 is examined, the codes and frequency values containing the opinions of recreation department students about their negative psychological experiences related to orienteering are shown. The negative psychological experiences of recreation department students while orienteering were expressed through concepts such as fear, anxiety, helplessness, stress, frustration, anger, and panic. It is evident that students expressed concepts such as stress (f:8), fear (f:4), and anxiety (f:4) more frequently. In addition, codes such as disappointment, anger, panic, helplessness, and distraction are particularly noteworthy.

It is possible that the students, experiencing orienteering for the first time, encountered both positive and negative emotions. The stress and anxiety experienced by the students while searching for the target, as well as the anxiety they felt during this process, were reflected in their expressions. The students' fear of getting lost is another category that stands out. Many people experience the fear of getting lost while orienteering; however, the fact that forest areas are often associated with fear-related images in their mental images may be one of the reasons for students' fear.

Additionally, it is clear from the students' expressions that failing to find the target by drawing the wrong route, or locating the wrong target, caused disappointment. Moreover, they expressed anger and panic when they were unable to find a target. The related opinions of the students participating in the research regarding their negative psychological experiences in the orienteering lesson are provided below as direct quotations: *P6''...I mean, when you can't reach the target, you are a little out of breath because your adrenaline is high. When you cannot find a target, you feel that you have passed the time. You think that others can do it faster than you and this is a negative thing for me.''*

P6''... I mean, how can I open it, now, as I said, time passes, on the one hand, you have not found the target, on the other hand, you think that others have found it, you think that you have lost it, and the next time, when you cannot find it, you lose your enthusiasm.''

P2 ''... I close myself to the outside because there are 5-6 more targets I need to find and I need to focus on the targets I have found because time is passing and we are racing against time because it is not a job we do in a laylay lom...''

P4''... What will happen if you can't find it, how can I do it, how can I find it? They were worried, but as I said when they find it, it is enjoyable. I mean, achieving something difficult.''

P5''... there was also something like not being able to reach the target, such as anxiety. At first, one of these targets, for example, the distance from the first target to the second target is too far, should I go there at first, I think strategically at that moment.''

P7''''... at first there was fear that I would not be able to find the target, I would not be able to catch up."

P8''... when I can't find the target or when I have difficulty in going, when I get tired, there is a slight panic, anger, why didn't you go from here, regret, why didn't you go from here, it would be easier if you went from here, it would be easier to go from here, self-commentary, these kinds of things usually happen.''

P6 ‘’... expressed the negative psychological experiences they had while orienteering with sentences such as ‘’... you go to the wrong target, you question yourself: why did I come here? where did I go wrong?‘’.

Social Experiences

Table 6. Recreation department students' views on social experiences regarding orienteering

Category	Codes	Students										*f*
		P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	
Social Experience	Collaborate		X		X				X	X	X	**5**
	Communication		X	X	X	X	X	X	X	X		**9**
	Brainstorming			X			X					**2**
	Competition								X			**1**
	Peer Education		X		X							**2**

Table 6 shows the codes and frequency values of the recreation department students' opinions about their social experiences in the orienteering course. The social experiences of recreation department students in the orienteering course were expressed through concepts such as cooperation, communication, brainstorming, competition, and peer education. It is evident that they expressed the concepts of communication (f:9) and cooperation (f:5) more frequently. In addition, codes such as brainstorming, competition, and peer education are particularly noteworthy.

Orienteering is a sport that offers many opportunities for peer education, cooperation, and socialization after the competition, in addition to being a sport that requires solo struggle in nature. We also observe this in the statements coded from the experiences of students who have taken orienteering lessons. During the interview, we observed that orienteering enhances communication, especially emphasizing the importance of communication. Moreover, the students excitedly expressed that it also allows for peer education and brainstorming.

The opinions of the students participating in the research regarding their social experiences in the orienteering course are provided below as direct quotations: *P10‘’... we did it, for example, my friend went somewhere else and I went somewhere else, so this road could have been shorter or you could have gone this way or that way.‘’*

P4‘’... Of course, we shared things with each other. I mean, we discussed how we found the targets difficult, the targets easy, how we found the targets or how we looked at them on the map, we talked about them, we had communication about the targets.‘’

P8‘’... in my social relationships, you know, sometimes we can help each other more because we are not doing this professionally, we can even help someone we don't know, we can even help someone we don't know, if they are very tired, if they are exhausted, you can see them in two seconds, they are already red, sweaty and out of breath, you can help them, it is nice.‘’

P9‘’... orienteering in social relations, of course, before doing orienteering, there is a chat environment there, there is also cooperation, such as where we are, I didn't understand this, I didn't understand that, what was this object, both in terms of refreshing information and socialisation, of course, people with low self-confidence sometimes had to ask for help.‘’

P9''... There was also one in our class, he said that he had social anxiety, but sometimes he was already coming because we had to help him, but he was asking for help, where am I, I don't understand where I am, where is my goal, he was actually a little bit more out of himself there, he did not miss asking questions.''

P7''... I mean, since I did it with people I didn't know, I started to mingle with them afterwards, like how did you find it, how did you interpret it, etc. I mean, I kind of socialised with them, which is a nice feeling, and I made new friends.'' with sentences such as these, the students expressed the social experiences they had while orienteering.

DISCUSSION

This study examined the views of recreation department students on their psychosocial experiences while orienteering. When the findings obtained from the students were analyzed, three themes emerged: mental, psychological, and social experiences (Table 2), with psychological experiences divided into two subcategories: positive and negative psychological experiences. Upon analyzing the codes related to mental experiences (Table 3) from student experiences, it was determined that there were frequently repeated codes such as focusing (f:6), improving memory (f:5), finding directions (f:4), visualizing in the mind (f:3), and problem solving (f:5).

When analyzing the codes of positive psychological experiences (Table 4) from student experiences, it was found that happiness (f:8), sense of success (f:6), excitement (f:6), and self-confidence (f:4) were among the most prominent. Among the negative psychological experiences (Table 5), stress (f:7), anxiety (f:4), and fear (f:4) codes stood out. The fact that students experienced a range of opposite emotions while engaging in orienteering may be related to the outdoor, risky, and adventurous nature of the sport. It was reflected in the students' expressions that they experienced stress while attempting to reach the targets via correct routes, competing against time on the track and with their competitors, and that they felt happiness when they found a difficult target or completed the competition with the desired performance. Additionally, it was found that communication (f:9) and cooperation (f:5) codes were notably repeated in the social experiences (Table 6). The students' statements reflected that discussing difficult targets after orienteering activities and sharing strategies for target finding contributed socially and mentally. It is essential for recreation department students to be equipped with a diverse range of experiences, especially in outdoor sports like orienteering, which has gained significant popularity in recent years (Özkavak et al., 2024). Moreover, the emotions students experience while engaging in orienteering, the positive social relationships they form, and their development in mental skills are crucial factors. The findings of our current study and the findings of the literature are discussed under three headings: mental experiences, psychological experiences and social experiences.

Mental Experiences

The mental experiences of the recreation department students during orienteering were expressed with concepts such as attention, focus, memory development, mental imagery, orienteering skills, calculation skills, effective and fast decision making, problem solving skills,

and selective perception. The students stated that they focused on the map, used their memories intensively, and developed various strategies when choosing a route, especially when reading the map, determining the locations of the target points, and going towards the target. When the literature is examined, there are studies that address the relationship between orienteering and psychophysiological, mental, cognitive and social aspects (Eccles et al., 2002; 2006; Feraco et al., 2021; Karaca, 2024; 2025; Karaca & Gündüz, 2021). Research on the relationship between orienteering and mental skills has focused on how orienteers position themselves in the environment (Mottet & Saury, 2013) or how and where they focus their attention to overcome information processing limitations during races(Eccles et al., 2002; Martin Mottet et al., 2016). Furthermore, Cornoldi et al. (2003) reported that orienteering experts had a stronger sense of direction (compared to non-practitioners or beginners) and demonstrated higher survey (map-based) representations of the environment, although they did not differ in landmark and route representations. In addition, Kaya et al. (2024) stated that orienteering can provide positive mental effects on young people who are engaged in orienteering, (Arıkan & Aladağ, 2019) stated that orienteering course is effective in improving students' map literacy skills. Tuna and Balcı (2013) found that orienteering increased their perception of map use self-efficacy. Similarly, Ayulde and Akbaş (2023) stated that orienteering has an effect on academic achievement and map literacy levels. Henriksen (2019) concluded that orienteering practices are effective in improving students' spatial thinking skills. Cataldi et al. (2021) investigated the relationship between orienteering training and short-term visuospatial memory and found that orienteering training improved recall and visuospatial memory. Feraco et al. (2021) examined whether orienteering is related to people's visuospatial skills and orienteering attitudes and reported that athletes with different orienteering specializations (n=51) scored higher than controls on visuospatial tasks and had more positive orienteering attitudes. The findings showed that orienteering improves individual visuospatial abilities, attitudes, spatial habits and spatial learning. Similarly, Sirakov and Belomazheva-Dimitrova (2021) examined the effect of a training program on mental attributes in elite orienteers (n=30) and concluded that orienteering tools improved concentration, attention stability and attention span. Waddington et al. (2024) argued that the cognitive benefits of exercise increase when combined with cognitive training and that orienteering provides more cognitive benefits than physical exercise alone, especially when performed at high intensities, as it combines exercise with spatial orientation. Feraco et al. (2021) investigated the relationship between orienteering training and short-term visuospatial memory and found that orienteering training improved recall and visuospatial memory. Together with these findings, our study results are consistent with psychological and cognitive-based themes such as memory improvement, attention, focus, orientation and cognitive development. Therefore, we can state that the findings of our study contribute to mental development in the context of mental experiences and are similar to many studies in the literature.

Psychological Experiences

When the positive psychological experience codes from the student experiences (Table 4) were examined, it was seen that happiness (f:8), sense of success (f:6), excitement (f:6) and self-confidence (f:4) were prominent. Among the negative psychological experiences (Table 5), stress (f:7), anxiety (f:4) and fear (f:4) codes were prominent. The fact that students experienced a series of opposite emotions while doing orienteering may be related to the open-air, risky and adventurous nature of the sport. It was reflected in the statements that students experienced

stress while trying to reach their goals on the right routes, competing against time and with their opponents on the track, and were happy when they found a difficult goal or completed the competition with the desired performance. When the literature was examined in the context of psychological experiences of orienteering, various studies examined different aspects of orienteering. Gorgulu et al. (2024) stated that mistakes made during orienteering affected psychophysiological reactions, especially heart rate. Waddington and Heisz (2023) tested orienteers with varying levels of experience (n=158) and found that expert orienteers had better allocentric and egocentric spatial processing and superior spatial memory. These effects persisted even after controlling for age, gender, and physical activity, suggesting that orienteering may be an effective intervention to prevent age-related cognitive decline in spatial navigation and memory. Additionally, Kaya et al. (2024) suggested that orienteering may have positive effects on the emotional development of young individuals, while Sümbül et al. (2019) highlighted the social, physical, and psychological benefits of nature-based sports such as orienteering. Leeder and Beaumont (2023) conducted a qualitative study with 84 British orienteering coaches and highlighted the values and beliefs of coaching philosophies that promote inclusiveness, fun, holistic development, and transferable skills. They emphasized the social aspects of orienteering, stating that coaches should foster inclusive, socially supportive environments that promote psychological and holistic development. Blagii et al. (2018) validated and tested orienteering teaching methods in physical education for high school students and found improvements in cognitive functions and positive psychological outcomes such as well-being, activity and mood. We can say that orienteering sports, due to its nature, requires making instantaneous correct decisions, and that this situation, which includes psychological difficulties as well as physiological difficulties, is reflected in the student experiences in the current study. Therefore, the findings of our current study seem to describe the positive and negative reflections of psychological experiences, while the literature focuses on the positive psychological gains of individuals who do orienteering.

Social Experiences

It was determined that the codes of communication (f:9) and cooperation (f:5) were significantly repeated in social experiences from student experiences (Table 6). Although orienteering is a sport practiced individually, it is a sport in which information sharing and joint analyzes are made between orienteers after the event and especially route selection is discussed. Therefore, orienteers communicate a lot after the event. In this context, Kalkan and Güzel (2018) found that orienteering, which is considered as a leisure time activity, has significant effects on individuals in both socialization and determination levels. According to Kaya et al. (2024) and Yildiz (2022) stated that orienteering can provide positive effects on the social development of young people.

Together with these findings, our study results are aligned with psychological and mental-based themes, such as memory improvement, attention, focusing, orientation, and cognitive development. According to Leeder and Beaumont (2023) conducted a qualitative study with 84 British orienteering coaches, emphasizing the values and beliefs of coaching philosophies that promote inclusiveness, fun, holistic development, and transferable skills. They highlighted the social aspects of orienteering, stating that coaches should foster inclusive, socially supportive environments that promote psychological and holistic development. According to Blagii et al. (2018) validated and tested orienteering teaching methods in physical education

for high school students, finding improvements in cognitive functions and positive psychological outcomes, such as well-being, activity, and mood. Another study in the literature suggested that a six-week orienteering program may serve as an effective educational tool to enhance the diversity of instructional methods employed by teachers (Asma & Yıldız, 2023). Mottet et al. (2016) used an enactive and phenomenological approach to explore novices' experiences in orienteering, concluding that participants constantly made judgments about the reliability of their navigation estimates. They argued that navigation in orienteering goes beyond a logical, computational process, incorporating embodied, social, cultural, and situated dimensions.

In line with these studies, orienteering has been shown to have positive effects on physical, mental, psychological, cognitive, and social aspects. In our study, we found that students' psychological experiences of orienteering were consistent with the results of several quantitative studies mentioned in the literature. Specifically, students expressed feelings of motivation, fun, happiness, self-confidence, adrenaline, a sense of success, cooperation, socialization, and positive communication.

However, the current study has limitations. As a qualitative study conducted with a volunteer sample, it has inherent challenges, such as difficulties in establishing a common mindset and methodology within the researcher group. Additionally, the students' experiences were confined to the orienteering course, and a volunteer sample group was used, so the psychosocial reflections may differ for students participating in orienteering on different tracks. Moreover, although the objectivity of the research was tried to be maintained by controlling the values, principles, beliefs, beliefs, experiences and approaches of the researchers towards the problem situation, this can be considered as another limitation of the research since it is not possible to completely neutralize these factors.

CONCLUSIONS

As a result, the findings obtained from interviews with recreation department students who had engaged in orienteering for an extended period (12 weeks) were categorized into three themes: mental, psychological, and social experiences. Psychological experiences were further divided into two subcategories, and codes were formed under each of these themes and categories. Mental experiences were expressed with codes such as attention, focusing, memory improvement, mental imagery, orientation skills, effective and fast decision-making, and problem-solving skills. Positive psychological experiences were described with concepts such as self-confidence, motivation, facing fears, adrenaline, happiness, love, feeling valuable, a sense of success, and excitement. Negative psychological experiences were articulated through concepts such as fear, anxiety, helplessness, stress, frustration, anger, and panic. Social experiences primarily featured codes related to cooperation and communication, which were particularly prominent. Future research could explore orienteering experiences in different environments or contexts, and the experiences of various sample groups could also be examined to gain a broader understanding.

Conflicts of Interest

The authors declare that they have no conflict of interest in relation to this article.

Authorship Contribution Statement: Study Design- RA, The Data Collection- RA; SEB; EDÜ; NA, Statistical Analysis and Manuscript Preparation- RA; SK, All authors read and approved of the final manuscript Information on.

Ethical Approval

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The Effect of Resistance Band Exercises on Strength Parameters in Pubertal Soccer Players

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Abstract

The aim of this study was to investigate the effect of resistance band training for 6 weeks on the strength performance development of puberty boys participating in soccer. Pre-test - post-test control group research design was used. The study was randomly divided into two groups as resistance band group (n=15) and control group (n=15) by randomization method. While the resistance band and control groups continued their regular soccer training, the resistance band group performed resistance band exercises before training 2 days a week for 6 weeks in addition to soccer training. Resistance band and control groups were tested for strength performance; explosive strength; vertical jump, standing long jump, backward medicine ball throw, upper body and core muscular endurance; plank test, 30 seconds push-ups, 30 seconds sit-ups, maximal strength; back and leg strength test, and for anaerobic power; pediatric rast test were applied. At the end of 6-week training, the two-way ANOVA test with repeated measures was used to determine the difference between the repeated measurement results obtained at two different time points in the dependent groups. Significance level was determined as $p<0.05$ in all calculations. When the pre-test and post-test differences of the resistance band group and the control group were examined, it was found that there was a statistically significant difference in explosive strength, muscular endurance, maximal strength values and a statistically significant difference in anaerobic power parameter.

Keywords: Anaerobic power and capacity, Explosive strength, Isometric strength, Strength training

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INTRODUCTION

Increasing the physical abilities of athletes during the development period has attracted significant interest in sports science, with research on this topic growing in recent years (Bonilla et al., 2021; Kokorev et al., 2023; Martínez-Aranda et al., 2024; Melin et al., 2024; Ojeda-Aravena et al., 2023; Ramirez-Campillo et al., 2022; Spiering et al., 2021). Athletes' physical fitness levels are closely linked to their health during training (Halson, 2014), which is critical for enhancing performance and ensuring long-term health (Burke et al., 2011). Proper strategies to enhance athletes' performance help them achieve their objectives, and balancing health with performance has become a crucial goal (Kraemer & Fleck, 2007). Consistent and structured training has been shown to significantly improve performance and promote long-term health outcomes (Burke et al., 2011; Smith & Norris, 2002). Strength training plays a pivotal role in the athletic progression of young athletes, offering advantages such as enhanced explosive power, increased speed and agility, and improved joint stability (Suchomel et al., 2016). Research demonstrates that strength training not only enhances muscle strength but also tendon endurance and joint stability, reducing the likelihood of injuries, particularly in critical areas like the knee and hip (Faigenbaum & Myer, 2010). Studies have found that young football players engaging in regular resistance training exhibit a reduced risk of injury, enhanced joint stability during repetitive motions, and an increased ability to withstand stress loads (Lesinski et al., 2016). Despite concerns about the safety of strength training during growth, they are often believed to stunt growth or cause permanent damage to growth plates—there is no evidence to support these claims (Lloyd et al., 2014). On the contrary, appropriate strength training has been found to improve athletic performance without negatively affecting growth (Myer et al., 2011).

In addition to traditional strength exercises, squat, lunge, and resistance band exercises are recognized for their potential to increase muscle mass and endurance (Behm et al., 2008). Resistance bands, known for their portability, affordability, and effectiveness, are an indispensable tool for strength training in young football players (Lesinski et al., 2016). These bands can enhance muscle mass, improve endurance, and support joint stability (Lesinski et al., 2016). Moreover, resistance bands have been shown to improve performance parameters such as speed, agility, and vertical jump (Mor et al., 2022). Resistance training with bands is particularly effective for developing motor control and intermuscular coordination, which improves skills such as passing and shooting in young football players (Lloyd et al., 2014). The use of resistance bands in training can also improve long-term health and physical activity levels in young athletes (Faigenbaum & Myer, 2010; Myer et al., 2011).

Despite the growing body of evidence supporting the positive effects of resistance band exercises on strength and functional capacity (Martins et al., 2021), research on their impact on pubertal athletes remains limited. Few studies focus on how elastic band exercises influence neuromuscular performance indicators such as reactive strength, dynamic strength, vertical jump, and postural sway (Lee et al., 2020). Strength development in children is influenced by the central nervous system's functioning, hormonal development, and the ability to tolerate oxygen debt (Rhea et al., 2003). While strength training in children primarily aims to improve neuromuscular connection rather than hypertrophy (Faigenbaum et al., 2001), resistance

training, including resistance band exercises, has been shown to rapidly enhance physical capacities and reduce injury risk (Hammami et al., 2022). Given the importance of strength in football performance, it is believed that resistance band exercises can produce positive results in young athletes (Mor et al., 2022; Suchomel et al., 2018). This study aims to investigate the effects of resistance band exercises as part of standard in-season training programs on the performance of pubertal football players. Ultimately, it seeks to contribute to training methodologies that support the athletic development of young athletes.

METHOD

Research Model

A structured pre-test post-test experimental design with a control group was used to analyze the effects of a six-week resistance band training program on strength performance. Thirty male volunteers in puberty from Kastamonu, who had played football for at least two years, formed the study group, enabling a thorough investigation into the training's effectiveness and its implications for adolescent athletes' physical development.

Research Groups

Voluntary consent form and parental consent form approval were obtained from the participants. The participants included in the study were divided into two groups as the experimental group (n=15) and the control group (n=15) by the randomization method. All participants were given information about vertical jump, standing long jump, backward medicine ball throw, 30-second push-up test, 30-second sit-up test, plank test, back leg strength test and PRAST tests, and then pre-test and post-test were performed. The mean age of the participants was determined as 11.46±0.51 Y/M in the resistance band group and 11.40±0.50 Y/M in the control group, their mean height was determined as 149.4±8.8 cm in the resistance band group and 147.4±8.47 cm in the control group, and their mean body weight was determined as 43.92±8.73 cm in the resistance band group and 42.26±9.21 kg in the control group.

Data Collection Tools

Height: The athletes' height was measured with a Mesilife MR-200 brand stadiometer with a precision of ± 1 cm

Body Weight: Participants' body fat percentages and body weight measurements were made with bare feet on an impedance analyzer (Omron BF-511 Digital Body Analysis Scale).

