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Original scientific paper

MORE LIKES, MORE CLIMBING: AN INVESTIGATION OF CLIMBERS' INTENTION TO USE SOCIAL MEDIA FOR SELF-PROMOTION[1]

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Abstract: Building on Ajzen's (1991; 2013) Theory of Planned Behavior (TPB), this study aimed to investigate the predictors of social media use among climbers globally. It focused on factors such as attitude, subjective norm, and intention, examining their impact on climbers' self-promotion across various social media platforms. The research encompassed activities spanning from natural environments to competitive sports climbing, emphasizing the evolving role of social media in these contexts. Employing a correlational research design, the study explored how TPB variables influence climbers' engagement with social media for self-promotion within the climbing community. A sample of 142 climbers from 21 countries participated in an online survey, selected through purposeful and convenient sampling methods. All respondents confirmed their use of social media platforms for self-promotion, with Instagram emerging as the primary platform of choice. This research contributes to understanding the intersection of psychological factors and social media behavior among climbers, shedding light on how attitudes, social norms, and intentions shape online self-presentation in adventure sports. By examining these dynamics, the study provides insights into what drives climbers' digital interactions and their implications for broader trends in sports communication and community engagement. Moreover, this study found that female climbers have a higher intention to use social media for self-promotion compared to male climbers.

Keywords: *climbing, social media, self-promotion, theory of planned behavior*

INTRODUCTION

Leading to our examination of how the factors of attitude, subjective norm, and intention, impact social media use among climbers worldwide, let us start by situating the terms *climbing* and *mountaineering* within existing scholarship. Further we explore previous literature and definitions on social media and their implication within the field of sport management. We refer to other scholars who were examining the opportunities and challenges brought by social media and the way they impact athletes. The rise of social media in sport has driven significant academic research, providing sports management experts with essential strategies and operational guidelines to optimize social media practices. Our study focused on self - identified climbers, and the factors that predict their intentions to use social media. This research study facilitates a deeper understanding of the potential factors that impact the way athletes use social media, spanning from natural high-risk environments to sports competition arenas. Perhaps there

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is no other sport as largely dependent on social media promotion as climbing and high-altitude mountaineering. In her book *False Summit*, Rak (2021) posits that the essence of a climb lies not just in the ascent but in the story that follows. Thus, creating identity through narrative is crucial in shaping perceptions of climbing, identity, and the human connection to nature (Rak, 2021). In climbing sports, especially in high-altitude mountaineering where there is no spectatorship nor broadcasting, the narrative is told through the subjective lens of the climber. Rak (2021) discussed the significance of the narratives told by the climbers through autobiographical literature and documentary films, stating that there is no other sport which produces that amount of literature written by the athletes themselves. In this study, we examined social media platforms, specifically Instagram, as a main tool for producing content for self-promotion among climbers since it was identified as the most used platform among all participants.

This study draws on the theory of planned behavior (TPB) and examines the factors driving climbers' intentions to use social media for self-promotion (Ajzen, 1991; 2013). Behavioral intention can be explained through an individual's attitudes, subjective norms, and perceived behavioral control toward a specific behavior (Ajzen, 1991; 2013), such as using social media for self-promotion. The survey was developed referencing the theory of planned behavior manuals (Ajzen, 2013; Francis et al., 2004) and operationalizes the use of social media for self-promotion as external variable through a series of related direct and indirect measurement items. Furthermore, this study utilized an adopted self-promotion five-item scale and six-item scale for measurement of Social Media Usage both developed by Taylor (2020) that will be further explained in the methods section. The primary scale was adopted from Ajzen (1991; 2013). Two other scales used in this study were the social media usage scale adopted from (Krasnova et al., 2013), followed by the Self-promotion scale (Taylor, 2020). Understanding climbers' intentions to use social media for self-promotion can reveal the factors influencing their actual behavior (Ajzen, 1991; Miller, 2017). Digital technologies online are crucial for branding and international sports sponsorships because they can engage with customers worldwide across various digital platforms (Koronios et al., 2020). We use this standpoint to understand the possible differences in behaviors between specific groups of climbers, such as: gender, and sponsored versus non sponsored athletes.