Medicine Ball Throwing Backwards; Medicine Ball Throwing Backwards: The athlete takes a position by placing the heels of his feet in front of the line and will throw, without crossing the line, and with his knees slightly bent, holds a 1-kilogram ball in front of his body with his arms stretched, and throws it with all his strength overhead and backwards to the maximum distance can throw. The distance between the line the athlete threw and the point where the medicine ball touched the ground was recorded in meters. The test was applied to the athlete twice, and the best result was recorded (Stockbrugger & Haennel, 2001).

30 Sec. Push-Up Test: The athlete places his hands on the ground in a prone position with hands shoulder-width apart and moves body properly with the angle created by arms. The participant lowers body down and bends elbows until chest is close enough to the ground. When the athlete's elbows are close enough to the ground, takes the starting position again. The application is limited by time. Each correct push-up is recorded (Diker & Müniroğlu, 2016).

30 Sec. Sit-Up Test: In this test, the highest number of sit-ups that the participant achieved in 30 seconds was recorded, in which abdominal muscle endurance was evaluated. Athletes were asked to lie on their backs, with their knees bent at 90 degrees and the soles of their feet on the ground, with their hands clasped behind their heads. The participant's position was fixed by the coach and the test teammate. The sit-up test was started by the coach with the start command. The participant lifted forehead past his knees for 30 seconds and returned to the starting position. Each correct sit-up performed by the participant was recorded (Diker & Müniroğlu, 2016).

Plank Test: This test is one of the basic static measurement tests used for back/core endurance. The participants were asked to lie face down and stand with their hands shoulder-width apart, and to stand on their toes, lifting their hips and keeping their hips, back, shoulders and neck parallel to the ground, and to maintain this position (Plank position). The time spent until the participant got tired and their posture deteriorated was recorded in seconds (Reiman and Manske, 2009).

Vertical Jump Test: Before the vertical jump test measurements were performed, the test protocol was explained to the athletes and the trials were performed on the mat. During the vertical jump test, a portable and controllable tablet was used to record the jump height in cm on the mat with a wide sensor area. The participant takes the starting position by standing on the contact mat area with the hands on the hips, knees bent at a 180-degree angle. The participant jumps to the highest distance that can be reached after the knees come to a 90-degree angle by receiving force from the arms. After the jump, the athlete contacts the mat again and comes to the starting position. The Microgate Witty device recorded the participant's jump height in centimeters. Three repetitions were made, and the best jump height values were recorded (Fatouros et al, 2000).

Standing Long Jump Test: The participant athlete positioned in front of the starting line with feet together and arms extended and performed a forward jump. The distance reached by the participant was measured in centimeters and jump was performed in two repetitions. The participant's best standing long jump was recorded. The test was performed on artificial turf.

Pediatric Running Based Sprinting Test (PRAST): The Pediatric RAST (PRAST) test includes 6 repeated sprint runs over a distance of 15 meters with ten-second rests in between. The only difference between the Pediatric RAST test and the RAST is the running distance area. While the RAST is performed at 35 meters, the Pediatric RAST test is performed at a distance of 15 meters. The Microgate photocell is positioned on both sides of the running area as the start and finish positions. The protocol was explained to the participants in detail and the test familiarization processes were provided (Bongers et al., 2014). The participant started his

sprint with the three-two-one start command while standing one meter behind the starting photocell. After finishing the first sprint, the rest period was kept for 10 seconds with the help of a stopwatch. The participant started the second sprint after resting for 10 seconds from where they finished the first sprint. This process in the test was performed in a way that would be 6 repeated sprints in total. The participant was asked to run quickly during all sprints. The participant was verbally motivated during the sprint process. The running times for each sprint run in the test were recorded in seconds. After all runs, the body weight of each participant was considered and the power outputs for each sprint run were calculated separately with the formula "Power = Body weight (kg) * Running distance squared (m2) / Running time cubed (s3)". The running time expressed with the formula was calculated in seconds (sec.), power outputs in Watts (W), running distance in meters (m) and body weight in kilograms (kg). After the power outputs for the sprint run were calculated, the lowest power output was recorded as minimum power, the highest power output as peak power and the arithmetic average of 6 power outputs as average power in absolute (Watt) values. The fatigue index was also calculated within a certain formula (Bongers et al., 2014).

Ethics Approval

The data collection process was carried out at Kastamonu Kuzeykent Hasan Doğan Sports Facilities Artificial Turf Football Field. Pre-tests and post-tests were applied with a total of 3 coaches and were carried out in 1 day between 18.00 and 19.00. The research was conducted with the decision of Kastamonu University Clinical Research Ethics Committee 2020-KAEK: 143-135 (Date: 12/01/2020).

Collection of Data

Both groups participated in Football training for six weeks and two days a week. The experimental group applied a special exercise program for the upper extremity, core region and lower extremity within a specially designed program with resistance bands during the warm-up phase for six weeks and two days a week, and after the resistance band exercises were completed, they were included in the main phase of the training. The movements in the resistance band training program are presented in detail in Table 1. and the 6-week training program is presented in Table 2. The control group participated only in their own Football training two days a week throughout the research period. The movements applied by the resistance band group were applied with a red resistance band (5 kg) for the first two weeks, with a blue resistance band (6 kg) for the following two weeks, and with a black resistance band (7 kg) for the last two weeks by increasing the band resistance level. Each movement was performed as 3 sets of 12 repetitions, and the rest period within the set was 15 seconds and the transition period between movements was 30 seconds (Tetik & Sevinç, 2019). The increasing loading principle was used as the loading principle in the training. Three coaches provided support to the athletes during the training process to ensure that they could perform the movements in the correct form.

Table 1. Detailed resistance band exercise program for the experimental group

1	2	3	4	5
Banded Plank (Core)	Side Plank Banded Leg Raises Right	Side Plank Banded Leg Raises Left	Banded Butterfly Bridge	Banded Crunch Slo-Mo
6	7	8	9	10
Biceps Curl Banded	Front Raise Banded	Latpull Down Banded	Standing Leg Abductions	Banded Hamstring Curl
11	12	13	14	15
Banded Lateral Lunge	Banded Side Steps	Banded Forward Lunge	Banded Back Lunge	Banded Squat+Leg Lift

Table 2. Resistance band exercise content

Movement	Training Number (Weekly)	Set	Rpt.	Rest Between Movements	Rest Between Sets	Type of Res. Band		
						1.2. Week	3.4. Week	5.6. Week
1	2	3	12	15 sec.	30sec.	Red	Blue	Black
2	2	3	12	15 sec.	30sec.	Red	Blue	Black
3	2	3	12	15 sec.	30sec.	Red	Blue	Black
4	2	3	12	15 sec.	30sec.	Red	Blue	Black
5	2	3	12	15 sec.	30sec.	Red	Blue	Black
6	2	3	12	15 sec.	30sec.	Red	Blue	Black
7	2	3	12	15 sec.	30sec.	Red	Blue	Black
8	2	3	12	15 sec.	30sec.	Red	Blue	Black
9	2	3	12	15 sec.	30sec.	Red	Blue	Black
10	2	3	12	15 sec.	30sec.	Red	Blue	Black
11	2	3	12	15 sec.	30sec.	Red	Blue	Black
12	2	3	12	15 sec.	30sec.	Red	Blue	Black
13	2	3	12	15 sec.	30sec.	Red	Blue	Black
14	2	3	12	15 sec.	30sec.	Red	Blue	Black
15	2	3	12	15 sec.	30sec.	Red	Blue	Black

sec: seconds, Red, Blue, Black: Indicates the hardness level of the resistance band used in the load. 5 kg = Red, 6kg = Blue, 7 kg = Black.

Analysis of Data

SPSS 23 (SPSS. Chicago. IL. US) package program was used in the statistical analysis of the study. The mean and standard deviations of the data were calculated with descriptive statistics. The normality of the distributions was determined by the Shapiro-Wilk test. Height, Weight, Fat Percentage and Body Mass Index data were accepted as confounders. The interaction between all measurements and confounders was evaluated using a multilevel mixed effect linear regression model. To evaluate the effect of confounders, simple regression model was used without any adjustments and then data were obtained by adding relevant independent variables to see if the regression coefficients changed. In addition, independent variables were accepted as confounders if the regression coefficient changed by more than 10%. To determine whether the main effect and main effect group interactions between the repeated measurement strength results obtained at two separate time points in dependent groups caused a difference or not, two-way ANOVA test was used in repeated directions in those showing normal

distribution. Additionally, for multiple comparisons, the Bonferroni correction was applied to control for Type I errors. The minimum (min.) number of participants required was determined with G-Power analysis version 3.1.9.6 (Dusseldorf, Germany) and was calculated by marking two-sided hypothesis test (effect size: 0.35) for minimum 80% power and 0.05 error level and the total number of participants (sample) was found to be 30. In addition, the training groups of the participants included in the study were determined by the double block randomization method.

FINDINGS

The differences in the pre-measurement demographic information of the resistance band group and the control group are shown in Table 2. According to the pre-measurement findings, no statistical difference was observed between the groups in terms of height, body weight, body fat percentage and body mass index ($p>0.05$). No confounding effect of gender, BMI or age was observed. Therefore, comparisons were made without any confounding effect. In addition, no difference was observed between the pre-test measurements of height, body weight and body mass index of the randomly assigned groups (Table 3).

Table 3. Baseline measurement data of participants (Pre-Test Results)

Variables	Group	Mean ± sd.	p
Height (cm)	DBG	149.4 ± 8.8	.243
	CG	147.0 ± 8.47	
Weight (kg)	DBG	43.92 ± 8.73	.661
	CG	42.46 ± 9.21	
Body Fat Percentage (%)	DBG	16.04 ± 5.53	.354
	CG	17.82 ± 4.78	
Body Mass Index (kg/m^2)	DBG	19.03 ± 2.43	.968
	CG	19.07 ± 2.80	

* $p \leq 0.05$, Data are shown as mean ± standard deviation; DBG= Resistance Band Group; CG= Control Group; mean= mean, sd= standard deviation

A two-way repeated measures analysis of variance (ANOVA) was conducted to examine the effects of time (pre-test and post-test) and group (experimental vs. control) on explosive strength, as measured through long jump, vertical jump, and backward medicine ball throw (Table 4). The results revealed a significant main effect of time, indicating an improvement in explosive strength over time across all measures. Standing long jump: $F= 96.711$, $p < .001$, $\eta^2 = .775$; Vertical Jump: $F= 147.523$, $p < .001$, $\eta^2 = .840$; Backward Medicine Ball Throw: $F= 43.017$, $p = .001$, $\eta^2 = .606$. The effect of group was not significant, suggesting that performance improvements were similar across both groups ($p > .05$). However, the time × group interaction was significant, indicating that the effect of time varied between groups. Long Jump: $F= 45.220$, $p = .001$, $\eta^2 = .618$; Vertical Jump: $F= 69.892$, $p = .010$, $\eta^2 = .714$; Medicine Ball Throw: $F = 21.383$, $p = .001$, $\eta^2 = .433$. Post-hoc comparisons revealed that the experimental group demonstrated a greater improvement in performance compared to the control group, respectively: Vertical long jump: +9.99% (experimental) vs. +1.85% (control); Vertical Jump: +31.97% (experimental) vs. +6.08% (control); Medicine Ball Throw: +12.21% (experimental)

vs. +2.05% (control). These findings indicate that, while both groups demonstrated improvement over time, the experimental group exhibits a significantly greater increase in explosive strength compared to the control group.

Table 4. Analysis of explosive strength performance

Test	Group	Test	n	Mean	sd.	Time	Group	Time ×Group
Standing Long Jump (cm)	RBG	Pre-Test	15	142.13	17.01	F=96.711 p= 0.001** η2=0.775	F=0.502 p= 0.485 η2=0.775	F= 45.220 p=0.001** n2= 0.618
		Post-Test	15	156.33	13.94			
	CG	Pre-Test	15	144.00	14.91			
		Post-Test	15	146.66	15.00			
Vertical Jump (cm)	RBG	Pre-Test	15	20.33	5.15	F=147.523 p= 0.001** η2=0.840	F=3.665 p= 0.066 η2=0.116	F= 69.892 p= 0.010** η2=0.714
		Post-Test	15	26.83	5.21			
	CG	Pre-Test	15	19.73	4.18			
		Post-Test	15	20.93	4.26			
Medicine Ball Throwing (cm)	RBG	Pre-Test	15	719.00	145.55	F=43.017 p= 0.001** η2=0.606	F=0.601 p= 0.066 η2=0.116	F=21.383 p=0.001** η2= 0.433
		Post-Test	15	806.86	145.91			
	CG	Pre-Test	15	741.40	167.72			
		Post-Test	15	756.60	166.49			

*p ≤ 0.05, ** p ≤ 0.01; Data are shown as mean ± standard deviation; RBG = Resistance Band Group; CG= Control Group; mean= mean, sd= standard deviation

The isometric strength, upper body, and core strength endurance of the subjects were assessed through a series of isometric tests, including the leg extension, push-up, sit-up, and plank tests (Table 5). The analysis revealed a significant main effect of time, indicating a general increase in strength performance; Leg Strength: $F = 85.556$, $p < .001$, $\eta^2 = .753$, Push-up: $F = 53.385$, $p < .001$, $\eta^2 = .656$, Sit-up: $F = 980.803$, $p < .001$, $\eta^2 = .743$ and Plank: $F= 39.802$, $p < .001$, $\eta^2 = .587$. These results indicate that both training interventions led to a significant improvement in strength performance over time. The effect of group was significant difference between groups was observed in push-up performance ($p < .05$), whereas other strength measures showed no significant group differences ($p>0.05$). The time × group interaction was significant, indicating that the effect of time on strength performance differed between groups. Leg Extension $F = 31.506$, $p < .001$, $\eta^2 = .6529$, Push-up: $F= 23.867$, $p < .001$, $\eta^2 = .460$, Sit-up: $F = 15.808$, $p < .001$, $\eta^2 = .361$, Plank: $F = 21.581$, $p < .001$, $\eta^2 = .435$. Post-hoc comparisons revealed that the experimental group demonstrated greater improvement in strength performance compared to the control group: Leg Extension: +34.39% (experimental) vs. +9.84% (control), Push-up: +52.80% (experimental) vs. +9.67% (control), Sit-up: +32.34% (experimental) vs. +11.53% (control), Plank: +43.22% (experimental) vs. +4.64% (control). These findings suggest that while both groups demonstrated improvement over time, the resistance band exercise program was more effective in enhancing isometric strength compared to the control condition.

Table 5. Analysis of isometric strength, upper body strength, and core strength endurance

Test	Group	Test	n	Mean	sd.	Time	Group	Time ×Group
Leg Extension (kg)	RBG	Pre-Test	15	54.66	19.16	F=85.556 p= 0.01** η2= 0.753	F=6.507 p= 0.016** η2=0.189	F=31.506 p=0.001** η2= 0.529
		Post-Test	15	73.46	15.79			
	CG	Pre-Test	15	46.73	14.86			
		Post-Test	15	51.33	15.88			
Push-Up (rep.)	RBG	Pre-Test	15	17.80	4.72	F=53.385 p= 0.001** η2= 0.656	F=0.601 p= 0.066 η2=0.116	F= 23.867 p= 0.001** η2= 0.460
		Post-Test	15	27.20	7.52			
	CG	Pre-Test	15	19.33	5.58			
		Post-Test	15	21.20	5.03			
Sit-Up (rep.)	RBG	Pre-Test	15	15.46	3.13	F=80.803 p= 0.001** η2= 0.743	F=0.051 p= 0.823 η2=0.002	F= 15.808 p= 0.001** η2= 0.361
		Post-Test	15	20.46	3.54			
	CG	Pre-Test	15	16.73	3.82			
		Post-Test	15	18.66	3.03			
Plank (sec.)	RBG	Pre-Test	15	142.20	96.81	F=39.802 p= 0.001** η2= 0.587	F=0.530 p= 0.473 η2=0.019	F= 21.581 p= 0.000** η2= 0.435
		Post-Test	15	203.66	133.14			
	CG	Pre-Test	15	201.00	131.07			
		Post-Test	15	210.33	131.69			

*p ≤ 0.05, ** p ≤ 0.01; Data are shown as mean ± standard deviation; RBG = Resistance Band Group; CG= Control Group; mean= mean, sd= standard deviation

The present study was conducted with the objective of examining the effects of time (pre-test vs. post-test) and group (experimental vs. control) on anaerobic power and capacity (Table 6). The assessment of these variables was conducted through the use of the pediatric RAST test, which provides a measurement of Peak Power, Average Power, and Fatigue Index. The results of the study indicated a significant main effect of time, suggesting that anaerobic performance improved over time across all variables. Specifically, the results showed that Peak Power: $F= 45.582$, $p < .001$, $\eta^2 = .619$; Average Power: $F= 31.248$, $p < .001$, $\eta^2 = .527$; Fatigue Index: $F= 19.993$, $p < .001$, $\eta^2 = .416$. These findings indicate that both training interventions resulted in a substantial improvement in anaerobic performance over time. The effect of group was not significant ($p > .05$), suggesting that there was no statistically significant difference in anaerobic performance between the experimental and control groups. Furthermore, the interaction between time and group was not statistically significant ($p > .05$), indicating that both training programs exhibited comparable effects on enhancing anaerobic performance. Over the course of the 6-week training period, both groups demonstrated comparable improvements in anaerobic performance: Peak Power: +18.23% (experimental) vs. +15.46% (control); Average Power: +17.80% (experimental) vs. +11.66% (control); Fatigue Index: +37.57% (experimental) vs. +37.20% (control). These findings indicate that both training interventions were equally effective in enhancing anaerobic power and capacity.

Table 6. Analysis of anaerobic power and capacity

Test	Group	Test	n	Mean	sd.	Time	Group	Time × Group
PRAST Peak Power (w)	RBG	Pre-Test	15	310.57	75.85	F=45.582 p= 0.001** η2= 0.619	F=0.006 p= 0.940 η2=0.000	F= 0.291 p= 0.594 η2= 0.010
		Post-Test	15	367.20	112.36			
	CG	Pre-Test	15	312.08	93.66			
		Post-Test	15	360.34	107.49			
PRAST Mean Power (w)	RBG	Pre-Test	15	274.12	58.83	F=31.248 p= 0.001** η2= 0.527	F=0.194 p= 0.663 η2=0.007	F= 1.458 p= 0.237 η2= 0.049
		Post-Test	15	322.91	96.34			
	CG	Pre-Test	15	269.68	81.78			
		Post-Test	15	301.14	93.32			
PRAST Fatigue Index (%)	RBG	Pre-Test	15	3.47	1.94	F=19.933 p= 0.001** η2= 0.416	F=0.194 p= 0.663 η2=0.007	F= 0.172 p= 0.682 η2= 0.006
		Post-Test	15	4.22	2.03			
	CG	Pre-Test	15	4.77	2.71			
		Post-Test	15	5.79	2.64			

*p ≤ 0.05, ** p ≤ 0.01; Data are shown as mean ± standard deviation; RBG = Resistance Band Group; CG= Control Group; mean= mean, sd= standard deviation

DISCUSSION and CONCLUSION

The most important finding of this study is that 6-week resistance training of 11–12-year-old boys playing Football is a method that causes improvement in isometric strength and also in the development of strength endurance and explosive strength. In particular, the findings obtained in isometric strength tests are considered significant, with the group difference being 24.55% higher than the mean change. Moreover, a notable finding was that the degree of change in explosive strength and strength endurance over time exhibited a higher positive development in comparison to the control group. It has been recognized that resistance band exercises play an important role in increasing explosive power in young athletes through various physiological and neuromuscular adaptations. In contemporary athletic training, the dynamics of resistance band exercises among young competitors can be classified into three categories: muscle fiber responses, neuromuscular adaptations, and coordination improvements. As athletes use resistance bands, muscle fibers respond uniquely to exercise demands. The neuromuscular system adapts significantly, enhancing movement efficiency and efficacy. Additionally, coordination becomes crucial, promoting agility for competition and the integration of movements. This multifaceted training approach highlights the importance of resistance band exercises, boosting young athletes' performance and establishing a strong foundation for future endeavours.

In contemporary athletic training, resistance band exercises are a key strategy for enhancing isometric strength, especially in youth and adolescents (Legerlotz, 2018). Young football players integrating isometric exercises see significant increases in maximal voluntary contractions and strength development (Häkkinen et al., 2011). A systematic review by Peitz et al. (2018) analyzed 75 studies with 5,138 participants aged 6 to 18, finding that resistance band programs effectively boost muscle strength and power in young athletes. Additionally, Mor et al. (2022) reported substantial improvements in balance, vertical leap, agility, and speed from these exercises. Canlı (2019) conducted a controlled study comparing standard basketball training with a strength regimen using resistance bands, highlighting the benefits of integrated training approaches.

As a result of the application, it was observed that the study group's standing long jump, vertical jump, medicine ball throw, and push-up test results increased more than the post-test results of the research group compared to the control group. The improvements in these performance parameters can be associated with an increase in isometric strength. In another study, Selçuk (2013) found that children who did swimming and strength training together improved their standing long jump, push-ups and sit-ups performances more than children who did only swimming training. In the study conducted by Ergener (2021) on judo athletes, only judo training was applied to the control group 6 days a week, and judo training was applied to the resistance band group 6 days a week and resistance band training was applied 3 days a week. As a result of the program, when the pre- and post-test values of the resistance band group were examined, it was determined that there was a significant difference in the standing long jump, backward medicine ball throw, and 30-second push-up test performances. In the study conducted by Gül (2019), while the control group received 90-minute tennis training 6 days a week, the resistance band group also received resistance band exercises 3 days a week at the

end of their tennis training. In the realm of physical fitness, a meticulous examination of the variances observed in final assessments between the control group and the resistance band cohort unveiled a noteworthy and statistically significant advantage for the latter. This distinction was particularly evident in the metrics of standing long jump, vertical jump, and the rigorous 30-second push-up evaluations. The research conducted by Bayrakdaroğlu et al. (2021) introduced a regimen of resistance band exercises in conjunction with football training for the experimental group, encompassing a demanding schedule of no less than seven hours weekly over an extensive eight-week timeframe. Conversely, the control group remained solely immersed in football training throughout the study's entirety. A thorough analysis of the pre-test and post-test scores elucidated that the resistance band group exhibited a markedly greater improvement in both standing long jump and sit-up performance when juxtaposed with their control counterparts.

In the investigation by Saravan and Kannan (2019), 24 middle school students engaged in resistance band exercises for 6 weeks, performing routines thrice weekly for upper and lower extremities. This approach significantly improved push-up performance in the resistance band group, highlighting the effectiveness of this training. Similarly, Coşkun's (2013) study involved strength exercises combining body weight with resistance bands over 6 weeks. Various assessments, including push-ups, sit-ups, leg strength, and bar hanging tests, showed that the group using only body weight improved less than those incorporating resistance bands. Prieske et al. (2016) incorporated resistance band elements into core strengthening exercises in young Football players. It was found that resistance band exercises caused increases in trunk muscle activity and led to significant performance improvements. The results of this study show that resistance band training can effectively improve core stability and contribute to overall athletic performance. In addition, it can be said that the strength parameters of the applied resistance band program, explosive strength, isometric strength and muscular endurance results support literature. Contrary to the findings of the reviewed studies, the results of our study did not show any statistically significant differences in sprints and calculated anaerobic performance results compared to the control group.

In their study, Kafa et al. (2020) included 13 male adult basketball players in a core training program consisting of 7 stations, 3 days a week, 40 minutes a day for 6 weeks, and including Bosu ball and resistance band exercises. In the study, pre-test and post-test data were evaluated within the scope of anaerobic power Running-Based Anaerobic Sprint. According to the results of the research, it was observed that the 6-week training had a statistically significant difference on the RAST test. Le Scouarnec et al. (2022) conducted a study to examine the effect of repeated sprint training with progressive elastic resistance on sprint performance and anterior-posterior force production in elite youth football players. In the context of the research conducted, it was observed that the cohort engaging in elastic resistance training exhibited noteworthy enhancements in both sprint performance and force generation, contrasting sharply with the control group, which failed to demonstrate any significant progress. Such findings indicate that the inclusion of elastic resistance within sprint training regimens can substantially elevate the sprinting capabilities of young football athletes. However, it must be noted that the six-week duration of the exercise protocol employed in this investigation may have been insufficient for the participants to achieve optimal adaptation. Conversely, a separate study

undertaken by Aktaş et al. (2011) highlighted that the group utilizing resistance bands not only engaged in strength training but also participated in tennis drills over an extended period of eight weeks, whereas the control group was limited to tennis training alone. As a result of the study, it was stated that the strength training applied for 8 weeks did not cause a change in anaerobic power in male tennis players aged 12-14. In this sense, there is a need for information in the literature regarding repeated sprint and anaerobic power outputs in this age group.

In our study, the results obtained from the standing long jump, vertical jump and backward medicine ball throw tests are significantly similar to the research findings examined in literature. As a result of the explosive strength development standing long jump, vertical jump and backward medicine ball throw tests, it is seen that there is a significant difference between the pre-test and post-test in the resistance band group. According to this result, the 6-week training application improved the standing long jump, vertical jump and backward medicine ball throw results of the participants. Within the scope of the research results, it can be said that the explosive strength capacity increased more in football players who had resistance band exercises.

When the participants' back and leg strength test results were examined in our study, it was stated that there was a statistically significant difference. As a result of the study, it was stated that the back and leg strength test results of the participants who took part in the 6-week training application improved. When evaluated as a percentage, the back and leg strength test increase was 34.39% in the resistance band group and 9.84% in the control group. When the literature is examined, it is seen that resistance band training performed additionally to strength training performance has a positive effect on maximal strength. When the push-up test, sit-up test and plank test results including the results of our research were examined, a statistically significant difference was determined. As a result of the research, the push-up test, sit-up test and plank test results of the participants who participated in the 6-week resistance band training improved. According to the push-up test results, 52.80% improvement was observed in the resistance band group and 9.67% in the control group; according to the sit-up test results, 32.34% improvement was observed in the resistance band group and 11.53% improvement was observed in the control group; according to the plank test results, 43.22% improvement was observed in the resistance band group and 4.64% improvement was observed in the control group. When the average results of the PRAST maximum strength test were examined, 18.23% improvement was observed in the resistance band group and 15.46% improvement was observed in the control group. The anaerobic power performance findings obtained as a result of our study are parallel to the literature findings. When compared with the literature, it was not observed that resistance band exercises positively affected anaerobic power capacity. As a result of the study, it was stated that muscle strength increases in 11–12-year-old football players were mostly due to neurological adaptations (Bompa & Haff, 2017). While no increase in muscle mass is seen in children during and before puberty, strength gain is seen. During this process, strength training programs stimulate the muscle and activate the central nervous system. It can be stated that this development can be understood when children perform movements related to strength and power efficiently. For this reason, with strength training, many muscles learn to move together, synchronization of movements and communication between muscles can be established. Finally, the inclusion of resistance bands in training

affects core stability and kinetic chain efficiency, which are very important for athletic performance. Exercises such as throwing a medicine ball with resistance bands help improve the connection between hip rotation, core stability and upper body power output (Palmer & McCabe, 2023). It is thought that this integrated approach will allow the athlete to effectively redirect force from the ground through the body, maximizing explosive movements that are essential in various sports.

As a result, this study found that a 6-week elastic band training program significantly improved explosive strength, strength endurance, and maximal strength in 11–12-year-old male football players. While no significant improvements were observed in anaerobic power, the resistance band group showed greater gains in strength-related parameters compared to the control group. The findings suggest that resistance band exercises are a practical and effective method for enhancing performance in young athletes. Incorporating such exercises into regular football training may support physical development during the pubertal period. The lack of a statistically significant improvement in anaerobic power may be explained by the specific characteristics and intensity of the elastic band exercises employed. The program primarily focused on resistance and strength-based movements, which may not have provided sufficient metabolic stress or high-intensity stimulus required to elicit adaptations in anaerobic power. Furthermore, the short duration and low frequency (two sessions per week) of the intervention might have been inadequate to produce measurable changes in anaerobic capacity within such a young population.

One of the limitations of this study is the relatively short duration of the intervention, which may not have been sufficient to observe the long-term effects of elastic band training, particularly on certain performance parameters. Moreover, the study did not include a follow-up period to assess the sustainability of the improvements observed post-intervention. External variables such as nutrition, sleep quality, and additional physical activities outside of the structured training sessions were not controlled, which could have influenced the athletes' performance outcomes. Lastly, the training protocol focused mainly on general strength development and may not have been specifically optimized for all performance domains assessed.

Suggestions

- More studies can be done on the effect of resistance band exercises on the strength parameters of 11–12-year-old football players.
- The development process can be examined by applying resistance band exercises on the strength parameters of 11–12-year-old football players for a period shorter or longer than 6 weeks.
- Resistance band exercises can be applied with a larger study group to determine the differences between the groups more clearly.

- The effects of resistance band exercises on female football players can be examined by including female athletes.
- The effects of resistance band exercises on athletes can be examined by including different branches.
- Resistance band exercises can be studied with professional football players and athletes from other branches.
- Muscle activation movements can be examined by means of an EMG device during the application of resistance band exercises.

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Reasons for Department Preference of Faculty of Sport Sciences Students with Classification Judgment Based Scaling Method*

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Abstract

This study was conducted using the scaling method based on classification judgments in order to determine the reasons for the department preference among students at the Faculty of Sport Sciences. The study was conducted at Sivas Cumhuriyet University, Faculty of Sport Sciences, during the 2022-2023 academic year and was completed with the participation of 297 students from the departments of Physical Education and Sports Teaching, Coaching Education, and Sport Management. Within the scope of the research, data were collected through a questionnaire that was revised based on expert opinions and comprised 37 statements. The data obtained were analyzed using Excel and R statistical programs. The results showed that individual factors played a primary role in students' reasons for choosing their department. The results indicate that individual factors are the most significant determinants of students' departmental preferences, with "my aptitude for the profession" and "my interest in the profession" cited most frequently. These were followed by environmental factors, particularly job opportunities and institutional infrastructure. In contrast, social influences, such as advice from family and peers, played a less prominent role. Notable differences emerged between departments: Coaching Education students prioritized career aptitude, while those in Physical Education and Sports Teaching emphasized alignment with future goals and job prospects. Sport Management students, on the other hand, focused more on the enjoyment derived from participation in sporting activities. Overall, while personal interests and career objectives were central to students' choices, departmental characteristics also contributed to shaping their preferences.

Keywords: Faculty of sport sciences, Reasons for department preference, Classification and ranking scaling, Motivational factors in university choice

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INTRODUCTION

Choosing a university and a field of study is one of the most significant decision-making processes with long-lasting effects throughout an individual's life. These choices not only determine one's career direction but also directly affect many aspects such as lifestyle, way of thinking, personal development, and contribution to society (Yavuz et al., 2018). A well-considered decision plays a shaping role in the opportunities, challenges, and successes a person may encounter in both professional and social life. Moreover, it is instrumental in the formation of identity, values, and social roles (Şeker & Çapri, 2020). University and department preference is the process of deciding which university and academic field students will study during their university life (Filter, 2010). This process shapes an individual's career orientation and determines their future professional life (Huffman et al., 2016; Öztürk & Ilıman, 2015). In this context, Holland's Theory of Vocational Choice (RIASEC) offers a significant framework for understanding individuals' decision-making processes regarding career preferences (Holland, 1996). According to this theory, individuals tend to choose careers that align with their personality types, and such congruence enhances both academic and occupational satisfaction. Similarly, the Social Cognitive Career Theory (SCCT) highlights the role of psychological mechanisms, such as self-efficacy beliefs, outcome expectations, and personal goals, in shaping students' preferences (Lent et al., 1994). These theories collectively emphasize that university and program preferences cannot be fully explained by external environmental factors alone. Instead, internal psychological dynamics play a critical role in the formation of these choices. However, recent studies show that external elements, such as economic security, employment prospects, and family influence, can become more dominant in students' decision-making processes (Mwinkume et al., 2024; Nguyen et al., 2023). While the university preference determines the institution where the student will receive their education, the department preference shows discipline in which the student will specialise and the field in which they will pursue their career (Kallio, 1995). These decisions are made in accordance with the individual's interests, abilities and career goals and have a direct impact on their professional success (Savickas, 1991).

Choosing the right university and the right field of study increases professional satisfaction and brings success in business. Working in a field that interests one strengthens their motivation and commitment to their work. In this context, the Self-Determination Theory (Deci & Ryan, 1985) underscores the significance of intrinsic motivation in individual decision-making processes. The theory posits that when the fundamental psychological needs for autonomy, competence, and relatedness are satisfied, individuals are more likely to make meaningful, volitional, and fulfilling choices. The selection of a university and academic department is, therefore, directly associated with the fulfillment of these basic psychological needs. This in turn helps to develop talents and maximise potential. At the same time, it helps to increase personal satisfaction and happiness (Bardakçı, 2019). On the other hand, making wrong choices can have negative effects on personal and professional life (Konak & Özhasar, 2019). Studying a subject that does not match one's interests and abilities can lead to academic failure and loss of motivation. In addition, studying a subject that they do not like or are not interested in may lose interest in their classes, which can reduce their academic performance. Furthermore, this

process can lead to a prolonged university graduation and an interruption in the educational process. Making the wrong choices can also lead to economic and time losses. While the years spent in the wrong department drain an individual's financial resources, a delayed start to a career can also lead to a loss of competitive advantage in the business world. On the other hand, wrong decisions regarding the choice of university and department can have negative consequences not only on a personal level but also in social and economic terms (Bardakçı, 2019; Şeker & Çapri, 2020). The inefficient use of educational resources slows down social development and has a negative impact on economic growth. A decline in the skilled workforce can lead to imbalances in the labour market and cause a decline in overall economic productivity. It is therefore very important for individuals to consider both their personal goals and their contribution to society when choosing a university and a field of study.

There are many studies in the literature that deal with the process of university and subject choice from various dimensions. These studies offer different approaches to understand the decision-making processes of students by analysing various factors related to the (Bardakçı, 2019; Chard & Potwarka, 2017; Çatı et al., 2016; Popp et al., 2011). Chapman's (1981) model is considered one of the first comprehensive and original studies on university choice processes. This model divides the factors that influence students' university choice into two categories: Intrinsic and extrinsic. Intrinsic factors include socioeconomic status, ability/expectations, and academic achievement, while extrinsic factors include family, friends, university staff, university location, academic staff, cost, and financial aid (Briggs, 2006; Chapman, 1981; Kallio, 1995; McManus et al., 2017; Şeker & Çapri, 2020; Wut et al., 2022). It is also found that factors such as university reputation, financial support, accommodation facilities and the academic environment play an important role in students' choice of university (Cosser & Du Toit, 2002; Maringe, 2006; Veloutsou et al., 2004). Factors such as educational expectations, academic reputation, the cost of education, the geographic location of the campus, the influence of university counsellors, and job prospects are among the other crucial factors that influence this process (Donnellan, 2002; Fernandez, 2010; Filter, 2010; Somers et al., 2006; Soutar & Turner, 2002). The socio-economic status of the family also plays an important role in students' choice of university and subject. Studies have shown that students who prefer education faculties generally have a medium socioeconomic status (Akbayır, 2002). Students' preferences are shaped by their parents' perceptions, and it has been reported that mothers' educational level has a significant impact on children's decision-making processes (McManus et al., 2017). In addition, the type of high school completed is also one of the important factors that influence preferences (Ulaş-Kılıç et al., 2020). Students who graduate from science high schools or Anatolian high schools generally tend to pursue prestigious fields such as medicine, engineering, and law, while students who graduate from vocational high schools tend to pursue applied sciences and technical fields (Ayık et al., 2010). In addition, it has been observed that students who graduated from physical education high schools tend to prefer Faculties of Sport Sciences (FSS) and Schools of Physical Education and Sports (SPES). Other factors that affect preferences include the population of the university location, its distance from home, one’s circle of friends and the opportunities that the city offers to students (Coşar, 2016; Fletcher, 2012; McManus et al., 2017). On the other hand, universities located in regions where socio-political tensions prevail have been found to have low preference rates

(Çokgezen, 2014; Erol et al., 2012). In addition to the socio-economic and environmental factors that shape students' preferences, evolving sectors also significantly influence career trajectories. In recent years, driven by technological advancements and globalization, the sports industry has rapidly expanded and has become an attractive field offering promising career opportunities for individuals with professional aspirations (Turgut et al., 2004). This growth has increased the demand for a qualified workforce in the sports industry, thereby elevating the role of Faculties of Sports Sciences (FSS) and Schools of Physical Education and Sports (SPES) in training field-specific professionals. The rising demand and institutionalization within the sports sector have expanded employment and career opportunities for FSS and SPES graduates, consequently increasing the attractiveness of these faculties in university and program selection processes (Yıldız et al., 2020; Yurtsızoğlu & Gül, 2023).

FSS and SPES provide qualified individuals to the sports industry by offering training in areas such as coaching education, physical education and sports teaching, sports management and recreation. These institutions offer students the opportunity to work in different areas of the sports industry by providing both theoretical knowledge and practical skills (Atalay, 2020; Şaşmaz-Ataçocuğu & Zelyurt, 2017). Although the increasing number of FSS and SPES in Turkey provides more opportunities for students, the quality of education and opportunities offered by each faculty varies. Therefore, factors such as the variety of sports in which specialization is offered, the equipment the facilities and the competence of the academic staff are important factors to consider when choosing a university. Since the demand for each sport varies in the job market, it is important for students to prioritize departments that offer specialization in sports with high employment potential. The training and postgraduate courses offered by the faculties help to shape students' careers at a higher level. Some faculties create different opportunities by offering specialization courses in areas such as extreme sports. The areas of specialization offered by each faculty and the expertise of the academic staff play an important role in these preferences.

Another important factor affecting the chances of finding a job after graduation is the personnel needs of the relevant institutions (Şeker & Çapri, 2020). The limited employment capacity of institutions such as the Ministry of National Education, the Ministry of Youth and Sports, municipalities and private enterprises makes it difficult for graduates to find a job. The decrease in the number of appointments and the increase in the number of graduates have made this process more complicated. This is also confirmed in the study by McManus, Haddock-Fraser and Rands (2017). The study highlighted that students consider long-term factors such as the possibility of finding a job after graduation, the appropriateness of academic programs and the career opportunities offered by institutions. Therefore, it is important for students to carefully evaluate the job opportunities after graduation, the personnel needs of the relevant institutions and the appointment policies while choosing these departments (Korkut-Owen et al., 2012; Magnusen et al., 2014). While choosing the branches suitable for their interests, they should also consider the current situation and future demand of these branches in the labor market. When the considerations affecting university and department preferences are analyzed with scientific methods, more transparent results are obtained. This process, supported by numerical data, objectively reveals the dynamics behind preferences.

In educational research, it is important to determine the relationship between different variables and the characteristics intended to be measured, in order to establish a link between their actual and assumed magnitudes. The numerical expression of this relationship is referred to as scaling (Crocker & Algina, 1986; Öncü et al., 2022). In this study, a scaling technique based on classification judgments was used to identify the reasons behind the departmental preferences of students in the Faculty of Sport Sciences. This method is grounded in Thurstone's Law of Comparative Judgment in the field of psychometrics and enables individuals to indicate their relative preferences among given options. Thus, preferences can be ranked on a psychological scale according to individuals' mental judgments, allowing the indirect measurement of latent attitudes or value judgments (Thurstone, 2017). This approach enables the understanding and ranking of the relative importance of factors that influence students' choices during the decision-making process. Particularly in multi-criteria decision environments, it allows for the mathematical modeling of individual judgments (Torgerson, 1958; 1961). In this way, the primary factors influencing preferences can be quantified, and their relative significance can be clearly demonstrated. Such scaling studies provide valuable insights for university administrations and education policymakers in better understanding students' needs and expectations and in improving educational programs. Additionally, they offer important contributions to institutions providing education in sport sciences by guiding program development and shedding light on the perceived importance of various preference factors. The purpose of this research is to determine the reasons for the preference of sport science faculty students in order of importance using a scaling technique based on classification judgments. The research will seek answers to the following questions:

1. What are the factors that influence the preferences of students in the Faculty of Sport Sciences?
2. Are there differences between departments (coaching, physical education and sport teaching, sport management) in the reasons for preference?

METHOD

Research Model

This study employed a quantitative research design to systematically analyze the reasons behind students' departmental preferences in the Faculty of Sports Sciences. The classification-based scaling method was used, which enables participants to rank various options in terms of importance (Turgut & Baykul, 1992). Rooted in Thurstone's comparative judgment theory, this technique offers a statistically grounded ranking of individual mental preferences (Thurstone, 2017; Torgerson, 1958). Unlike traditional multiple-choice surveys, this method not only identifies preferred factors but also reveals the cognitive priority order among them. It was deemed appropriate for this study as it more accurately captures students' relative judgments in complex decision-making processes.

Research Groups

The population of the study consists of all students studying at the Faculty of Sport Sciences. The sample consists of 297 students (176 males, 121 females) studying at the Faculty of Sport Sciences at Sivas Cumhuriyet University in the 2022-2023 academic year who volunteered to participate in the study. The participants were 1st-4th grade students studying in different fields such as physical education, coaching education and sports management. The random sampling method was used to select the sample. The demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic characteristics of the participants

Variables		Number (n)	Percentage (%)
Gender	Male	176	59.3
	Female	121	40.7
Study Department	Coaching education	103	34.7
	Physical education teaching	98	33.0
	Sport management	96	32.3
University degree type	Sports high school	54	18.2
	Other high school graduates	243	81.8
Place of residence	Sivas	208	70.0
	Other	89	30.0
Total		297	100.0

Data Collection Tools

The study employed a researcher-developed questionnaire consisting of four demographic and 37 preference-related multiple-choice items. The instrument was based on the scale originally developed by Korkut-Owen et al. (2012) and revised by Bardakçı (2019), adapted through a comprehensive literature review to fit the study's objectives. Expert feedback from sport sciences academics was incorporated during its finalization. A pilot test with 20 students was conducted to evaluate clarity and applicability. Based on the feedback, ambiguous items were revised, enhancing the form's content validity and usability.