Mountain Sports and Social Media

Mountain climbing has long been associated with taking risks and overcoming fears (Beedie, 2015; Frison-Roche & Jouty, 1996). This phenomenon and mountain sports, in general, have received relatively little sociological consideration despite the increasing sportification of mountaineering culminating with the debut of sports climbing in the 2020 Tokyo Olympics (Pfister & Gems, 2019). Scholars, at times, refer to the same activities as action, adventure, extreme, or lifestyle sports (Breivik, 2010; Cohen et al., 2018; Thorpe, 2014) and definitions vary. Kerns (2021) considered action sports as unorganized, participant-led, pursuits of risk and creativity in either natural or urban environments. Immonen et al. (2022) used an ecological dynamics framework to advance nuanced definitions of adventure sports with: (i) activity categories (such as adventure and extreme sport niches), (ii) characterizations of specific activities (such as sports climbing and trad climbing) understood as specific forms of life, and (iii), perceptions, cognitions and actions of individuals within these specific activities. Based on this, in this paper, the term *climbing* has a dual meaning: the act of scaling a rock face or a mountain, and an independent sport or discipline, such as *sports climbing, trad climbing, ice climbing,* or *bouldering*, disciplines that vary depending on the style and environment they take place in.

The mid-2010s saw a renewed scholarly interest in action sports (e.g. Thorpe, 2014, 2017; Wheaton, 2015; Van Bottenburg & Salome, 2010). Various scholars explored the cultures of sports like snowboarding, surfing, BMX, BASE jumping, kite-surfing, mountain biking, mountain climbing, and skateboarding. For example, exploring "action sport and the politics of identity" and assessing the trajectory of sports sociology at large, Wheaton (2015) noted the significance of "emerging, high-risk, and lifestyle sports" as a crucial perspective in contemporary sport sociology. These activities blend elements of art, play, and games, crossing boundaries that redefine conventional sporting norms. In an in-depth analysis of transnational mobilities, Thorpe (2014) posited that action sports diverge from traditional sports by their relationship to national identity, presenting an important opportunity to examine emerging trends in the globalization of sports and youth culture. Additionally, in 2017, Thorpe articulated a research agenda concerning action sports, social media, and emerging technologies. Climbers' activities often include increased risk exposure, technical climbing abilities, extended expedition lengths and sports competition at the Olympic games (Linxweiler & Maude, 2017). The growing use of smartphones in everyday life may drastically change the way people interact with their environments (Pohl, 2006). While smartphone use in natural settings may

provide numerous benefits to users, negative consequences may also exist, with the severity of these consequences increasing in extreme environments (Ewert & Shultis, 1999; Martin, 2017; Martin & Blackwell, 2016; Pohl, 2006).

Filo et al. (2015) described social media as innovative technologies that enable interactivity and co-creation, allowing organizations (such as teams, governing bodies, agencies, and media groups) and individuals (including consumers, athletes, and journalists) to develop and share user-generated content. In recent years, a significant trend has emerged on social networking sites (S.N.S.s). As image-based platforms like Instagram gain popularity, users are increasingly communicating and presenting themselves by sharing photographs they take of themselves, commonly known as "selfies" (Kim et al., 2016). As selfies become increasingly popular as a unique form of self-presentation across various S.N.S.s, an intriguing question emerges: what motivates people to post selfies on these platforms? To explore this issue, other scholars also examined the factors of selfie-posting behavior on S.N.S.s by applying and extending Ajzen's Theory of Planned Behavior (TPB). Kim et al. (2016) proposed and tested a conceptual model based on the Theory of Planned Behavior (TPB) incorporating narcissism as an additional variable. Results indicate that attitude, subjective norm, perceived behavioral control, and narcissism significantly influence the intention to post selfies on social networking sites. This approach relates to our study, which utilized TPB to investigate related phenomena among a specific population, such as self-identified climbers, emphasizing the differences between male and female athletes. In a study discussing social media use among female athletes, Toffoletti and Thorpe (2018) noted that among drastic under-representation of female athletes in traditional media, social media provides a platform that can bridge this gap and reshape conventional gender identities in sports.

Reviewing additional scholarly literature on the use of social media in sport, we identify a considerable connection with the dramaturgical perspective of Erwin Goffman. Goffman's performative self (1959) is increasingly used among scholars to explain variations in online participation. Goffman's dramaturgical approach uses a theatrical metaphor to explain how individuals present an "idealized" version of themselves rather than an authentic one. This approach views life as a stage where people perform for an audience. Goffman defined a performance as an individual's activity in front of observers, which in turn has some impact on that audience. This ongoing presence allows individuals to adjust their behavior and manage impressions by selectively revealing details. Drawing on this concept, Hogan (2010) suggested dividing self-presentation into two types: performances in synchronous "situations" and artifacts in asynchronous "exhibitions". Goffman's dramaturgical approach, which includes the ideas of front and backstage, is primarily concerned with situations. In contrast, social media often combine exhibitions (like status updates and photo sets) with situational activities (like chatting). Bullingham and Vasconcelos (2013) concluded that Goffman's original framework is highly valuable for understanding identity and self-presentation through interaction in the online world. Additionally, the online environment, with its advanced capabilities for self-editing, can provide opportunities to further develop and refine Goffman's framework.

Applied to our case, we associate the factors that predict the social media use among climbers, with the front stage and backstage given by Goffman. Elaborated further in the discussion section, this approach resonates with the attitude, the subjective norm, and the behavioral control, suggested with the TPB and examined in this study, also linked to the work of Kim et al. (2016), cited earlier. Little is currently known about the factors driving the use of social media by climbers, especially in high-risk environments. The purpose of this study was to explore to what extent factors such as intention, attitude and subjective norm, may influence social media engagement among climbers from diverse background and experience. Based on the presented literature, the following hypotheses got tested (Graph 1):

H_1: Attitude will be a significant predictor of climbers' intentions to use social media for self-promotion.

H_2: Perceived behavioral control will be a significant predictor of climbers' intentions to use social media for self-promotion.

H_3: Subjective norm will be a significant predictor of climber' intentions to use social media for self-promotion.

H_4: Social media use will be a significant predictor of climber' attitude to use social media for self-promotion.

H_5: Social media use will be a significant predictor of climber' behavior to use social media for self-promotion.

H_6: Social media will be a significant predictor of climber' subjective norm to use social media for self-promotion.

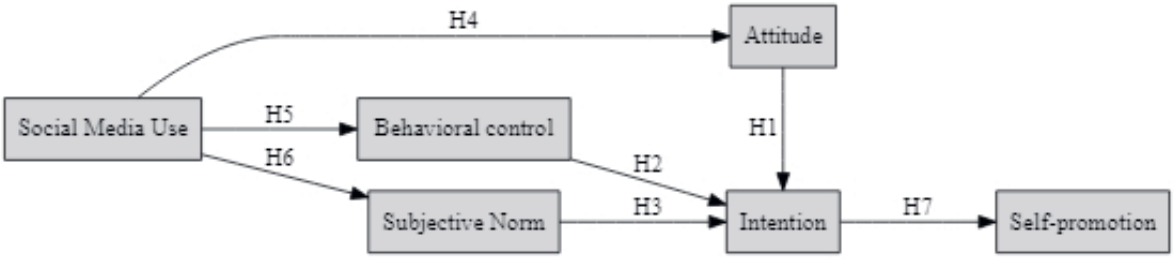
H_7: Intention will be a significant predictor of climbers' direct use of self-promotion.

With that, these two research questions were developed:

Research question 1: To what extent do attitude, subjective norm, and perceived behavioral control predict the intention to use social media for self-promotion among climbers?

Research question 2: How do the intentions to use social media for self-promotion differ between female and male climbers?

Graph 1. *Proposed model*



METHODS

Examinee sample

A correlational research design was used in this study to examine the relationship between the Theory of Planned Behavior (TPB) variables and variables related to the use of social media and self-promotion within the climbing community. A sample of 142 (N=142) climbers from 21 different countries participated in this study via an online survey after I.R.B. approval was obtained. A purposeful and convenient sampling technique was obtained, and the researchers used email, social media groups and local climbing gyms to contact directly those members of the climbing community who were interested in the study. The only requirement to participate in the voluntary online anonymous survey was that the participant must be over 18 and can be identified as a climber. It is important to note that Google Form only registered fully completed surveys, hence we do not have any information as to how many participants started completing the survey. However, there was a conscious effort to ensure that survey bias was prevented by utilizing existing scales that were already validated and reliable. This minimized the possibility that bias would occur during the collection of data during the survey.