Ethics Approval

All phases of the study were conducted in accordance with ethical principles. The required ethics committee approvals for this study were obtained from the Sivas Cumhuriyet University Educational Sciences Research Proposal Ethics Evaluation Board on 30/04/2023 with document number 290527 and decision number E-50704946-100-290527. Participants were informed about the research, and it was emphasised that their participation was voluntary. An 'Informed Voluntary Consent of Participants' was obtained from the students who agreed to participate in the study.

Collection of Data

Data collection began after the necessary approvals had been obtained from the ethics committee and the institution. The students who agreed to participate in the study were informed about the research verbally and in writing, and an Informed Voluntary Participant Consent Form was obtained. The questionnaire was completed online and face-to-face via the Google Forms platform. A total of 297 students (176 males, 121 females) were reached. The questionnaires were sent to students from different disciplines such as physical education, coaching education and sport management.

Analysis of Data

The collected data were transferred to the Excel package program. The statistical program R (4.2.2) was used for data analysis. Descriptive statistics such as frequency (f) and percentage (%) were used for data analysis. The analysis results were presented by applying relevant statistical methods. In this direction, the data obtained were analyzed using the scaling technique based on classification judgments. As a result of this analysis, the reasons for choosing a department were determined and ranked from the most important reason to the least important reason.

FINDINGS

In this part of the study, the importance levels assigned by students of the Faculty of Sport Sciences to various reasons for their departmental preferences were analyzed. To this end, frequency, cumulative frequency, cumulative proportion, and unit normal deviation matrices were generated, followed by the computation of scale scores for each reason. Due to the multi-step nature of the scaling technique based on classification judgments, Tables 2 and 3 present the technical stages of the procedure, while Table 4 displays the final interpretable results. The findings indicate that preference reasons were ranked both at the faculty level and across departments, revealing notable differences between them.

Table 2. Frequency matrix (F), Cumulative frequency matrix, Matrix of cumulative ratios (P)

	Frequency Matrix (F)					**Cumulative Frequency Matrix**					**Cumulative Ratios Matrix**			
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**
Q1	3	3	10	103	178	3	6	16	119	297	0.010	0.020	0.054	0.401
Q2	27	14	28	139	89	27	41	69	208	297	0.091	0.138	0.232	0.700
Q3	9	5	18	100	165	9	14	32	132	297	0.030	0.047	0.108	0.444
Q4	11	9	33	98	146	11	20	53	151	297	0.037	0.067	0.178	0.508
Q5	4	3	13	98	179	4	7	20	118	297	0.013	0.024	0.067	0.397
Q6	25	20	57	86	109	25	45	102	188	297	0.084	0.152	0.343	0.633
Q7	17	13	56	102	109	17	30	86	188	297	0.057	0.101	0.290	0.633
Q8	7	8	48	123	111	7	15	63	186	297	0.024	0.051	0.212	0.626
Q9	54	41	63	73	66	54	95	158	231	297	0.182	0.320	0.532	0.778
Q10	2	2	13	98	182	2	4	17	115	297	0.007	0.013	0.057	0.387
Q11	65	20	44	87	81	65	85	129	216	297	0.219	0.286	0.434	0.727
Q12	4	2	15	106	170	4	6	21	127	297	0.013	0.020	0.071	0.428
Q13	52	40	71	62	72	52	92	163	225	297	0.175	0.310	0.549	0.758
Q14	44	34	59	82	78	44	78	137	219	297	0.148	0.263	0.461	0.737
Q15	61	48	51	71	66	61	109	160	231	297	0.205	0.367	0.539	0.778
Q16	28	25	42	99	103	28	53	95	194	297	0.094	0.178	0.320	0.653
Q17	67	25	47	74	84	67	92	139	213	297	0.226	0.310	0.468	0.717
Q18	14	21	36	97	129	14	35	71	168	297	0.047	0.118	0.239	0.566
Q19	92	51	51	52	51	92	143	194	246	297	0.310	0.481	0.653	0.828
Q20	80	33	60	66	58	80	113	173	239	297	0.269	0.380	0.582	0.805

Table 2 (Continue). Frequency matrix (F), Cumulative frequency matrix, Matrix of cumulative ratios (P)

	Frequency Matrix (F)					**Cumulative Frequency Matrix**					**Cumulative Ratios Matrix**			
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**
Q21	141	53	44	32	27	141	194	238	270	297	0.475	0.653	0.801	0.909
Q22	82	46	78	54	37	82	128	206	260	297	0.276	0.431	0.694	0.875
Q23	12	15	46	108	116	12	27	73	181	297	0.040	0.091	0.246	0.609
Q24	24	20	85	99	69	24	44	129	228	297	0.081	0.148	0.434	0.768
Q25	14	17	28	116	122	14	31	59	175	297	0.047	0.104	0.199	0.589
Q26	9	11	18	91	168	9	20	38	129	297	0.030	0.067	0.128	0.434
Q27	61	43	63	73	57	61	104	167	240	297	0.205	0.350	0.562	0.808
Q28	78	36	49	82	52	78	114	163	245	297	0.263	0.384	0.549	0.825
Q29	40	15	35	80	127	40	55	90	170	297	0.135	0.185	0.303	0.572
Q30	137	25	39	42	54	137	162	201	243	297	0.461	0.545	0.677	0.818
Q31	7	5	32	81	172	7	12	44	125	297	0.024	0.040	0.148	0.421
Q32	11	10	35	97	144	11	21	56	153	297	0.037	0.071	0.189	0.515
Q33	14	4	43	104	132	14	18	61	165	297	0.047	0.061	0.205	0.556
Q34	69	22	37	76	93	69	91	128	204	297	0.232	0.306	0.431	0.687
Q35	103	51	35	57	51	103	154	189	246	297	0.347	0.519	0.636	0.828
Q36	14	16	36	103	128	14	30	66	169	297	0.047	0.101	0.222	0.569
Q37	65	35	46	66	85	65	100	146	212	297	0.219	0.337	0.492	0.714

Table 2 presents the integrated results of the frequency distribution (F), cumulative frequency (Φ), and cumulative proportion (P) of the importance levels assigned by students of the Faculty of Sport Sciences to various reasons for choosing their academic department. Each row corresponds to a specific preference reason (Q1–Q37), and the columns represent importance levels ranging from 1 (least important) to 5 (most important). The first segment of the table (F) shows how frequently each importance level was selected, allowing direct comparison of student priorities. The second segment (Φ) displays the row-wise cumulative totals, illustrating how the importance of each reason aggregates across levels. The final segment (P) shows the cumulative proportions derived by dividing each cumulative frequency by the total number of respondents (n=297), thus providing a comparative metric of relative significance. For instance, Q10 (aptitude for the profession) received the highest score (level 5) from 182 students, highlighting its salience. Conversely, Q21 (influence of other relatives) was most frequently rated at the lowest level (1), suggesting it is relatively unimportant in students' decision-making. These combined matrices allow a comprehensive analysis of how different preference factors are valued, both absolutely and proportionally, supporting deeper interpretation of cognitive patterns in departmental choices.

Table 3. Unit normal deviations matrix (Z) and Weighting and Scaling (Condition B)

	Unit normal deviations matrix (Z)						a_j and Sc Calculation – Condition B					
Reasons	**1**	**2**	**3**	**4**	**totZjg**	**Zj**	**ssZj**	**aj**	**zj**	**ajzj**	**Sj**	**Sc**
Q1	-2.323	-2.050	-1.608	-0.252	-6.232	-1.558	0.919	0.807	-1.591	-1.284	0.57	1.802
Q2	-1.335	-1.089	-0.731	0.525	-2.630	-0.658	0.827	0.898	-0.806	-0.724	0.01	1.242
Q3	-1.876	-1.673	-1.239	-0.14	-4.928	-1.232	0.775	0.957	-1.096	-1.049	0.335	1.567
Q4	-1.786	-1.496	-0.921	0.021	-4.182	-1.046	0.797	0.931	-1.255	-1.169	0.455	1.687
Q5	-2.212	-1.985	-1.496	-0.26	-5.954	-1.488	0.872	0.851	-1.456	-1.240	0.525	1.758
Q6	-1.378	-1.030	-0.403	0.34	-2.471	-0.618	0.755	0.983	-0.693	-0.681	-0.033	1.200
Q7	-1.578	-1.276	-0.555	0.34	-3.069	-0.767	0.854	0.869	-0.823	-0.715	0.001	1.233
Q8	-1.985	-1.640	-0.799	0.322	-4.102	-1.026	1.027	0.722	-1.133	-0.818	0.104	1.337
Q9	-0.908	-0.468	0.08	0.765	-0.532	-0.133	0.722	1.027	-0.39	-0.401	-0.313	0.919
Q10	-2.471	-2.212	-1.578	-0.287	-6.549	-1.637	0.975	0.761	-1.754	-1.335	0.621	1.853
Q11	-0.776	-0.565	-0.165	0.605	-0.901	-0.225	0.608	1.219	-0.367	-0.448	-0.266	0.966
Q12	-2.212	-2.050	-1.471	-0.182	-5.915	-1.479	0.921	0.806	-1.341	-1.080	0.366	1.598
Q13	-0.934	-0.497	0.123	0.699	-0.61	-0.152	0.714	1.039	-0.47	-0.488	-0.226	1.006
Q14	-1.044	-0.635	-0.097	0.635	-1.142	-0.285	0.726	1.022	-0.551	-0.563	-0.151	1.081
Q15	-0.823	-0.34	0.097	0.765	-0.3	-0.075	0.674	1.101	-0.352	-0.388	-0.326	0.906
Q16	-1.315	-0.921	-0.468	0.394	-2.310	-0.578	0.734	1.010	-0.853	-0.862	0.148	1.380
Q17	-0.753	-0.497	-0.08	0.574	-0.756	-0.189	0.58	1.280	-0.335	-0.429	-0.285	0.948
Q18	-1.673	-1.186	-0.709	0.165	-3.403	-0.851	0.783	0.947	-0.98	-0.928	0.214	1.446
Q19	-0.497	-0.046	0.394	0.947	0.798	0.2	0.617	1.203	-0.04	-0.049	-0.665	0.567
Q20	-0.615	-0.304	0.208	0.859	0.148	0.037	0.644	1.152	-0.193	-0.223	-0.491	0.741
Q21	-0.063	0.394	0.846	1.335	2.512	0.628	0.6	1.236	0.419	0.518	-1.232	0.000
Q22	-0.594	-0.174	0.506	1.152	0.89	0.223	0.768	0.966	-0.003	-0.003	-0.711	0.522
Q23	-1.746	-1.335	-0.688	0.278	-3.491	-0.873	0.882	0.841	-1.009	-0.848	0.134	1.367
Q24	-1.400	-1.044	-0.165	0.731	-1.878	-0.47	0.954	0.778	-0.602	-0.468	-0.246	0.986
Q25	-1.673	-1.257	-0.846	0.226	-3.551	-0.888	0.815	0.91	-1.150	-1.047	0.333	1.565
Q26	-1.876	-1.496	-1.136	-0.165	-4.674	-1.168	0.734	1.011	-1.198	-1.212	0.498	1.730
Q27	-0.823	-0.385	0.157	0.871	-0.18	-0.045	0.73	1.016	-0.22	-0.223	-0.491	0.741
Q28	-0.635	-0.295	0.123	0.934	0.126	0.032	0.677	1.096	-0.111	-0.121	-0.593	0.64
Q29	-1.105	-0.896	-0.516	0.182	-2.334	-0.583	0.566	1.311	-0.851	-1.116	0.402	1.634
Q30	-0.097	0.114	0.459	0.908	1.384	0.346	0.439	1.689	0.053	0.09	-0.804	0.429
Q31	-1.985	-1.746	-1.044	-0.2	-4.975	-1.244	0.802	0.925	-1.311	-1.212	0.498	1.730
Q32	-1.786	-1.471	-0.883	0.038	-4.102	-1.025	0.802	0.926	-1.179	-1.091	0.377	1.610
Q33	-1.673	-1.550	-0.823	0.14	-3.906	-0.976	0.833	0.89	-1.143	-1.018	0.303	1.536
Q34	-0.731	-0.506	-0.174	0.487	-0.924	-0.231	0.531	1.398	-0.497	-0.695	-0.019	1.214
Q35	-0.394	0.046	0.349	0.947	0.949	0.237	0.563	1.317	0.112	0.147	-0.861	0.371
Q36	-1.673	-1.276	-0.765	0.174	-3.540	-0.885	0.798	0.93	-1.040	-0.967	0.253	1.485
Q37	-0.776	-0.421	-0.021	0.565	-0.654	-0.164	0.575	1.290	-0.212	-0.273	-0.441	0.791
TotZjg	-47.528	-35.257	-16.041	15.439	-83.387	Totav	Sst					
Av,Zjg	-1.285	-0.953	-0.434	0.417	-2.254	-0.563	0.742					

Table 3 presents the combined output of unit normal deviations (Z) and the weighting and scaling process under Condition B for the reasons behind students' departmental preferences in the Faculty of Sport Sciences. This integrated format enables both a diagnostic view of standardized deviations in response patterns and a final interpretative ranking based on statistical scaling. The first section of the table (Z-scores across columns 1–4) quantifies how

much each preference reason deviates from the overall average at different importance levels. Negative Z-values indicate lower perceived importance, whereas positive Z-values reflect reasons concentrated at higher importance levels. For instance, Q21 (influence of other relatives) had the strongest positive deviation at level 4 (Z = 1.335), while Q10 (aptitude for the profession) had the lowest deviation at level 1 (Z = -2.471), underscoring contrasting levels of perceived relevance. The summary statistics—total deviation (totZjg), mean deviation (Zj), and standard deviation (ssZj)—offer further insights into variability and central tendency for each reason across all levels. These are then used to calculate weight coefficients (aj) and the weighted deviations (ajzj), forming the basis for raw scale values (Sj). These were finally normalized to a 0-based index (Sc) to facilitate ranking. As a result, Q10 emerged with the highest Sc value (1.853), confirming its dominance as the most influential reason, while Q21 received the lowest score (Sc = 0.000), suggesting minimal effect on student decisions. This unified table therefore offers a comprehensive and quantifiable picture of how students prioritize different factors in selecting their academic department.

Table 4. Scaling of reasons for preference according to faculties and departments

Reasons	Generalsc	Reasons	CE_{sc}	Reasons	$PEST_{sc}$	Reasons	SM_{sc}
Q 10	1.853	Q 10	1.969	Q 5	1.898	Q 31	2.039
Q 1	1.802	Q 1	1.948	Q 4	1.860	Q 10	2.034
Q 5	1.758	Q 5	1.820	Q 10	1.860	Q 1	1.868
Q 31	1.730	Q 26	1.775	Q 1	1.814	Q 5	1.717
Q 26	1.730	Q 12	1.773	Q 29	1.752	Q 26	1.689
Q 4	1.687	Q 32	1.745	Q 26	1.714	Q 12	1.629
Q 29	1.634	Q 4	1.734	Q 31	1.701	Q 25	1.590
Q 32	1.610	Q 3	1.616	Q 25	1.619	Q 32	1.590
Q 12	1.598	Q 36	1.563	Q 33	1.590	Q 29	1.564
Q 3	1.567	Q 33	1.563	Q 16	1.569	Q 3	1.501
Q 25	1.565	Q 31	1.561	Q 32	1.560	Q 4	1.469
Q 33	1.536	Q 29	1.490	Q 12	1.555	Q 33	1.437
Q 36	1.485	Q 18	1.454	Q 36	1.531	Q 18	1.376
Q 18	1.446	Q 25	1.416	Q 3	1.526	Q 23	1.360
Q 16	1.380	Q 23	1.346	Q 2	1.499	Q 7	1.300
Q 23	1.367	Q 8	1.300	Q 18	1.475	Q 8	1.294
Q 8	1.337	Q 16	1.260	Q 8	1.398	Q 36	1.269
Q 2	1.242	Q 6	1.258	Q 23	1.392	Q 16	1.237
Q 7	1.233	Q 7	1.238	Q 34	1.334	Q 34	1.131
Q 34	1.214	Q 2	1.181	Q 6	1.252	Q 6	1.111
Q 6	1.200	Q 34	1.148	Q 7	1.206	Q 2	1.103
Q 14	1.081	Q 14	1.013	Q 14	1.160	Q 14	1.079
Q 13	1.006	Q 24	0.996	Q 17	1.105	Q 13	0.962
Q 24	0.986	Q 13	0.989	Q 11	1.065	Q 24	0.926
Q 11	0.966	Q 11	0.985	Q 13	1.048	Q 11	0.868
Q 17	0.948	Q 9	0.938	Q 24	1.024	Q 9	0.862
Q 9	0.919	Q 15	0.911	Q 15	0.956	Q 17	0.861
Q 15	0.906	Q 17	0.903	Q 9	0.935	Q 15	0.842
Q 37	0.791	Q 37	0.792	Q 37	0.874	Q 37	0.719
Q 27	0.741	Q 20	0.738	Q 27	0.825	Q 20	0.687
Q 20	0.741	Q 27	0.722	Q 20	0.796	Q 27	0.683
Q 28	0.640	Q 28	0.631	Q 28	0.710	Q 28	0.585
Q 19	0.567	Q 19	0.564	Q 19	0.635	Q 19	0.505
Q 22	0.522	Q 22	0.521	Q 22	0.583	Q 22	0.464
Q 30	0.429	Q 30	0.421	Q 30	0.507	Q 30	0.372
Q 35	0.371	Q 35	0.363	Q 35	0.438	Q 35	0.316
Q 21	0.000	Q 21	0.000	Q 21	1.898	Q 21	0.000

Table 4 presents the zero-based scale values (Sc) that indicate the relative importance students in the Faculty of Sport Sciences assign to various reasons for choosing their departments. These values are reported across the general faculty (GeneralSc) and by department: Coaching Education (CEsc), Physical Education and Sports Teaching (PESTsc), and Sport Management (SMsc), allowing for both overall and department-specific comparisons. Across the entire faculty, "My professional aptitude" (Q10) emerged as the most important reason (Sc = 1.853), followed by "My interest in the profession" (Q1, Sc = 1.802) and "It is suitable for my future goals" (Q5, Sc = 1.758). This trend indicates that students prioritize career-related fit and interest across disciplines. In Coaching Education, the same top three reasons were observed in similar order, with "My professional aptitude" (Q10) scoring highest (Sc = 1.969), reinforcing the emphasis on skill alignment and professional orientation. For Physical Education and Sports Teaching students, "Suitable for my future goals" (Q5, Sc = 1.898) ranked first, followed by "High probability of finding a job in this department" (Q4, Sc = 1.860) and "My professional aptitude" (Q10, Sc = 1.860), showing a stronger concern for employability and professional match. In the Sport Management department, "Because I enjoy participating in sporting activities" (Q31, Sc = 2.039) was most influential, indicating that personal interest in sports plays a critical role in students' decisions, followed by Q10 (Sc = 2.034) and Q1 (Sc = 1.868). Across all departments, "Guidance from other relatives" (Q21, Sc = 0.000) consistently received the lowest importance rating, suggesting that external familial influence is minimal. Similarly, "Just to have a Bachelor's degree" (Q35) was ranked low, implying that most students prioritize intrinsic and career-focused motivations over instrumental ones. This table not only highlights the common factors valued by all students but also reveals department-specific tendencies, offering a deeper understanding of student motivations and informing program development in sport sciences education.

DISCUSSION and CONCLUSION

This study examined the reasons for students' departmental preferences at the Faculty of Sports Sciences, identifying their relative importance and variation across departments using scaling matrices. While shared trends were observed faculty-wide, department-specific dynamics also shaped preference patterns. Across the faculty, "My aptitude for the profession" (Q10; Sc = 1.853) emerged as the most influential reason, followed by "My interest in the profession" (Q1) and "High probability of finding a job" (Q5). The least important factor was "Advice from other relatives" (Q21; Sc = 0.000), highlighting students' reliance on personal goals rather than external influence. In Coaching, students emphasized professional aptitude and personal interest, reflecting self-driven decision-making. Similarly, in Physical Education and Sports Teaching (PEST), job prospects (Q5) and personality compatibility (Q4) were prioritized. Conversely, "I enjoy sports" (Q31) was a key driver for Sport Management (SM) students, underlining intrinsic motivation. Again, Q21 consistently ranked lowest across all departments. These findings highlight how student preferences are shaped by a combination of internal motivations, career goals, and discipline-specific priorities. However, this study is limited to a sample group from the Faculty of Sports Sciences at Sivas Cumhuriyet University, which

restricts the generalizability of its findings. Broader studies involving multiple institutions and larger participant groups are needed to validate the results. Despite this limitation, the study contributes significantly to the literature by clarifying the factors behind major selection in sport sciences. While similar determinants are seen across disciplines—such as personal interest, ability, social influence, and structural conditions—this study also identifies field-specific patterns unique to exercise sciences.