Measuring instruments

There are many climbers who use social media platforms, such as Facebook, Instagram, and TikTok, where they appear as passive consumers of content. They scroll through their News feeds and follow other climbing friends' discussions or follow popular climbing destinations or professional climbers' journeys, or they follow the discussions of their climbing friends. Although social media offers the promise of expanding horizons for climbers, there is a growing sense of apprehension and a question about what drives climbers to post and share stories about their adventures, wherever they may be and what they may be doing. The variables used in this study were derived from previous literature and were adapted from six variables used in previous studies. Namely, Social Media Use Scale, Self-promotion Scale, and Theory of Planned Behavior Scale, which had variables such as Subjective Norm, Perceived Behavior Control, and Attitude. This survey began with a brief description of the demographic characteristics of climbers in the first part, information about their social media usage adapted from Taylor (2020) and Krasnova et al. (2013) in the second part, followed by the Self-promotion scale (Taylor, 2020), and Theory of Planned Behavior scale (Ajzen, 1991; 2013).

Theory of Planned Behavior. According to Ajzen (1991; 2013), the theory of planned behavior (TPB) may prove to be a useful theoretical framework for analyzing the factors that drive climbers' intentions to use social media to promote themselves (Ajzen, 1991; 2013). An individual's behavioral intention can be explained by looking at their attitudes, subjective norms, and perceived behavioral control over a specific behavior (Ajzen, 1991; 2013) in this case, using social media for the purpose of self-promotion. There were 15 items on the scale that were based on a 5-point Likert scale, resulting in four different factors based on the results of this study: Attitude (3 items), Subjective Norm (6 items), Perceived Behavioral Control (4 items), and the final Behavior Intention (3 items). Examples of questions: "Following highly skilled climbers on social media is important to me," "Most people support my social media posts and want me to post more," and "Using social media during a climbing trip/project will help me stay connected".

Self-promotion Scale. Self-promotion is a strategy that individuals use to express a positive image of themselves by emphasizing their own strengths, contributions, and accomplishments in relation to others, in this case, climbers (Den Hartog et al., 2020). To conduct this study, we build on existing items, originating from Taylor's study (2020) as the basis of our questionnaire. A 5-item scale was used to measure this phenomenon. An example of a question was: "I want to make people aware of my accomplishments" on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree".

Social Media Usage. The instrument that was used in this study was the six-item Social Media Usage scale developed by Taylor (2020) on a 5-point Likert scale. As part of the questionnaire, the participants were asked: "On social media, how often do you: (1) ...look through your News Feed; (2) ...check out the conversations your friends are having; (3) ...browse the profiles of others". These questions were primarily inspired by the Koroleva et al. (2010) study.

Statistical analysis

This study used both multiple regression and correlation analyses in order to identify which predictors have the greatest impact on behavior intention, self-promotion and social media use among climbers around the globe after Cronbach alpha was calculated and checked using SPSS 27 and Jamovi 2.3.16. as the statistical software. To determine climbers' intention to promote themselves via social media as well as the influence of subjective norms, perceived behavioral control, and attitude on their willingness to use social media for self-promotion, an independent sample t-test was conducted to determine gender differences, as well as differences between sponsored and non-sponsored climbers and their intention for self-promotion and what drives that decision the most. To test the hypotheses a Path analysis method was used to analyze the data to determine the model fit statistics and parameter estimates based on all variables and constructs from the study's model. To perform this task, a number of indicators were used: Chi-square, which indicates that a value less than three indicates a good fit.

RESULTS

Descriptive statistics and correlation

For the statistical interpretation of the participants in this study, descriptive analysis was first used to understand the shape of data and some background information, before conducting hypothesis testing. In total, 142 climbers with diverse climbing experience were included - 54 males, 82 females and 6 from a diverse gender population, such as queer and transgender. The average age of the participants was M=36.3 (SD=10.3), where the youngest climber was 18 years old and the oldest 73 years old. It was confirmed by every climber who participated in this study that social media is one of their forms of expression, and communication. No doubt that sponsorship plays a large role in social media today, especially for the purpose of promotion, but only 10.6 percent of the respondents in this study reported having some kind of sponsorship for their climbing activities (Table 1). In the survey, most respondents identified themselves as intermediate (41.5%) and advanced climbers (33.1%), whereas 18.3 percent stated that they are at the beginner level with 7 percent stating that they are at the professional level.

Table 1. *Descriptive information*

Features		Population	Proportion (%)
Gender	Female	82	57.7
	Male	54	38
	Other	6	4.3
Climbing level	Beginner	26	18.3
	Intermediate	59	41.5
	Advanced	47	33.1
	Professional	10	7
Sponsorship	No	127	89.4
	Yes	15	10.6

Ten most popular social media applications were listed in the survey (Instagram, Facebook, X, Viber, Tik-Tok, Be Real, WhatsApp, Snapchat, and LinkedIn), and out of the ten most popular social media applications, 92.3 percentage of climbers referred to Instagram as their primary application, followed by Facebook and X as their secondary applications. One of the major factors that determine the success of a social media campaign is the number of followers that the climbers have on the social media platforms. There are two most common groups for the number of followers for this study, 101-1000 (47.1%) and 1001-5000 (35.7%).