In the study, “interest in the profession” stands out as one of the most important factors in students' reasons for preference. This result is in line with the study by Korkut-Owen et al. (2012), who found that professional interest is the most effective factor in faculty preferences. In addition, Turgut et al. (2004) emphasized that personal skills and interest in sports departments are crucial. Öztürk and Ilıman (2015) stated in their study with health management students that professional skills and interest ranked first among preference reasons and highlighted that individual skills are of general importance. Doğan and Türkmen (2019) emphasized that personal factors play a central role in career choice, and Bardakçı (2019) showed the importance of job search anxiety in career choice. Similarly, the study by Cárdenas et al. (2021) found that, in addition to individual abilities and career interest, support from family and teachers is also an important factor in students' career choices. This study shows that the interplay of personal and social factors supports the process of making an informed decision. However, some studies have shown that not only intrinsic motivations, but also extrinsic factors can be decisive in career choices. For example, in a study conducted in Ghana, Mwinkume et al. (2024) found that economic reasons, family influence, and job security were more prominent than vocational interest in students’ preferences for technical and vocational education. This finding partially diverges from the "interest in the profession" factor emphasized in our study and highlights the significance of contextual conditions in career decision-making.

Statements such as “It is suitable for my future goals” (question 5 - 1.758), “This department I have chosen will give me more advantages in obtaining a profession” (question 32 - 1.610), “The field allows me to improve myself” (question 12 - 1.598) and “There are more opportunities for career advancement” (question 18 - 1.446) show that students tend to choose departments not only for short-term educational gains but also for long-term career goals. Popp et al. (2011) emphasised that there are significant differences in the selection processes of domestic and international student athletes. Domestic sport students considered the possibility of finding a good job as one of the most important factors when choosing their university. Gürdoğan (2016) emphasises that the possibility of finding a job after graduation, personal development opportunities and career advancement opportunities are crucial for the choice of university. Similarly, Savickas (1991) found that alignment of interest, skills and long-term values play a role in an individual's career choice. These findings are consistent with Chapman's (1981) university choice model. In this model, an individual's abilities, interests and goals are considered important factors in career choice and major preferences. In addition, Lin (1997) stated that individuals consider not only present conditions but also future possibilities when making decisions, so it is of great importance for students to consider their career goals when making decisions. Similarly, McManus et al. (2017) found that factors such as academic

reputation, post-graduation employment opportunities and personal career goals are crucial to students' preference processes. Price et al. (2003) found that areas with high employment opportunities are attractive to students. Hooley and Lynch (1981) also found that the association of career opportunities with professional positions is crucial for students. However, some studies have shown that, contrary to the current research findings, students' preferences are shaped more by environmental and structural conditions. For example, Nguyen et al. (2023) found that in the post-COVID-19 period, economics students in Vietnam prioritized factors such as employment security, income potential, and resilience to economic fluctuations in their career choices. Similarly, Baharun et al. (2011) identified that, in addition to educational quality, factors such as family influence, cost, social life, and the physical location of the university played a significant role in international students' higher education preferences in Malaysia. These divergent findings indicate that academic and career preferences are shaped not only by individual orientations but also by varying economic and social conditions.

Another important factor influencing students' preferences is the expectation of personal development, which is reflected in the statement "The subject enables me to improve myself". While Korkut- Owen et al. (2012) stated that personal development goals play a crucial role in career choice, Erkuş et al. (2020) stated that individuals consider the possibilities of finding a job and advancing in the profession. This shows that students not only care about their employability, but also about their long-term professional development. In addition, the study found that students prefer the Faculty of Sport Sciences because they "enjoy engaging in sporting activities" (Question 31 - 1.730). This shows that individuals make their choices not only by considering tangible benefits or logical considerations such as future career opportunities but are also influenced by intrinsic and emotional factors such as personal satisfaction and enjoyment. Similarly, Strasser et al. (2002) found that the "fun and enjoyment" factor is one of the decisive factors in students' choice of university. Turgut et al. (2004) found that 34.5% of students preferred sports-related departments because they found them "active and enjoyable". Similarly, Özkurt et al. (2022) stated that one of the most important factors guiding individuals' behavior is 'pleasure" and that this feeling has a significant impact on the decisions and behaviors people make in daily life. Although this study did not focus directly on this main preference, it shows that the feeling of 'pleasure' occupies an important place in various decision-making and preference processes of individuals in daily life. This can be seen as one of the foundations on which the findings of the current study are based. Yavuz-Söyler (2022) stated that the fact that SPES is seen as a 'fun and enjoyable school' is an important factor in students' preference for this faculty. In another study by Saylan-Kırmızıgül and Kızılay (2020), it was emphasized that the expectation of a "fun field" is important for career preferences. These results show that students prefer not only job opportunities but also fields that fit their lifestyle and provide emotional satisfaction. At this point, some international studies also indicate that students' choices are influenced not only by career goals but also by factors such as personal satisfaction, compatibility with the social environment, and alignment with their lifestyle. For example, Simoes and Soares (2010) reported that students attach great importance to lifestyle-related aspects such as campus life and social facilities in their university selection. Similarly, Maringe (2006) emphasized that individuals tend to choose

environments in which they feel comfortable and happy, highlighting a direct link between this preference and personal satisfaction.

The statement “The probability of finding a job in this field is high” (question 5 - 1.758) shows that employment opportunities are an important factor for students. This result is in line with the findings of Doğan and Türkmen (2019) and Soutar and Turner (2002), who emphasize that the possibility of finding a job is a decisive factor in choosing a field of study. In addition, Şeker and Çapri (2020) stated that job opportunities are a primary criterion in students' educational and career choices. Similarly, Popp et al. (2011) emphasized that the employment potential of the degree and the academic reputation are decisive for the university preferences of domestic sport students. The study by Erkuş et al. (2020) shows that employment opportunities play an important role in students' subject preferences. In this context, the fact that sport sciences students see employment opportunities as the main reason why economic security after graduation is important to them. On the other hand, Tomlinson (2008) argues that students’ actions driven by post-graduation employment pressure may sometimes lead to the marginalization of personal interests, curiosity, and the sense of satisfaction, potentially reducing their overall contentment with the educational experience. This perspective suggests that employment prospects alone may not constitute a sufficient criterion for choice, and that some students place greater value on making more holistic and satisfaction-oriented decisions.

The findings of the study show that family and environmental factors have a minor influence on the preference processes of students in the Faculty of Sports Science. In particular, factors such as “advice/instructions from my parents” (1.006) and “advice/instructions from other relatives” (0.000) have very low significance, suggesting that these factors are less influential in students' preference decisions. The current findings suggest that students largely base their preferences on their personal interests, abilities and career goals. In the literature, these findings on exercise sciences students differ from some other studies. Şeker and Çapri (2019), for example, found that family support has a significant influence on the career choice process. Similarly, Özyürek and Kılıç-Atıcı (2002) found that guidance from family members is effective in students' career choices. Bardakçı (2019) emphasized that proximity to family is a crucial factor in university choice and that students generally prefer to live in the same city as their family. Donnellan (2002), Soutar and Turner (2002) also found that family recommendations play a role in the choice of degree programs. However, Chard and Potwarka's (2017) study of student athletes in Canada found that recommendations from family members and relatives played only a relatively minor role in the decision to participate in a particular sport; personal interests, suitability for an academic programme and athletic opportunities were highlighted as more decisive factors. This difference could be due to the unique structure of the sport sciences field. The fact that students in the Department of Exercise Sciences are more inclined to make independent decisions, as opposed to other majors, could be related to the fact that this field of study is directly related to an individual's personal interests and abilities. In this field, students tend to make decisions based on their own desires and abilities, rather than being guided by family. Individual achievement and motivation may play a more crucial role than family support or environmental factors, especially in a field where aptitude tests based on athletic background are effective.

In the study, the high significance of the statement “Because I have a sporting background” (question 29 - 1.634) clearly shows the influence that students' individual experiences have on their career choice. However, the low scale value of the statement “Because I am a national sportsman” (question 30 - 0.429) indicates while a sporting background is generally important, national or international achievements only play a limited role in the choice of a field of study. This result indicates that individuals make decisions based on their broader general sporting experiences when choosing a sport sciences Faculty and that national athlete status is not a primary consideration. Pope and Pope (2009) showed that athletic achievement increases student applications, but applications come from both low and high achieving students. This suggests that the impact of athletic achievement on university preferences is based on a general perception of success, while specific and high-level athletic achievements are less decisive. These findings partially overlap with the study by Doğan and Türkmen (2019) in the case of Niğde Ömer Halisdemir University. In the aforementioned study, it was found that sporting achievements (e.g. being a national athlete, Olympic degrees) play a role in university preferences. However, the low importance of the "national athlete" factor in the current study could indicate that the study group consists of a limited number of individuals with this characteristic. Furthermore, this result also shows that the effect of a general sporting background is more dominant in the preference process than the effect of international performance. Krumboltz's (1976) learning theory explains how previous experiences and environmental factors influence people's career choices (Krumboltz et al., 1976). According to this theory, previous experiences related to sport can be a source of motivation that encourages the choice of sport-related occupations. The fact that athletic background is highly effective in the preference process of sport sciences students is consistent with this theoretical framework. At the same time, this finding points to the crucial role of the connections that individuals build with sporting activities in their career choice processes. In summary, the study shows that an athletic background is an influential factor in students' preferences, but more specific factors such as national-level athleticism are less determinative in this process. The research shows that the physical and academic facilities of the university influence students' preferences. “The adequacy of the university's facilities (field, hall, etc.)” (question 26; scale score: 1.730) stands out as one of the factors with the highest importance for students. In contrast, the “competence of academic staff” (question 25; scale score: 1.565) and the “educational, social and cultural facilities of the university” (question 23; scale score: 1.367) had a relatively lower, but still significant influence. The “popularity of the university” (question 24; scale score: 0.986) was rated as a relatively less important reason for preference.

Adequacy of facilities is a crucial factor, especially in fields that require practical training, such as sport sciences. In the study, the high scale value of this factor (1.730) emphasizes the importance of the physical infrastructure that students need for their education. In the study conducted by Doğan and Türkmen (2019) at Niğde Ömer Halisdemir University, similar results were obtained and it was found that the sports infrastructure of universities is crucial for students' preferences. Similarly, Magnusen et al. (2014) reported that sports facilities are one of the important factors influencing student-athletes' preferences for a university. In particular, it was emphasized that modern and large athletic facilities are a strong decision factor in the preference process of both student-athletes and coaches and that these facilities play a crucial

role in the recruitment process. Kramer (2023) found in his study of student athletes that the quality of athletic facilities and physical infrastructure are the most important preference factors, especially for student transfer athletes. All of these findings show that the adequacy of fields, halls and other practice areas in sport sciences faculties plays a fundamental role in meeting students' expectations for the quality of education. However, there are also studies that present contrasting findings on this issue. James et al. (1999), in their research conducted with university applicants in Australia, found that physical infrastructure and campus facilities were not as influential as commonly assumed in university preferences. Instead, the study revealed that students tended to base their choices more on factors such as the quality of academic programs, the qualifications of academic staff, and post-graduation employment opportunities.

The ‘competence of academic staff’ (1.565) is an important factor in students’ preferences for a university or department. In the study by Erkuş et al. (2020), it was found that the knowledge and expertise of academics are among the most important factors influencing students' preferences. The quality of academic staff plays a crucial role in meeting students' expectations of the educational process by helping them to acquire professional knowledge and skills. Similarly, Magnusen et al. (2014) emphasized that the competence and personal characteristics of coaches are critical to the preference processes of physical education students. In particular, the head coach's leadership style, technical knowledge, and the relationship he or she establishes with the athlete are among the important factors that influence student decisions in sports-based programs. In addition, Kramer (2023) found that coaches' personal characteristics and coaching abilities have an impact on the university preferences of student transfer athletes. Based on their previous experiences, transfer athletes place more importance on the communication style and professional skills of coaches. These findings suggest that the competence of both academic staff and coaches are important factors that increase student satisfaction not only during the preference stage but also throughout the educational process. On the other hand, some studies suggest that this situation may not apply uniformly across all student groups. Hemsley-Brown and Oplatka (2006), in their review, indicate that certain groups of students prioritize factors such as institutional reputation, social opportunities, scholarship availability, and post-graduation employment potential over the qualifications of academic staff when making university choices. Although the "educational, social and cultural facilities of the university" (1.367) is an important factor in students' preferences, they are not as crucial as the physical infrastructure for sport sciences students. In Altaş's (2006) study, it was found that university students rate social and cultural facilities as a factor that enriches university life. However, the fact that sport sciences students focus intensely on applied courses and athletic activities may cause such opportunities being ranked second in their preferences. Similarly, in James-MacEachern and Yun's (2017) study of international students in Canada, physical environment and recreational facilities were ranked among the least important factors.

The physical environment and recreational facilities were among the least important factors influencing the university preferences of sport sciences students. the “popularity of the university” (0.986) also had a relatively minor influence. Veloutsou et al. (2004), Maringe (2006) and Cosser and Du Toit (2002) emphasized that university reputation was an influential factor in students' preferences. Similarly, Zhai et al. (2019) found in their systematic review

that the general reputation and rankings of universities are crucial for international students' preferences. Çatı et al. (2016) found that female students in particular attach more importance to university reputation, campus facilities and social factors. However, the results of this study show that sport sciences students attach more importance to tangible factors such as physical facilities and academic factors rather than abstract factors such as popularity.

The study found that systemic factors such as “My departmental preference in high school” (0.919), “The exam was difficult in the year I took the university exam” (0.741), “Because my central placement grade was sufficient for this department” (0.640), and “Just to have a bachelor's degree” (0.371) had relatively low significance for the departmental preferences of students in the Faculty of Physical Education. This finding suggests that professional interest, personal skills and career goals are more crucial to students' choices. Similarly, Dube et al. (2022) found that personal and economic factors (location, financial accessibility) were more important in the university choice process, while admission requirements and financial aid opportunities were more important in the choice of a degree program. Nevertheless, some studies suggest that the factors influencing students’ academic major and career choices are not solely limited to current conditions, but are also shaped by individual interest in technology and labor market expectations. For instance, Chen et al. (2016), in their study on preferences in the field of system development, found that variables such as outcome expectations, job opportunities, and individual innovativeness in information technologies significantly influenced students’ field selection. This research revealed a direct relationship between academic major preference and career orientation, indicating that students’ vocational tendencies are shaped by both available opportunities and their perceived self-efficacy.

According to the current study, the influence of systemic factors is limited. However, there are various findings in the literature that the type of school can have an influence on major subject preferences. For example, Ayık et al. (2010) reported that graduates of science and general secondary schools based their university preferences largely dependent on their exam results. Korkut-Owen et al. (2012) also found that the specializations chosen by vocational high school graduates during high school influenced their university preferences. In particular, it was found that Anatolian and science high school graduates often attached importance to factors such as “The score obtained in the university entrance examination is sufficient for this field” and “It is a prestigious profession”. In Telli-Yamamoto's (2006) study, it was found that the grades obtained in the central examination system in Turkey are one of the important factors influencing students' university preferences. However, in the current study, it was found that the effect of the examination system at the Faculty of Sports Sciences was limited. For example, the low scale scores of the statements “The exam was difficult in the year I took the university exam” and “Because my central placement grade was sufficient for this school” indicate that students' preferences are based on factors such as athletic background, individual ability and career interest. In the literature, studies on the examination system come to different conclusions. For example, the study by Tataroğlu et al. (2011) indicates that the preferences of prospective mathematics teachers are largely influenced by examination results, while the current study shows that individual factors are more important for students in the Faculty of Sport Sciences. Finally, the low scale value of the statement “Just to have a bachelor's degree”

(0.371) shows that students do not consider sport sciences faculties as an obligation or alternative, but rather consciously prefer them. This is in line with Erkuş et al. (2020) finding that a Bachelor's degree is not just a formality, but also a tool for personal and professional development. As a result, the study shows that systemic factors such as the examination system have a limited influence on the preferences of students in the Faculty of Sport Sciences and that individual factors and career goals are more dominant.

Conclusion

This study analyzed the factors that influence the departmental preferences of physical education students and evaluated the importance of these factors across the entire faculty and departments. The results indicate that individual interests, abilities, and professional goals rank highest in student preferences, while environmental and systemic factors had a relatively low influence. The factors with the highest importance across the faculty were "My aptitude for the profession" and "My interest in the profession". This result clearly shows that students make their career choices based on their personal skills and motivation. Employment opportunities and personal development opportunities were also among the important factors influencing students' choices. On the other hand, factors such as "advice/instructions from other relatives" and "just to have an undergraduate degree" were of minor importance as reasons. This finding shows that students adopt a more independent attitude in their career choice and make their decisions based on individual goals rather than external factors. The comparison between departments revealed that the reasons for students' preferences vary according to the specific dynamics of each department. It was found that coaching students prioritized personal skills and professional interest, while physical education and sports teaching students considered job opportunities and professional compatibility to be more crucial. Sports management students, on the other hand, placed more emphasis on emotional factors such as the enjoyment of sporting activities. In summary, the study shows that personal factors play a central role in the career choices of students in the Faculty of Sport Sciences, while the influence of systemic and environmental factors is limited. This situation shows that students make their career choices consciously and are guided by their individual goals and career plans.

Recommendations

This study was conducted on the students of the Faculty of Sport Sciences at Sivas Cumhuriyet University. It is recommended that similar studies be conducted at sports science faculties in other regions in order to generalize the results. In this context, examining regional differences with larger sample groups covering Turkey as a whole can help to obtain more comprehensive data on this area. A scaling method based on classification judgments was used in the study. In the future, qualitative or mixed methods may be preferred to investigate the reasons for students' preferences in more depth, and the current findings may be supported by using other data collection tools. Also, in addition to the reasons for preference discussed in this study, new variables or factors can be added to conduct more comprehensive analyses. In particular, it is suggested that the reasons for preference can be diversified and that students can be given the opportunity to express their opinions in more detailed formulations. Furthermore, in order to guide practitioners, it is recommended that school counselors, academic advisors, and career planning professionals take students' preference tendencies into account when providing

individualized guidance. In addition, to enhance the generalizability of the research, multi-center studies conducted across different institutions and long-term (longitudinal) research may be employed to analyze how students' decision-making processes evolve over time.

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Methodological Trends of Basketball Theses and Dissertations in Türkiye*

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Abstract

This content analysis aims to examine the basketball theses and dissertations in Türkiye to reveal their methodological trends. In the literature review conducted in the Turkish Council of Higher Education thesis center database with the word "basketball", 793 documents were reached between 1982 and 2020. Using the criterion sampling technique, 673 documents were examined, including 554 theses and 119 dissertations. An increasing knowledge production trend was found in the number of theses and dissertations over the years. Male authors were dominant in the production. While the quantitative research methods (especially causal comparison, quasi-experimental, correlational, and survey methods) predominate than other research methods; athlete and student samples were the most studied groups in all methods. The results show that the number of both basketball theses and dissertations has grown rapidly and basketball theses and dissertations in Türkiye are produced with a greater variety of research samples in many research approaches.
Keywords: Postgraduate education, Knowledge production, Scientific production, Basketball methodology

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INTRODUCTION

Students who wish to pursue postgraduate education, especially those balancing dual careers as bachelor students and athletes often research their sports branches. However, they struggle to assess the academic status of their chosen field within the literature (Is it current, new, interesting, popular, scientific, etc.). Reviews and content analysis of scientific fields or sports branches are helpful for graduate students seeking to navigate these challenges.

Postgraduate education is an advanced academic program designed for individuals with an undergraduate degree to specialize in their chosen field, such as science experts, or earn a doctorate in their chosen field. To meet societal needs and develop skilled professionals, postgraduate programs are offered by graduate schools. In Türkiye, postgraduate education encompasses specialization in medicine, proficiency in art, as well as master's and doctoral programs. Medical specialization, conducted in training and research hospitals, equips doctors with specialized expertise. Proficiency in art, a Ph.D. level program, focuses on producing original artistic works and enhancing creative skills in stage and music arts, typically spanning at least eight undergraduate semesters and a minimum of four years (Karaman & Bakırcı, 2010). Master's and Ph.D. programs involve coursework and a thesis, leading to an academic degree upon successful thesis defense (Kozak, 2015).

Upon completing university education, postgraduate research outcomes include a graduate thesis, medical specialization thesis, proficiency study in art, and doctoral thesis, all conducted under the guidance of a consultant. As the research progresses in scope and depth, the researcher's expertise increases accordingly (Yıldız & Yıldırım, 2017). In Turkish universities, master's, doctoral, and specialization theses are carried out by graduate schools of science, health, social sciences, and institutes of postgraduate education. Earning a master's or doctoral degree is closely linked to job opportunities both in Türkiye and internationally. Individuals who complete a thesis-based degree are believed to have stronger research skills and a better ability to access knowledge in their field (Üstdal et al., 2004). Additionally, postgraduate research, particularly in the form of a thesis, is considered a key indicator of a discipline's academic prestige (Hall, 1991).

The methodology that researchers strive to respond to the complex real-world problems in dissertations depends on the scientific discipline and the researchers' worldview. Although research can be classified based on methods, data characteristics, data collection techniques, the data collection process, sample size, experimental design, research purpose, and research philosophy (Büyüköztürk et al., 2014), studies in social and behavioral sciences are typically categorized into qualitative, quantitative, and mixed-method research based on their philosophical paradigm (Teddlie & Tashakkori, 2009).

Each research method has its characteristics and distinct perspectives on scientific validity. While quantitative research assumes a single objective truth, qualitative research acknowledges multiple truths. This distinction arises from the differing foundations of the positivist and constructivist paradigms (Leppink, 2017). In quantitative research, researchers are expected to remain objective and detached from personal biases throughout the research process.