Table 2. *Descriptive Statistics for Direct Measure*

	N	Mean (S.D.)	Min	Max	Cronbach α of observed variables
Intention	142	3.69 (.93)	1.00	5.00	.84
Attitude	142	3.73 (.75)	1.00	5.00	.70
Behavioral Control	142	3.07 (1.0)	1.00	5.00	.86
Subjective Norm	142	3.29 (.85)	1.00	5.00	.81
Social Media Usage	142	3.30 (.63)	1.00	5.00	.75
Self-Promotion	142	3.31 (.88)	1.00	5.00	.85

This study (Table 2) utilized a five-point Likert scale in which 1 is the minimum level (strongly disagree) and 5 is the maximum level (strongly agree) of statements. Furthermore, it was found that the reliability coefficient for this study was in a range of $\alpha = .70$ to $\alpha = .86$. The lowest value of $\alpha = .70$ was for the attitude, and the highest value $\alpha = .86$ for the perceived behavior control. With that we ensured internal reliability, even .70 was at the borderline of acceptance.

Table 3. *Relationship between vectors and Intention*

	1	2	3	4	5
Intention					
Attitude	.548**				
Perceived Behavior Control	.614**	.433**			
Subjective Norm	.674**	.462**	.808**		
Social Media Usage	.509**	.481**	.369**	.396**	
Self-Promotion	.567**	.377**	.636**	.661**	.524**

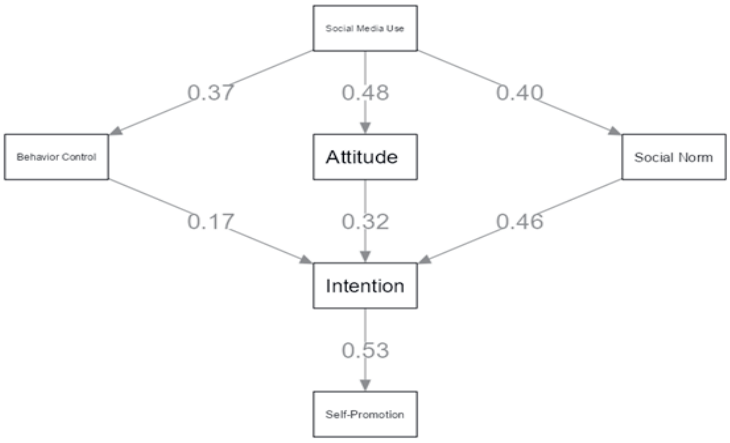
** = $p < .005$

An analysis of Pearson's product-moment correlations was performed to determine whether there were significant relationships between all the directly measured variables and their correlations. All variables used in this study had a positive relationship between each other. Yet, the subjective norms and perceived behavioral control had

the highest statistically significant positive relationships (r = .880, p = .005) while attitude and self-promotion had the smallest statistically significant positive relationships (r =3.77, p = .005) (Table 3).

Proposed Hypothesized Model

Graph 2. *Proposed Model Diagram*



Path analysis showed that all paths were positive and statistically significant. The path coefficient from intention to self-promotion had the strongest standardized regression weight of .531. The model's chi-square, $\chi^2(8, 15) = 461$, $p < .005$. The intention was explained with 29% of variation in self-promotion (Graph 2, Table 4).

Table 4. *Analysis of hypotheses*

Hypothesis – Relation path	β	P-value
H1: Attitude → Intention	.317	.000***
H2: Behavior Control → Intention	.166	.000***
H3: Subjective Norm → Intention	.461	.000***
H4: Social media → Attitude	.481	.000***
H5: Social media → Behavior Control	.369	.000***
H6: Social media → Subjective Norm	.396	.000***
H7: Intention → Self Promotion	.531	.000***