Conversely, in qualitative research, the researcher's perspective plays a more significant role compared to quantitative methods (McCusker & Gunaydin, 2015). Unlike qualitative research, quantitative research focuses on measuring and analyzing the quantifiable aspects of reality (Queirós et al., 2017). Recently, mixed-method research has been proposed as a way to bridge the gap between qualitative and quantitative approaches. By integrating both methods, mixed-method research leverages their respective strengths to generate high-quality data (Leppink, 2017). This approach allows researchers to explore research problems without being confined to a single methodology (Johnson & Onwuegbuzie, 2004). It also challenges rigid, dogmatic research practices. A realistic and pluralistic approach to research enhances knowledge production and improves its overall quality (Maxcy, 2003).

In Türkiye, several studies have analyzed theses written on different sports disciplines, including snowsports (Taşçıoğlu, 2024), badminton (Doğar et al., 2021), traditional Turkish sports (Şahin & Evli, 2020), tennis (Büyükergün, 2020), racket sports (Kuter & Öztürk, 2012), basketball (Sevim, Sevim, et al., 2004), and handball (Sevim, Şinoforoğlu, et al., 2004).

While all of these studies focused on the metadata and subject matter of the theses, only a few examined their methodological aspects (Doğar et al., 2021; Şahin & Evli, 2020). Doğar et al. (2021) and Şahin and Evli (2020) categorized the research methods as quantitative and qualitative; however, they did not specify which specific methods were used within these categories. Only one study analyzed the distribution of authorship by gender (Doğar et al., 2021). There are only a few studies that examine the gender distribution of authorship in sports-related theses (Doğar et al., 2021; Şahin & Evli, 2020). The results indicate that male dominance persists in sports branch theses and dissertations.

Reviewing postgraduate theses and dissertations within a specific field can provide insight into the key staples of the methodology utilized. In this context, the objectives of this research were to (a) analyze the metadata of basketball-related theses, (b) assess them based on research methods. This research is significant as it highlights the methodological development of basketball in Türkiye and serves as a valuable resource for graduate students writing theses and dissertations in this field. The above review highlights the significance of examining basketball-related research in postgraduate education. This research aims to assess the current status of theses and dissertations on basketball in Türkiye.

The research questions are as follows:

- What is the distribution of metadata (year, type (theses and dissertations), language, and university (state and foundation)) in basketball theses?
- What is the year distribution of basketball theses?
- What is the gender distribution of basketball theses?
- Which research methods are commonly used in basketball theses?
- What types of data analysis are used in basketball theses?
- What sports samples are examined in basketball theses?

METHOD

Research Model

Content analysis is a powerful data reduction technique that transforms extensive text into fewer content categories based on explicitly designed coding rules (Stemler, 2001). Another definition describes content analysis as a research technique used to make replicable and valid inferences from text to its context (Krippendorff, 2019). Robson and McCartan (2016) emphasized that content analysis can be conducted both quantitatively and qualitatively.

The findings of content analysis research can highlight which research methods are prioritized in each field and whether methodological changes have occurred over time. This information can guide academics in exploring new approaches, learning innovative methods, and expanding academic networks (Stead et al., 2012). Conducting such an analysis could help researchers classify theses, develop an understanding of the presence of basketball-related postgraduate research in Türkiye, and provide insights into potential future studies on basketball.

Research Groups

A total of 793 research reports (648 master's theses, 131 doctoral dissertations, and 14 specialization theses in medicine) related to basketball were identified in the database covering the period from 1982, the year the first thesis was published, to 2020 were examined (Table 1).

Table 1. Research universe and sample

Include/Exclude			Accessible		Total
			No	Yes	
Include	Type	Master	0	554	**554**
		PHD	0	119	**119**
	Total		**0**	**673**	**673**
Exclude	Type	Master	2	92	**94**
		PHD	0	12	**12**
		Med	1	13	**14**
	Total		**3**	**117**	**120**

Ethical Approval

The research was approved by the Ethics Committee of Eskişehir Technical University (Approval No: E-87914409-050.03.04-21253).

Data Collection

To address the research questions, basketball-related research reports from the Turkish Council of Higher Education (YÖK) database were analyzed using content analysis, focusing on their metadata and research methods. The Turkish Council of Higher Education's database is a digital repository that archives research reports from Turkish universities and provides full-text access. As of 2021, the database contains 653,559 research reports across various academic degrees, including "Proficiency in Art," "Minor Specialization in Medicine," "Master of Science," "Specialization in Medicine," "Doctorate," and "Specialization in Dentistry," spanning from 1900 to 2021. Within the sports field, there are 8,765 research reports, consisting of 7,076 master's theses, 1,597 doctoral dissertations, and 92 specialization theses in medicine (YÖK, 2021).

The search was conducted using the Turkish keyword "basketball," with the search option set to "all," ensuring that reports containing the term in the title, keywords, or summary were included. However, some reports were excluded as they were deemed unrelated to the research objective. Specific criteria were established to filter out unsuitable reports based on the study's purpose.

According to the criteria, reports that were inaccessible (n=3) and dissertations of expertise in medicine (n=13) were excluded from the research. Additionally, master's theses (n=92) and doctoral dissertations (n=12) that mentioned the word "basketball" in the summary but were not directly related to the subject were removed during the identification phase of the review process. In total, 120 postgraduate reports were excluded. Following these criteria, 673 theses and dissertations were analyzed in this research.

Analysis of Data

An iterative process of reviewing was conducted for analyzing basketball dissertations. The authors prepared an Excel sheet for metadata of theses. The file was sent to the independent experts to identify and control the disciplines of sports sciences and methodologies of the theses. In theses and dissertations subjected to content analysis in terms of the research methods and designs, sample, and data analysis were analyzed as methodological elements. A paper classification form used (Sözbilir et al., 2012) in the science of education in the classification of the research method elements was adapted to the sports sciences by the researchers for the review process.

While the form was being modified, current classifications of research methodologies in the literature were utilized. Throughout the data analysis, a three-stage control process was carried out to ensure validity and reliability. The inconsistencies were discussed at the review level of the content analysis process and agreements were reached. The content analysis process, and the characteristics of independent coders are given below in Table 2.

Table 2. Demographics of the experts and content analysis process

Demographic Characteristics				Content Analysis Process		
Gender	**Basketball Coaching Expertise***	**Education Level**	**Academic Expertise**	**Identification (December 2020 - January 2021)**	**Control (February 2021 - March 2021)**	**Review (February 2021 - March 2021)**
Male	C	Master Degree	Physical Education and Sport Sciences	X	X	X
Male	B	Master Degree	Physical Education and Sport Sciences	X	X	X
Male	B	Master Degree	Sport Management	X	X	X
Male	E	Master Degree	Sport Management	X	X	X

*Basketball Coaching Expertise: Basketball coaching is carried out in five different categories in Türkiye, namely E, D, C, B, and A, respectively. Coaches who have completed their coaching period in their category and successfully passed their training move up from the E category through the A category.

The methodological review process involved a detailed reading of the theses. To determine the methodological aspects of the theses, each researcher first read the abstracts. When there was insufficient information regarding the research methods in the abstract, the full theses were read. However, not all theses provided direct information about the research method elements. Therefore, each researcher determined the methodology of the theses based on the coding guide and adapted form through a thorough reading.

In the content analysis process, a deductive approach was initially planned, using the classification form and code guide. However, the code guide and classification form, which were based on previous studies, proved insufficient in categorizing the theses into distinct methodologies. As a result, new themes were developed and added to the existing methodology classifications. Consequently, both deductive and inductive approaches were employed in the process. While deductive logic prioritizes general concepts, rules, and principles, followed by their exemplification, inductive logic determines concepts and principles by examining examples (Khaldi, 2017). Descriptive statistics were used to present the findings. Additionally, multiple response analyses were applied to address some research questions, as these could involve multiple sample groups in the thesis or dissertation. SPSS 25.0 (Chicago, IL) was used to perform the analyses.

FINDINGS

Twenty of the 83 universities were foundation universities. A total of 58 academic reports (8.62% of 673) were written in foundation universities, including 2 dissertations and 56 theses. A total of 29 academic reports were written in the English language in 12 universities, including 4 dissertations and 25 theses (4.31% of 673). Most of them were in the last 5-year period. Seven of 25 theses written in foundation universities were written in the English language (Table 3).

Table 3. Frequencies of theses and dissertations by years

University	87-90	91-95	96-00	01-05	06-10	11-15	16-20	PhD	MSc	T
Gazi University	0	8	11	9	20	17	21	27	59	**86**
Marmara University#	2	4	5	7	13	6#	17	13	41	**54**
Hacettepe University#	1	1	1	7	10#	7	9	10	26	**36**
Selçuk University	0	2	3	5	7	5	8	1	29	**30**
Ondokuz Mayıs University	0	0	1	5	3	5	12	5	21	**26**
Ankara University	1	1	3	3	3	6	6	7	16	**23**
Kütahya Dumlupınar University	0	0	0	1	8	2	8	2	17	**19**
Bolu Abant İzzet Baysal University	0	0	1	2	5	6	4	8	10	**18**
Ege University	1	0	2	3	2	2	7	4	13	**17**
Muğla Sıtkı Koçman University	0	0	0	3	1	3	10	2	15	**17**
Fırat University#	0	0	2	1	2	2	10#	2	15	**17**
Niğde Ömer Halisdemir University	0	0	2	3	7	2	2	0	16	**16**
Mersin University	0	0	1	1	3	4	6	2	13	**15**
Atatürk University	0	0	2	1	5	3	3	3	11	**14**
Orta Doğu Teknik University#	1#	2#	3#	2#	3#	1#	2#	4	10	**14**
Manisa Celal Bayar University	0	0	0	3	2	3	4	2	10	**12**
İstanbul Gelişim University*	0	0	0	0	0	0	12	0	12	**12**
Sakarya University	0	0	1	3	2	3	2	0	11	**11**
Çukurova University	0	1	1	1	5	0	3	1	10	**11**
Erciyes University	0	1	0	1	2	5	2	3	8	**11**
İstanbul University	0	0	1	0	0	1	9	1	10	**11**
Dokuz Eylül University	0	3	0	1	1	4	1	5	5	**10**
Akdeniz University	0	0	1	1	1	1	5	2	7	**9**
Bahçeşehir University*#	0	0	0	0	0	3	5#	0	8	**8**
Kocaeli University	0	0	0	3	1	1	3	4	4	**8**
Dicle University	0	1	1	0	2	3	1	0	8	**8**
Anadolu University	0	0	0	0	1	3	4	2	6	**8**
Karadeniz Teknik University	0	3	1	0	2	1	0	0	7	**7**
Kırıkkale University	0	0	0	1	1	0	5	1	6	**7**
Gaziantep University	0	0	1	2	0	3	1	0	7	**7**
Trakya University	0	0	1	1	2	0	3	1	6	**7**
Haliç University*	0	0	0	0	0	3	4	0	7	**7**
Balıkesir University	0	0	0	0	0	2	4	0	6	**6**
Yüzüncü Yıl University	0	0	0	1	2	0	3	1	5	**6**
Uludağ University	0	2	0	1	0	1	1	0	5	**5**
Yeditepe University*#	0	0	0	0	0	1	4#	0	5	**5**
Gedik University*	0	0	0	0	0	1	3	0	4	**4**
Pamukkale University	0	0	0	0	0	1	3	0	4	**4**
Bartın University	0	0	0	0	0	0	4	0	4	**4**
İnönü University	0	0	1	0	0	0	3	1	3	**4**
Süleyman Demirel University	0	0	1	0	0	2	0	0	3	**3**

* Foundation University, State University, # English, Turkish

Table 3 (Continue). Frequencies of theses and dissertations by years

University	87-90	91-95	96-00	01-05	06-10	11-15	16-20	PhD	MSc	T
Çanakkale Onsekiz Mart University	0	0	0	0	0	1	2	0	3	**3**
Boğaziçi University#	1#	0	0	0	0	0	2#	0	3	**3**
Sivas Cumhuriyet University	0	0	0	1	1	0	1	0	3	**3**
Aydın Adnan Menderes University	0	0	0	0	0	0	3	0	3	**3**
Kahramanmaraş Sütçü İmam University	0	0	0	0	2	0	1	0	3	**3**
Burdur Mehmet Akif Ersoy University	0	0	0	0	0	1	2	1	2	**3**
Aksaray University	0	0	0	0	0	1	2	0	3	**3**
İstanbul Medipol University*	0	0	0	0	0	0	3	0	3	**3**
Acıbadem Mehmet Ali Aydınlar University*	0	0	0	0	0	0	3	0	3	**2**
Harran University	0	0	1	0	0	1	1	0	3	**2**
Zonguldak Karaelmas University	0	0	0	2	0	0	0	0	2	**2**
Hitit University	0	0	0	0	0	0	2	1	1	**2**
Yıldız Teknik University	0	0	0	0	1	0	1	0	2	**2**
Başkent University*	0	0	0	0	0	1	1	0	2	**2**
Ağrı İbrahim Çeçen University	0	0	0	0	0	1	1	0	2	**2**
Ankara Yıldırım Beyazıt University	0	0	0	0	0	0	2	0	2	**2**
Hasan Kalyoncu University*	0	0	0	0	0	1	1	0	2	**2**
Afyon Kocatepe University	0	0	0	0	0	2	0	0	2	**2**
Ordu University	0	0	0	0	0	0	2	0	2	**2**
Eskişehir Osmangazi University	0	0	0	1	1	0	0	0	2	**2**
İstanbul Teknik University#	0	1	0	0	1#	0	0	0	2	**1**
İstanbul Bilgi University*#	0	0	0	0	0	0	2#	0	2	**1**
Necmettin Erbakan University	0	0	0	0	0	0	1	0	1	**1**
Kadir Has University*	0	0	0	0	1	0	0	0	1	**1**
Giresun University	0	0	0	0	0	0	1	0	1	**1**
İstanbul Kültür University*	0	0	0	0	0	0	1	1	0	**1**
Üsküdar University*	0	0	0	0	0	0	1	0	1	**1**
Sabancı University*#	0	0	0	0	0	0	1#	0	1	**1**
Avrasya University*	0	0	0	0	0	0	1	0	1	**1**
Hatay Mustafa Kemal University	0	0	0	0	0	0	1	0	1	**1**
Türk Hava Kurumu University*	0	0	0	0	0	0	1	1	0	**1**
Maltepe University	0	0	0	0	0	0	1	1	0	**1**
Uşak University	0	0	0	0	0	0	1	0	1	**1**
Çankaya University*#	0	0	0	0	0	0	1#	0	1	**1**
Yaşar University*	0	0	0	0	0	0	1	0	1	**1**
İstanbul Ticaret University*	0	0	0	0	1	0	0	0	1	**1**
Kafkas University	0	0	0	0	1	0	0	0	1	**1**
Tokat Gaziosmanpaşa University	0	0	0	0	0	0	1	0	1	**1**
Bozok University	0	0	0	0	0	0	1	0	1	**1**
Trabzon University	0	0	0	0	0	0	1	0	1	**1**
İhsan Doğramacı Bilkent University*#	0	0	0	0	0	0	1#	0	1	**1**
Total (T)	**7**	**30**	**48**	**76**	**125**	**122**	**265**	**119**	**554**	**673**

* Foundation University, State University, # English, Turkish

While the first thesis was written in 1987, the first dissertation was written in 1989. Both types showed an increasing trend from the late 1980s to the 2020s (Figure 1).

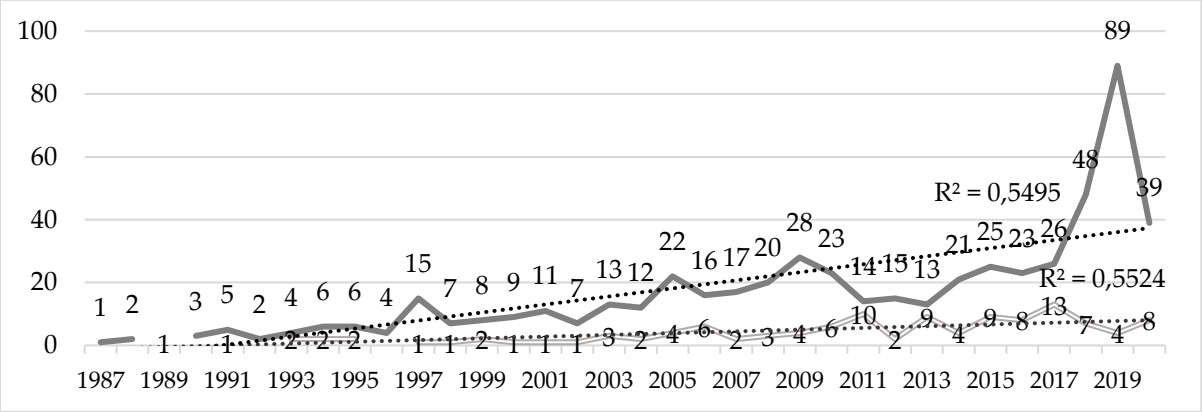

Figure 1. Distribution of theses and dissertations by years

The distribution of the basketball theses and dissertations produced by male and female authors was examined in the figure (Figure 2). It was found that 205 female authors and 468 male authors. An increasing trend was found in both genders from the late 1980s to 2020s.

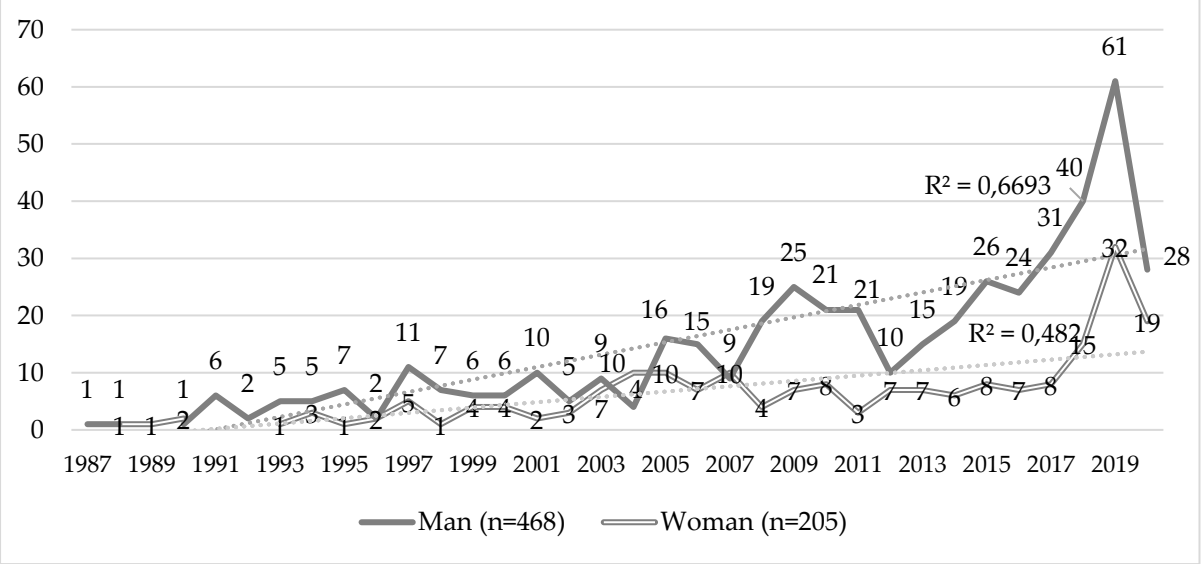

Figure 2. Distribution of theses and dissertations by genders

It was found that basketball theses and dissertations were written using 3 different methods as quantitative, qualitative, and mixed methods, respectively. While causal comparison research (n=189) was the most used in quantitative methods, the least used are content analysis (n=3), reviews and historical research (n=3). In quantitative methods, while dissertations were 113 (17%), the theses were 533 (83%) (Table 4).

Table 4. Frequencies of theses and dissertations by research methods, designs, and analysis

PhD	MSc	Designs	Methods	Analysis	PhD	MSc
24	165	Causal Comparison	**Quantitative Methods (n=646)**	Inferential Statistics	104	470
30	117	Quasi-Experimental				
29	114	Correlational		Descriptive Statistics	6	50
18	113	Survey				
11	16	Experimental		Content Analysis	1	8
0	3	Content				
1	2	Review		Not Accessible	2	5
0	3	Historical				
0	8	Case study	**Qualitative Methods (n=17)**	Content Analysis	1	13
1	5	Phenomenology		Thematic Analysis	0	1
0	1	Ethnography		Descriptive Analysis	1	6
0	1	Discourse analysis		Discourse Analysis	0	1
0	1	Grounded theory				
1	3	Exploratory Sequential Design	**Mixed Methods Research (n=10)**	Inferential Statistics and Descriptive Analysis	2	2
1	2	Design Based Research		Inferential Statistics and Content Analysis	2	1
2	0	Explanatory Sequential Design		Descriptive Statistics and Descriptive Analysis	1	1
1	0	Embedded Design		Not Accessible	0	1

The most used analysis techniques in the quantitative methods (n= 646) were inferential statistics (n= 574) and descriptive statistics (n= 56). The most preferred analysis techniques in qualitative methods were content analysis (n=14) and descriptive analysis (n=7). The most used techniques in mixed research methods (n=10) was “inferential statistics and descriptive analysis” (n=4), while the least used technique was “descriptive statistics and descriptive analysis” (n=1). In the seven of quantitative methods and one of the mixed research methods, the information of statistical analysis was not accessible (Table 4).

Table 5. Frequencies of theses and dissertations by samples

Samples	PhD	MSc	T
Players	73	392	465
Students	22	89	111
Consumers	7	20	27
Managers	5	16	21
Referees	5	12	17
Coaches	2	12	14
Teams and Organizations	2	7	9
Disabled People	2	5	7
Video Records	1	0	1
Volunteers	0	1	1
Total (T)	**119**	**554**	**673**

It was found that the most used samples of basketball theses and dissertations were players and students (Table 5).

Players and students were the most studied groups in basketball samples. The samples of basketball consumers included spectators, fans, tourists, customers of basketball stores, and athlete parents. It was found that the samples were studied by gender and age. In the samples of basketball managers, the samples included the president of the basketball federation, the federation board, the federation technical board, provincial representatives, observers, sports club managers, and sponsors. The samples of basketball referees were studied in terms of referee classification (FIBA, ULEB, A class, B class, C class, federation referee, district referee, provincial referee, and candidate referee) and gender (male and female). In the samples of basketball coaches, it was found that the coaches were defined by their gender (male and female) and classification (A, B, C, D, E) characteristics. In the samples of basketball teams and organizations, it was found that the samples were basketball clubs, Turkish Basketball Federation (TBF), TBF coach training system, player contracts, and TBF arbitration board decisions. Besides, it was found that clubs were studied according to the league levels (Superleague, I., II., etc.). In the samples of disabled people, it was found that mentally disabled groups were studied by gender (male and female) and age (child and adult). Written in the samples of disabled basketball players were studied on Paralympic, hearing impaired, and physically disabled (wheelchair basketball players) basketball players. In addition, it was found that a thesis written in the field of computer engineering studied video recordings as a sample. In a thesis on basketball organization volunteers, it was found that the sample was defined by gender and age (Table 5).

Table 6. Frequencies theses and dissertations by athlete samples

PhD	**Woman**		Junior	1	34	**MSc**	**Woman**		Junior	32	232	**266**
			U14	3					U14	32		
			U16	4					U16	41		
			U18	4					U18	37		
			Amateur	5					Amateur	32		
		Senior	Professional	16				Senior	Professional	55		
			National	1					National	3		
	Man		Junior	1	80		**Man**		Junior	47	425	**505**
			U14	9					U14	66		
			U16	15					U16	79		
			U18	12					U18	75		
			Amateur	16					Amateur	68		
		Senior	Professional	26				Senior	Professional	90		
			National	1					National	0		
											Total	**771**

Basketball player samples were studied in terms of the category (junior, U14, U16, U18, and senior (professional, amateur, and master)), nationality, and gender (male and female). In addition, it was found that a thesis studied on a sample of retired women's basketball players. Furthermore, it was found that a thesis studied a sample of retired women's basketball players (Table 6).

Table 7. Frequencies theses and dissertations by student samples

PhD	**Woman**	Primary School	1	13	**MSc**	**Woman**	Primary School	11	70	**83**
		Secondary School	4				Secondary School	19		
		High School	2				High School	15		
		University	6				University	25		
	Man	Primary School	1	20		**Man**	Primary School	15	98	**108**
		Secondary School	5				Secondary School	24		
		High School	2				High School	21		
		University	12				University	38		
Total										**201**

It was found that student samples were studied in terms of school (primary school, secondary school, high school, and university) and gender (female and male). Also, it was found that both students, teachers, and administrators were often studied together. In a thesis, students with obesity disorders were the sample (Table 7).

DISCUSSION and CONCLUSION

Students aspiring to undertake postgraduate education, particularly those managing dual lives as undergraduate students and athletes, frequently investigate their respective sports disciplines. Nonetheless, they find it challenging to evaluate the academic standing of their selected discipline within the literature in terms of contemporary, novel, engaging, prevalent, scientific, etc. Analyzing reviews and content in scientific disciplines or sports sectors has been demonstrated to benefit graduate students aiming to overcome such challenges. In this context, this research analyzed basketball theses and dissertations to assist basketball practitioners and researchers in understanding academic studies from Turkish universities about basketball and to enhance knowledge of research methods utilized in this field.

The academic history of basketball in Türkiye is not as extensive as the overall history of the sport in the country (Yüce & Aytuna, 2020). The first academic study on basketball at universities occurred in 1982. Before the establishment of sports colleges under the Council of Higher Education in Türkiye in 1982 (Açıkada, 1997), basketball-related dissertations were primarily written in the field of medicine. However, after the establishment of the sports colleges, basketball theses began to be produced in the field of sports sciences. Since that time, the number of both theses and dissertations has grown rapidly, reaching a significant increase by 2020. On average, approximately 17 theses and about 6 dissertations are written each year.

Research indicates that both state and foundation universities in Türkiye have produced theses and dissertations on basketball in English and Turkish. This prevalence suggests the sport's popularity in the country. However, only 5% of these academic works have been written in English, and there are no reports in other languages. This percentage is significantly low for Turkish universities that aim for internationalization (YÖK, 2017). Given that most of the English-language reports were written in the last five years, it is anticipated that their numbers will increase in the coming years, aligning with the goal of greater internationalization.

The results showed male dominance of basketball is reflected in both research samples and authorship in theses and dissertations. The ratio of male authors was twice that of female authors in the total theses and dissertations from 1987 to 2020. On average, male authors produced about 14 theses per year, whereas female authors produced approximately 6. The annual distribution of authorship by gender was similar in studies related to action sports (Ellmer et al., 2020) and badminton (Doğar et al., 2021) indicating that men led the production of theses and dissertations in these areas. The male dominance trend may be a reflection of a broader pattern within the field of physical education and sports (Hernández-González et al., 2020). However, data from recent years suggests that the situation is changing. While the number of theses and dissertations authored by women remains lower than that of their male counterparts, there has been a notable increase in female authorship over the past five years.

In the research, it was found that quantitative methods are causal comparison research, quasi-experimental research, correlational research, survey method, experimental research, content analysis, review, and historical research, respectively. On the other hand, qualitative method research included case study, phenomenology, ethnography, discourse analysis, and grounded theory, respectively. In addition, it was found that the mixed method research included exploratory sequential design, design-based research, explanatory sequential design, and embedded design, respectively. Quantitative methods (96%) were the most commonly used method. In Türkiye, while qualitative research was dominant in traditional sports (Şahin & Evli, 2020); quantitative research was dominant in badminton (Doğar et al., 2021), e-sports (Döşyilmaz et al., 2023) volleyball (Can & Afyon, 2024) and basketball (Ünlü et al., 2024). Considering these research, quantitative research is dominant in studies on branches in Türkiye. The reason may be that the performance and health perspective is prominent in sports branches and the quantitative method is older when compared to other methods. There is no paradigm shift in basketball theses and dissertations like theses and dissertations in social fields in sports (Elmas et al., 2018). As expected, the distribution of analysis in theses and dissertations was similar to the distribution of designs. Quantitative analysis techniques were mostly inferential and descriptive analysis; qualitative analysis techniques were mostly content and descriptive analysis.

The research showed that samples of basketball theses and dissertations were in ten categories: athletes, students, coaches, referees, consumers, managers, teams and organizations, individuals with disabilities, video records, and volunteers. The analysis revealed that many stakeholders in basketball, ranging from players to volunteers, were included in the research. However, it was found that 3x3 basketball players and various disabled groups were not research samples in these theses and dissertations. Regarding gender distribution among athletes and students, the findings indicated that female samples accounted for only 15% of the studies.

A total of 793 research theses and dissertations related to basketball were analyzed in the research, including 648 master's theses, 131 doctoral dissertations, and 14 specialization theses in medicine, covering the period from 1982 to 2020. Although this research provides a comprehensive overview of basketball-related theses and dissertations in Turkish universities

between 1982 and 2020, there was a limitation. The analysis was limited to publicly accessible theses and dissertations, which may have excluded unpublished or restricted-access studies, potentially affecting the completeness of the dataset. While the results of the research show the map of basketball in Turkish universities from the past to the present, it also shows the dominant research methods, analysis techniques, and samples in the theses written for basketball. In addition, both existing and nonexistent results were interpreted to give a clue to readers for further research. While the data sources were scanned in the studies examining the theses and dissertations written for a sports branch, it was found that the scanning was done only in the title. Therefore, in further research, when scanning data sources in future content analysis or reviews, performing the scanning not only in the title but also in keywords and abstracts as in this research will provide more comprehensive results.

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Comparison of the Effects of 10 Weeks of Fitness and Kettlebell Workouts on Some Physical Parameters of Sedentary Individuals*

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Abstract

In this study, it is aimed to scientifically reveal the changes that may occur in sedentary individuals with fitness and kettlebell training for 10 weeks and to compare these two different training practices. The research group of the study consists of sedentary individuals residing in Bayburt province. The participants included in the study first had anthropometric measurements (height, body weight, skinfold thickness, circumference measurements), diameter measurements, digital back-leg dynamometer measurement, vertical jump performance measurement, maximal 1 repetition "squat" performance measurement, and maximal 1 repetition "deadlift" performance measurement. The participants were randomly divided into two groups and included in the kettlebell and fitness training groups. As a result of the fitness training performed regularly for 10 weeks, it was observed that there were statistically significant differences between the pretest-posttest scores of the participants in shoulder diameter, chest diameter, arm diameter, squat, deadlift, sled, countermovement jump (CMJ) and squat jump (SJ). As a result of the kettlebell training performed regularly for 10 weeks, it was observed that there were statistically significant differences between the pretest-posttest scores of the participants in shoulder diameter, thigh diameter, squat, deadlift, sled, CMJ, SJ and back-leg strength. As a result, it can be said that fitness and kettlebell training are effective training types on the change of physical parameters of sedentary individuals.
Keywords: Fitness, Kettlebell, Weight training, Sedentary

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INTRODUCTION

A sedentary lifestyle refers to a way of living characterized by minimal physical activity and a predominantly inactive routine. Sedentary lifestyles, characterized by a lack of physical activity, have become increasingly prevalent over time, particularly as societal and technological advancements continue to progress (Lee et al., 2021). This way of living is linked to various negative health effects, such as a reduced lifespan, elevated blood pressure, and a higher risk of diabetes. Studies indicate that physical inactivity is responsible for one in ten premature deaths worldwide, and reducing sedentary behavior by 25% could prevent over 1.3 million deaths annually (Lee et al., 2012). Obesity is one of the most important problems that arise in relation to a sedentary lifestyle. Obesity is a complex, multifactorial disease defined by the World Health Organization as a condition characterized by excessive fat accumulation, which poses a risk to health (WHO, 2022). Sedentary behavior and lack of physical activity may elevate the risk of obesity (Silveira et al., 2022). Obesity has emerged as one of the most urgent public health issues of contemporary times. In addition to contributing to the development of various diseases, it significantly reduces quality of life and increases mortality rates. Moreover, obesity is not only a global public health issue but also imposes significant economic burdens on national healthcare systems (Daniels, 2005). Obesity has been linked to numerous cardiovascular risk factors (Flegal et al., 2005; Willett et al., 1995) and metabolic disorders (Field et al., 2001). Currently, obesity-related deaths are increasing at an alarming rate worldwide, making it the second leading cause of preventable mortality after smoking (Daniels, 2005). Consequently, individuals increasingly turn to regular physical exercise as a means of combating obesity. Physical activity and exercise training programs are essential components of a comprehensive approach to obesity management (Oppert et al., 2023).

Health is essential for human survival and development (Li et al., 2021). Exercise is a fundamental component of a healthy lifestyle, promoting overall well-being by enhancing musculoskeletal fitness and reducing the risk of various diseases (Kell et al., 2001). It is a critical factor in mitigating obesity-related risks for both adults and young individuals (USDHHS, 2008). Scientific research has demonstrated that regular exercise can effectively facilitate weight loss. Individuals who consistently engage in structured physical activity not only mitigate health complications associated with excessive fat accumulation but also enhance their overall physiological functions and physical capabilities. To maintain and improve health, people participate in various sports, among which fitness training is one of the most preferred. Fitness is a broad discipline that encompasses numerous movement patterns essential for overall physical health. It is defined as a set of structured physical activities designed to induce physiological adaptations, enhance physical performance, and promote overall well-being. Regular fitness training is associated with numerous health benefits, including improved bone strength, maintenance of a healthy body weight, increased muscle strength, enhanced flexibility, and better mental health. Additionally, it has been linked to a reduced risk of various types of cancer (CDCP, 2010). It is suggested that regular exercise is associated with lower levels of depression (Kim, 2022), anxiety (Patterson et al., 2021), and neuroticism (De Moor et al., 2006; Desai et al., 2023). Similarly, Zhu and Cheng (2022) argue that fitness training can be an effective strategy for managing anxiety.

Kettlebell training, although widely utilized in Russia for many years, has only recently gained global recognition as a functional strength-training tool (McGill, 2011). Kettlebell training has emerged as one of the most popular fitness trends in the United States in recent years (Kim et al., 2024). Due to its emphasis on dynamic, full-body movements, kettlebell training is commonly incorporated into CrossFit workouts to develop muscular strength and endurance (Holmberg, 2009; Öztürk & Taş, 2020). As a training method, CrossFit integrates kettlebell exercises into its holistic approach to fitness. Kettlebell exercises are ideal for functional training, as they simulate real-life movements and challenges encountered in daily activities (McGill, 2011). Kettlebell training has been shown to be an effective strategy for improving strength, power, and endurance in both men and women (Santos Jr. et al., 2024). Some of the most popular kettlebell exercises include the kettlebell swing, goblet squat, clean and press, snatch, and Turkish get-up. One notable advantage of kettlebell swings is their ability to mimic everyday joint actions. For example, the hip hinge movement used in kettlebell swings activates lower extremity muscle patterns similar to those observed during running (Kartages et al., 2019). Kettlebell exercises (e.g., swings, cleans, snatches, push-presses, and high-pulls) are typically performed in a ballistic manner, characterized by a rapid concentric contraction following an eccentric counter-movement, effectively utilizing the stretch-shortening cycle (Lake & Lauder, 2012; McGill & Marshall, 2012). Kettlebell training provides multiple health benefits, including the generation of power (Levine et al., 2022). Furthermore, kettlebell training induces significant cardiovascular stress while simultaneously providing resistance training benefits, such as increased respiratory rate, heart rate, and oxygen consumption (Budnar et al., 2014; Falatic et al., 2015; Farrar et al., 2010). Given these factors, kettlebell training is considered a high-energy-demand activity that promotes significant physical development (Jay et al., 2011). Additionally, kettlebell training has been shown to improve postural control and may potentially alleviate certain musculoskeletal pain conditions (Girard & Hussain, 2015). Kettlebell training can be considered an effective strategy for enhancing strength, power, and endurance (Levine et al., 2022). Research further suggests that kettlebell exercises increase levels of cortisol, testosterone, and immunoreactive growth hormone, thereby positively influencing muscle adaptation and hypertrophy (Budnar et al., 2014; Raymond et al., 2018). Moreover, kettlebell training has been found to enhance glucose tolerance, contributing to improved metabolic health (Greenwald et al., 2016). It has been suggested that the kettlebell swing exercise may improve cardiorespiratory fitness (Tsatsouline, 2006). Also, kettlebell swing exercises have been proposed as a method for improving strength, power, endurance, and aerobic capacity (Vuk & Pajtak, 2023).

This study aims to examine and compare the physical and physiological changes that occur in sedentary individuals residing in Bayburt, Turkey, following a 10-week fitness and kettlebell training program. By analyzing these changes scientifically, the study seeks to highlight the importance of structured exercise interventions for individuals with insufficient physical activity levels. Additionally, the study aims to provide participants with fundamental knowledge about fitness and kettlebell training, guiding them through a structured exercise regimen to facilitate physical and physiological development while promoting overall well-being.

METHOD

Research Model

This study employed a pretest-posttest experimental design without a control group to investigate the effects of fitness and kettlebell training programs on selected physical parameters of sedentary individuals.

Research Groups

The study population consisted of sedentary individuals residing in Bayburt, Turkey. The sample comprised 24 sedentary individuals living in this province. Participants were randomly assigned into two groups: 12 in the fitness training group and 12 in the kettlebell training group. All participants were male.

Data Collection Tools

During the training phase, the following equipment was utilized: a squat rack, a bench press station, two dumbbells of each weight, four Olympic bars, one weight sled, and three plyometric jump boxes (two large and one small). Additionally, kettlebells weights were used in pairs. Body weight measurements were obtained using a digital scale, and body dimensions were assessed with a measuring tape. Hand-grip strength was measured using a hand dynamometer, while vertical jump performance was evaluated using a pulley-system jump meter. Furthermore, back-leg strength was assessed with a digital back-leg dynamometer.

Technical training sessions were conducted in the sports hall of the Faculty of Sports Sciences at Bayburt University. The intensity of the training programs was systematically increased over a total period of 10 weeks, with participants exercising three times per week. During the first two weeks, each exercise was performed for one set of 12 repetitions to focus on technical instruction and anatomical adaptation. In the subsequent four weeks, participants completed two sets of 12 repetitions for each exercise. In the final four weeks, they performed three sets of 12 repetitions per exercise. Each training session lasted approximately 70 minutes, consisting of a dynamic warm-up (10 minutes), the main workout session (50 minutes), and a cool-down and stretching phase (10 minutes). Data for the study were obtained between September 23 and November 30, 2024.

The training programs implemented over the 10-week period were as follows:

10-Week Training Program

Fitness Training Program

Monday: Warm-up (10 min), equipment introduction, workout session (Barbell Row, Barbell Deadlift, Barbell Upright Row, Barbell Squat, Dumbbell Shoulder Press, Standing Dumbbell Curl, Barbell Bench Press) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Wednesday: Warm-up (10 min), workout session (same exercises as Monday) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Friday: Warm-up (10 min), workout session (same exercises as Monday) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Kettlebell Training Program

Monday: Warm-up (10 min), equipment introduction, workout session (Kettlebell Row, Kettlebell Deadlift, Kettlebell Upright Row, Kettlebell Squat, Kettlebell Shoulder Press, Kettlebell Biceps Curl, Kettlebell Bench Press) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Wednesday: Warm-up (10 min), workout session (same exercises as Monday) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Friday: Warm-up (10 min), workout session (same exercises as Monday) (50 min), stretching and cooling-down exercises after completing the training (10 min).

Ethics Approval

Ethical approval for this study was obtained from the Ethics Committee of Bayburt University (08.11.2023, session number: 2023/19, decision number: 363).

Collection of Data

Prior to participation, all individuals were provided with detailed information about the study, including potential risks and adverse effects, and were required to sign an informed consent form. Individuals who did not sign the consent form were excluded from the study. Participants were instructed to refrain from engaging in any physical activity within 24 hours before undergoing the tests. At the beginning of the study, participants underwent a series of baseline measurements, including anthropometric assessments (height, body weight, skinfold thickness, circumference measurements), diameter measurements, digital back-leg dynamometer tests, hand-grip strength assessments, vertical jump performance tests, and maximal one-repetition tests for both squat and deadlift exercises. Additionally, a sled push test was conducted. After completing the 10-week training program, all these measurements were repeated as post-tests.

Analysis of Data

The collected data were analyzed using SPSS 25.0. To assess the normality of the data distribution, the Kolmogorov-Smirnov and Shapiro-Wilk tests were performed. The findings revealed that the data did not conform to a normal distribution. Consequently, the Wilcoxon Signed-Rank Test was employed to compare the pre-test and post-test scores in order to examine within-group differences. As a result of the G*Power analysis, the test power was calculated as 0.60. This value indicates that the test is moderately powerful, meaning that there is a 60% chance that it will detect true effects. In general, a test power of 0.80 and above is preferred, but a value of 0.60 offers a moderate level of reliability.

FINDINGS

Table 1. Pretest anthropometric measurements of fitness participants

Participant	Age (Year)	Height (m)	Weight (kg)	Shoulder (cm)	Chest (cm)	Arm (cm)	Waist (cm)	Thigh (cm)
FK1	23	1,74	94,5	114	103	32	100	64
FK2	25	1,83	97,5	111	101	33	103	58
FK3	25	1,9	97	118	101	34	103	58
FK4	38	1,91	120,6	122	115	32	115	52
FK5	39	1,75	73,1	105	90	28	87	50
FK6	22	1,81	89,4	124	105	33	90	58
FK7	22	1,84	76,5	108	96	28	89	56
FK8	22	1,69	80,1	107	97	31	93	61
FK9	21	1,76	73,6	104	91	26	92	50
FK10	22	1,74	80	118	95	32	94	53
FK11	34	1,76	72,4	106	97	27	90	50
FK12	22	1,76	72,6	102	90	26	85	52

FK refers to participants in the fitness workout group.

The ages of the participants were recorded in years, their heights in meters, their weights in kilograms, and their diameter and circumference measurements in centimeters.

Table 1 presents the pretest anatomical measurements of participants who underwent the fitness training program.

Table 2. Posttest anatomical measurements of fitness participants

Participant	Age (Year)	Height (m)	Weight (kg)	Shoulder (cm)	Chest (cm)	Arm (cm)	Waist (cm)	Thigh (cm)
FK1	23	1,74	101,7	130	107	36	98	65
FK2	25	1,83	97	110	100	33	102	55
FK3	25	1,9	96	119	103	37,5	109	50
FK4	38	1,91	117,2	126	122	38	115	59
FK5	39	1,75	73,7	109	91	30	89	52
FK6	22	1,81	92,5	128	108	36	92	57
FK7	22	1,84	76	110	97	30	86	56
FK8	22	1,69	79	117	98	36	89	62
FK9	21	1,76	75,3	109	92	30	88	57
FK10	22	1,74	77,1	113	95	34	87	53
FK11	34	1,76	75,8	117	102	31	89	57
FK12	22	1,76	72,6	111	93	29	88	57

FK refers to participants in the fitness workout group.

The ages of the participants were recorded in years, their heights in meters, their weights in kilograms, and their diameter and circumference measurements in centimeters. FK refers to participants in the fitness workout group.

Table 2 presents the posttest anatomical measurements of participants who underwent the fitness training program.

Table 3. Pretest weight measurements of fitness participants

Participant	Squat (kg)	Deadlift (kg)	Sled Push (s)	CMJ (cm)	SJ (cm)	Hand-Grip (N)	Back-Leg Strength (N)
FK1	115	130	8,68	52	47	39,7	145,5
FK2	65	100	24,4	49	43	58,8	165
FK3	65	100	11,5	35	31	59,9	142
FK4	55	130	8,01	37	36	43,9	181
FK5	75	80	9,44	38	35	44,5	157
FK6	105	150	14,68	51	40	57	251,7
FK7	95	120	7,9	44	44	49,4	148,5
FK8	95	120	14,15	45	42	51,2	179
FK9	75	80	8,71	41	41	44,5	135
FK10	95	110	7,61	41	41	51,6	199,5
FK11	75	90	10,65	35	33	52,6	159,5
FK12	65	100	6,22	46	44	47,2	155

FK refers to participants in the fitness workout group.

The squat and deadlift strength of the participants was calculated based on the total weight, including the bar weight and the plates used (kg). Sled push performance was measured in seconds by recording the time taken to complete a 15-meter distance. CMJ (Countermovement Jump) and SJ (Static Jump) tests were measured in centimeters (cm). Handgrip strength and back-leg strength were measured in newtons (N) using a dynamometer.

Table 3 presents the pretest weight measurements of participants who underwent the fitness training program.

Table 4. Posttest weight measurements of fitness participants

Participant	Squat (kg)	Deadlift (kg)	Sled Push (s)	CMJ (cm)	SJ (cm)	Hand-Grip (N)	Back-Leg Strength (N)
FK1	135	170	5,13	58,5	55,5	52	166
FK2	120	110	8,2	47	44	57,3	172
FK3	90	130	7,91	39	35	62,2	182
FK4	95	150	6,62	56	56	58,4	202,5
FK5	95	100	6,71	48	42	43	114
FK6	160	165	5,18	48	48	63	242
FK7	140	135	4,78	46	47	41,5	129
FK8	135	150	6,6	42	39	57	144,5
FK9	135	140	7,15	40	39	45,7	140
FK10	85	140	4,96	46	50	55,5	183,5
FK11	105	110	6,95	51	48	54,2	181
FK12	105	130	6,83	59	59	45,7	215

FK refers to participants in the fitness workout group.

The squat and deadlift strength of the participants was calculated based on the total weight, including the bar weight and the plates used (kg). Sled push performance was measured in seconds by recording the time taken to complete a 15-meter distance. CMJ (Countermovement

Jump) and SJ (Static Jump) tests were measured in centimeters (cm). Handgrip strength and back-leg strength were measured in newtons (N) using a dynamometer.

Table 4 presents the posttest weight measurements of participants who underwent the fitness training program.

Table 5. Pretest anatomical measurements of kettlebell participants

Participant	Age (Year)	Height (m)	Weight (kg)	Shoulder (cm)	Chest (cm)	Arm (cm)	Waist (cm)	Thigh (cm)
KK1	44	1,74	77,9	108	100	28	102	56
KK2	45	1,81	113,6	121	113	32	114	62
KK3	36	1,66	71,4	107	92	27	92	50
KK4	45	1,72	101,2	117	113	32	118	63
KK5	19	1,72	62,7	110	87	26	77	46
KK6	22	1,92	77,8	109	98	29	85	52
KK7	22	1,79	87	113	102	35	100	55
KK8	39	1,81	93,3	112	106	31	100	54
KK9	21	1,77	106	124	115	35	106	59
KK10	19	1,76	81,6	109	100	29	93	50
KK11	18	1,66	83,5	112	103	31	97	56
KK12	23	1,79	71,9	115	95	29	95	52

KK refers to participants in the kettlebell workout group.

The ages of the participants were recorded in years, their heights in meters, their weights in kilograms, and their diameter and circumference measurements in centimeters.

Table 5 presents the pretest anatomical measurements of participants who underwent the kettlebell training program.

Table 6. Posttest anatomical measurements of kettlebell participants

Participant	Age (Year)	Height (m)	Weight (kg)	Shoulder (cm)	Chest (cm)	Arm (cm)	Waist (cm)	Thigh (cm)
KK1	44	1,74	78,9	115	100	31	101	58
KK2	45	1,81	104	123	113	32	110	60
KK3	36	1,66	71,6	112	94	32	91	57
KK4	45	1,72	99	123	114	34	107	57
KK5	19	1,72	68	112	93	31	78	54
KK6	22	1,92	79	113	95	28	79	55
KK7	22	1,79	85,6	119	102	34	91	62
KK8	39	1,81	94,8	125	105	32	101	60
KK9	21	1,77	99	124	117	35	101	62
KK10	19	1,76	85,5	114	100	32	94	59
KK11	18	1,66	86	122	105	32	98	62
KK12	23	1,79	70	121	102	32	96	55

KK refers to participants in the kettlebell workout group.

The ages of the participants were recorded in years, their heights in meters, their weights in kilograms, and their diameter and circumference measurements in centimeters.

Table 6 presents the posttest anatomical measurements of participants who underwent the kettlebell training program.

Table 7. Pretest weight measurements of kettlebell participants

Participant	Squat (kg)	Deadlift (kg)	Sled Push (s)	CMJ (cm)	SJ (cm)	Hand-Grip (N)	Back-Leg Strength (N)
KK1	65	95	18,46	26	28	37,8	111,5
KK2	75	115	9,6	26	27	37,9	117
KK3	65	90	9,29	38	40	41,2	123
KK4	45	90	9,71	22	21	44,5	117,5
KK5	95	110	10,2	41	39	56,2	272,5
KK6	95	140	6,26	72	60	68	277,5
KK7	115	120	7,61	41	38	56,4	164
KK8	95	140	8,88	39	45	64	171,5
KK9	125	130	9,68	37	37	52,8	174
KK10	75	100	8,03	49	46	48,8	141
KK11	65	80	8,55	37	34	37,2	124,5
KK12	50	75	7,84	59	57	42,6	153

KK refers to participants in the kettlebell workout group.

The squat and deadlift strength of the participants was calculated based on the total weight, including the bar weight and the plates used (kg). Sled push performance was measured in seconds by recording the time taken to complete a 15-meter distance. CMJ (Countermovement Jump) and SJ (Static Jump) tests were measured in centimeters (cm). Handgrip strength and back-leg strength were measured in newtons (N) using a dynamometer.

Table 7 presents the pretest weight measurements of participants who underwent the kettlebell training program.

Table 8. Posttest weight measurements of kettlebell participants

Participant	Squat (kg)	Deadlift (kg)	Sled Push (s)	CMJ (cm)	SJ (cm)	Hand-Grip (N)	Back-Leg Strength (N)
KK1	105	110	7,98	40	31	41,6	117,5
KK2	130	135	6,51	47	46	42,8	127,5
KK3	105	100	7,66	49	47	44	131
KK4	95	110	6,15	45	43	41	133
KK5	150	130	6,65	50	49	47,1	275
KK6	125	140	5,33	72	70	65	246
KK7	110	150	5,77	52	45	54,2	175
KK8	115	160	6,86	52	53	58,6	177
KK9	130	140	6,1	50	46	48	226
KK10	100	140	5,81	59	51	52,5	147,5
KK11	125	130	6,15	39	33	39,6	127
KK12	75	120	5,93	65	64	53	199

KK refers to participants in the kettlebell workout group.

The squat and deadlift strength of the participants was calculated based on the total weight, including the bar weight and the plates used. Sled push performance was measured in seconds by recording the time taken to complete a 15-meter distance. CMJ (Countermovement Jump) and SJ (Static Jump) tests were measured in centimeters. Handgrip strength and back-leg strength were measured in newtons using a dynamometer.

Table 8 presents the posttest weight measurements of participants who underwent the kettlebell training program.

Table 9. Wilcoxon signed-rank test results for pretest and posttest scores of weight, body circumference measurements, and strength performance in the fitness group

Experimental Group Pretest-Posttest Values			N	Mean Rank	Sum of Rank	Z	p
Weight	**Posttest – Pretest**	Negative Rank	7	5,07	35,50	-,223	0,824
		Positive Rank	4	7,63	30,50		
		Ties (Equal)	1				
Shoulder	**Posttest – Pretest**	Negative Rank	2	4,50	9,00	-2,359	**0,018**
		Positive Rank	10	6,90	69,00		
		Ties (Equal)	0				
Chest	**Posttest – Pretest**	Negative Rank	1	3,00	3,00	-2,695	**0,007**
		Positive Rank	10	6,30	63,00		
		Ties (Equal)	1				
Arm	**Posttest – Pretest**	Negative Rank	0	0,00	0,00	-2,947	**0,003**
		Positive Rank	11	6,00	66,00		
		Ties (Equal)	1				
Waist	**Posttest – Pretest**	Negative Rank	7	5,93	41,50	-,758	0,448
		Positive Rank	4	6,13	24,50		
		Ties (Equal)	1				
Thigh	**Posttest – Pretest**	Negative Rank	3	5,67	17,00	-1,076	0,282
		Positive Rank	7	5,43	38,00		
		Ties (Equal)	2				
Squat	**Posttest – Pretest**	Negative Rank	1	1,00	1,00	-2,988	**0,003**
		Positive Rank	11	7,00	77,00		
		Ties (Equal)	0				
Deadlift	**Posttest – Pretest**	Negative Rank	0	0,00	0,00	-3,077	**0,002**
		Positive Rank	12	6,50	78,00		
		Ties (Equal)	0				
Sled Push	**Posttest – Pretest**	Negative Rank	11	7,00	77,00	-2,981	**0,003**
		Positive Rank	1	1,00	1,00		
		Ties (Equal)	0				
CMJ	**Posttest – Pretest**	Negative Rank	4	3,13	12,50	-2,080	**0,037**
		Positive Rank	8	8,19	65,50		
		Ties (Equal)	0				
SJ	**Posttest – Pretest**	Negative Rank	2	2,75	5,50	-2,630	**0,009**
		Positive Rank	10	7,25	72,50		
		Ties (Equal)	0				
Handgrip	**Posttest – Pretest**	Negative Rank	4	4,75	19,00	-1,571	0,116
		Positive Rank	8	7,38	59,00		
		Ties (Equal)	0				
Back-Leg Strength	**Posttest – Pretest**	Negative Rank	5	6,40	32,00	-,549	0,583
		Positive Rank	7	6,57	46,00		
		Ties (Equal)	0				

In Table 9, the Wilcoxon Signed-Rank Test was applied to determine whether there were statistically significant differences between the pretest and posttest scores of weight, body circumference measurements, and strength performance in the fitness training group. The analysis revealed statistically significant differences in shoulder diameter ($z= -2.359$; $p<0.05$), chest diameter ($z= -2.695$; $p<0.05$), arm diameter ($z= -2.947$; $p<0.05$), squat ($z= -2.988$; $p<0.05$), deadlift ($z= -3.077$; $p<0.05$), sled push ($z= -2.981$; $p<0.05$), CMJ (Countermovement Jump) ($z= -2.080$; $p<0.05$), and SJ (Static Jump) ($z= -2.630$; $p<0.05$) between pretest and

posttest scores. No statistically significant differences were observed in the remaining variables.

Table 10. Wilcoxon signed-rank test results for pretest and posttest scores of weight, body circumference measurements, and strength performance in the kettlebell group

Experimental Group Pretest-Posttest Values			N	Mean Rank	Sum of Rank	Z	p
Weight	**Posttest – Pretest**	Negative Rank	5	8	40	-,078	,937
		Positive Rank	7	5,43	38		
		Ties (Equal)	0				
Shoulder	**Posttest – Pretest**	Negative Rank	0	11	0	-2,943	**,003**
		Positive Rank	11	6	66		
		Ties (Equal)	1				
Chest	**Posttest – Pretest**	Negative Rank	2	3,75	7,50	-1,479	,139
		Positive Rank	6	4,75	28,50		
		Ties (Equal)	4				
Arm	**Posttest – Pretest**	Negative Rank	2	2,50	5,00	-2,316	**,021**
		Positive Rank	8	6,25	50,00		
		Ties (Equal)	2				
Waist	**Posttest – Pretest**	Negative Rank	7	8,29	58,00	-1,524	,128
		Positive Rank	5	4,00	20,00		
		Ties (Equal)	0				
Thigh	**Posttest – Pretest**	Negative Rank	2	4,25	8,50	-2,402	**,016**
		Positive Rank	10	6,95	69,50		
		Ties (Equal)	0				
Squat	**Posttest – Pretest**	Negative Rank	1	1,50	1,50	-2,946	**,003**
		Positive Rank	11	6,95	76,50		
		Ties (Equal)	0				
Deadlift	**Posttest – Pretest**	Negative Rank	0	0,00	0,00	-2,950	**,003**
		Positive Rank	11	6,00	66,00		
		Ties (Equal)	1				
Sled Push	**Posttest – Pretest**	Negative Rank	12	6,50	78,00	-3,059	**,002**
		Positive Rank	0	0,00	0,00		
		Ties (Equal)	0				
CMJ	**Posttest – Pretest**	Negative Rank	0	0,00	0,00	-2,937	**,003**
		Positive Rank	11	6,00	66,00		
		Ties (Equal)	1				
SJ	**Posttest – Pretest**	Negative Rank	1	1,00	1,00	-2,987	**,003**
		Positive Rank	11	7,00	77,00		
		Ties (Equal)	0				
Handgrip	**Posttest – Pretest**	Negative Rank	6	6,50	39,00	,000	1,000
		Positive Rank	6	6,50	39,00		
		Ties (Equal)	0				
Back-Leg Strength	**Posttest – Pretest**	Negative Rank	1	10,00	10,00	-2,276	**,023**
		Positive Rank	11	6,18	68,00		
		Ties (Equal)	0				

In Table 10, the Wilcoxon Signed-Rank Test was applied to determine whether there were statistically significant differences between the pretest and posttest scores of weight, body circumference measurements, and strength performance parameters in the kettlebell training group. The analysis revealed statistically significant differences in shoulder diameter ($z= -2.943$; $p<0.05$), thigh diameter ($z= -2.402$; $p<0.05$), squat ($z= -2.946$; $p<0.05$), deadlift ($z= -$

2.950; $p<0.05$), sled push ($z= -3.059$; $p<0.05$), CMJ (Countermovement Jump) ($z= -2.937$; $p<0.05$), SJ (Static Jump) ($z= -2.987$; $p<0.05$), and back-leg strength ($z= -2.276$; $p<0.05$) between pretest and posttest scores. No statistically significant differences were observed in the remaining variables.

DISCUSSION and CONCLUSION

Following the implementation of the training programs, significant differences were observed in the pretest and posttest values of shoulder, chest, and arm diameters in participants who engaged in fitness training. Similarly, significant differences were found in shoulder and thigh diameters among participants in the kettlebell training group. Consistent with these findings, Akkoç (2013) reported significant differences in the shoulder, chest, arm, and forearm regions among individuals engaged in bodybuilding. Similarly, Ertören (2020) found significant changes in the biceps, shoulder, chest, abdominal, quadriceps, and calf regions. In another study, Geri et al. (2015) demonstrated that a 12-week fitness training program led to statistically significant differences in the biceps, chest, shoulder, abdominal, and thigh regions. Akgül (2016) found significant differences in shoulder, arm extension, arm contraction, waist, abdomen, hip, and thigh measurements in a study conducted on sedentary women. Additionally, Majerič (2019) reported that an eight-week fitness program effectively reduced abdominal and hip circumference. Similarly, Mendonça et al. (2022) reported that a 12-week training program was effective in enhancing muscle mass and reducing body fat percentage in individuals. Govindasamy et al. (2024) suggest that kettlebell training improves body composition and fitness by reducing body fat percentage. Research indicates that skeletal muscle hypertrophy can occur in response to prolonged resistance training involving various loading paradigms (Roberts et al., 2023) and that repeated resistance exercises contribute to muscle hypertrophy (Bhasin et al., 1996). Furthermore, regular exercise is associated with fat loss. Based on these findings, it can be concluded that both training modalities influence physical parameters, with kettlebell training leading to greater reductions in thigh circumference compared to fitness training.

Moreover, significant differences were identified in pretest and posttest scores for squat, deadlift, sled push, CMJ (Countermovement Jump), and SJ (Static Jump) among participants in the fitness training group. Similarly, participants in the kettlebell training group exhibited significant improvements in squat, deadlift, sled push, CMJ, SJ, and back-leg strength. Previous studies have also demonstrated the effectiveness of kettlebell training in improving physical performance parameters. Öztürk (2020) reported significant improvements in vertical jump performance following kettlebell training, while Yıldırım (2024) found significant enhancements in both vertical jump and back-leg strength. Additionally, research suggests that kettlebell training contributes to increased muscle mass (Baker, 2008; Jay et al., 2012; Levine et al., 2022; Palmieri-Smith, 2013; Stagi et al., 2023). Beltz (2012) emphasized that an eight-week kettlebell training program is an effective method for enhancing muscular strength. From a broader perspective, Hackett et al. (2016) found that weightlifting exercises, including squats and deadlifts, commonly incorporated in Olympic weightlifting programs, significantly

increased vertical jump height. Similarly, the study conducted by Kul et al. (2021) found that regular weightlifting training increased individuals' vertical jump performance. Other studies have also indicated that these exercises positively influence specific strength parameters (Carvalho et al., 2014; Hermassi et al., 2017; Ikebukuro et al., 2011; İnce, 2018; Jaiswal et al., 2024; Levine et al., 2023; Musa et al., 2009; Stagi et al., 2023; Talpey et al., 2016). Strength training interventions are often assessed based on maximal isometric and dynamic muscle strength, power, speed, agility, and jump performance (ACSM, 2009). The squat exercise is considered a fundamental movement that mimics daily activities and sports-related movements, involving flexion and extension of the hip, knee, and ankle joints. It is widely regarded as one of the most effective exercises for enhancing lower extremity strength and power (Clark et al., 2012). Studies have reported that squat training positively affects jump height (Fukutani et al., 2014; García-Valverde et la., 2022; Gourgoulis et al., 2003; Kilduff et al., 2008; Rixon et al., 2007; Weber et al., 2008). Similarly, the deadlift is a multi-joint, closed kinetic chain exercise that engages numerous lower extremity muscles by extending the hips and knees while lifting a barbell from the ground (Bezerra et al., 2013; Bird & Barrington-Higgs, 2010; Earle & Baechle, 2008). Research suggests that deadlift training may contribute to improvements in jump performance (Chen et al., 2024; Montano et al., 2021; Santos Jr. et al., 2022; Thompson et al., 2015). Based on these studies, it can be inferred that the inclusion of squat and deadlift exercises in both fitness and kettlebell training protocols played a key role in the observed performance enhancements. Overall, both training modalities appear to positively influence strength-related parameters in sedentary individuals.

Over the course of 10 weeks, participants in the fitness training group exhibited significant improvements in shoulder diameter, chest diameter, arm diameter, squat, deadlift, sled push, CMJ, and SJ pretest-posttest scores. Similarly, participants in the kettlebell training group demonstrated significant improvements in shoulder diameter, thigh diameter, squat, deadlift, sled push, CMJ, SJ, and back-leg strength. These findings suggest that kettlebell training is more effective than traditional fitness exercises in reducing thigh circumference. Additionally, kettlebell training resulted in a statistically significant increase in back-leg strength compared to fitness training. Both training groups exhibited statistically significant improvements in vertical jump performance; however, the increase was more pronounced in the kettlebell training group. Conversely, no statistically significant differences were observed in grip strength among participants in either training group.

In conclusion, both fitness and kettlebell training programs have been shown to provide significant improvements in key physical parameters such as muscle strength and body composition in sedentary individuals. Moreover, these programs stand out as effective methods for enhancing strength levels and improving overall physical health, thereby contributing to a better quality of life. This study primarily focused on comparing fitness and kettlebell exercises. Future research should explore comparisons between different types of sports and training modalities.

The study sample consisted exclusively of male participants. Future studies should examine potential differences between male and female participants to determine whether training

responses vary based on gender. The duration of this study was limited to 10 weeks. Extending the training period could yield more comprehensive results. Future studies could incorporate additional exercises to compare their effectiveness in targeting specific muscle groups and improving performance outcomes. The present study did not include a control group. Future research should incorporate a control group to strengthen the validity of findings.

Conflicts of Interest: No financial or personal conflicts of interest were reported in this study.

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