=p>0.05; *=p <0.05; **p<0.01; ***=p<0.001

An independent t-test was conducted to compare self-promotion and intention to use among different genders. The mean value for climbers identifying as female (M = 4.04, SD = 0.82) was significantly higher than for climbers identifying as male (M = 3.65, SD = 1.07) for intention, t (92) = -2.29, p = .02. Due to the very small number of climbers identifying as queer, transgender and other, compared to males and females, these groups were removed from the analysis. Furthermore, the study found statistically significant differences between climbers with sponsorship for their climbing activities and those without any financial, equipment, or similar support. For climbers with sponsorship, self-promotion, intention, attitude, behavioral control, and subjective norms were more important than for those without sponsorship. Specifically, the intention for self-promotion among sponsored climbers (M = 4.49, SD = 0.91) was significantly higher compared to non-sponsored climbers (M = 3.82, SD = 0.94), t (17.3) = -2.56, p = 0.02. Additionally, the subjective norm for sponsored climbers (M = 4.12, SD = 0.94) was significantly higher than that of non-sponsored climbers (M = 3.20, SD = 0.79), t (16.4) = -3.64, p = 0.001. In other words, for sponsored climbers, perceptions of what others think and how other climbers behave are more influential compared to those without sponsorship. This indicates that social expectations and the actions of peers play a greater role in shaping the attitudes and intentions of climbers with sponsorship.

DISCUSSION

In his substantive essay on social media use, Erland (2022) stated: "If you do not exist online, you do not exist". From a climbing perspective, this can be summed up as: "If you did not post about your climb on social media, it is as if the climb never happened". Even if climbing activities can take place in an isolated and high-risk environment, an increasing number of climbers share their activities and daily lives on social media. The reasons vary, so the purpose of this study was to examine the factors that predict climbers' worldwide intention to use social media for self-promotion. The results showed a positive relationship among all factors in this study; subjective norms and perceived behavioral control had the highest statistically significant positive relationships (r = .880, p = .005). Furthermore, the results suggested that climbers' intention to use social media for self-promotion was explained by their attitudes, behavior control and subjective norms. The path coefficient from intention to self-promotion had the strongest standardized regression weight of .531. With that, we investigated research question 1: "To what extent do attitude, subjective norm, and perceived behavioral control predict the intention to use social media for self-promotion among climbers?"

To address the second research question, "How do the intentions to use social media for self-promotion differ between female and male climbers?" this study examined the differences in social media self-promotion intentions among genders. The findings revealed a significant difference between female and male climbers. Specifically, female climbers had significantly higher intentions to use social media for self-promotion (M = 4.04, SD = 0.82) compared to male climbers (M = 3.65, SD = 1.07), t (92) = -2.29, p = 0.02. This indicates that gender plays a notable role in the intention to engage in self-promotion on social media, with female climbers showing a greater propensity towards this behavior. These findings resonate with the presented studies addressing the underrepresentation of female athletes in traditional media outlets, and the shift brought by social media, that can potentially bridge that gap and challenge conventional gender identities in sport (Toffoletti & Thorpe, 2018).

Applied to our case, we associate the factors that predict the social media use among climbers, with the front stage and backstage given by Goffman. This can be explained by adding filters and representing the best self on social media, aiming to meet expectations from the audience. On the other hand, the practical implications of this study highlight the needs among climbers. For instance, introducing opportunities like Name, Image, and Likeness (NIL) rights for climbers, like those available to college athletes in the U.S., could be beneficial. Furthermore, compared to professional athletes who receive extensive educational support on effectively using social media for self-promotion, climbers would greatly benefit from similar opportunities. Given the evident intention among climbers to use social media for self-promotion in the future, providing them with targeted educational resources is essential. Since female climbers had a higher intention to use social media for self-promotion, many outdoor industries can recognize and use that for their marketing purposes.

Limitation and Recommendation

First, this study examined gender differences, but a primary limitation was the lack of diversity, particularly among populations identifying as queer, transgender, and other gender identities. Secondly, during this study we discovered that some countries do not allow access to certain social media platforms we used as primary tools, such as Instagram. As a result, climbers from these countries excluded themself from the study. Third, due to the short time of data collection, the sample size was not big enough for the S.E.M. analysis, planned at the beginning.

Based on this study, future research could benefit from a mix methods design conducting in-depth interviews to better understand gender differences related to their ability. Additionally, since climbing has become a more popular competitive sport, it would be valuable to explore the differences in self-promotion strategies between competitive climbers and recreational climbers. Investigating these aspects could provide a more comprehensive understanding of how various factors influence self-promotion in the climbing community.

CONCLUSION

Aiming to investigate the factors that predict climbers' intentions to use social media for self-promotion, it was discovered that there is a significant positive correlation between all these factors. Additionally, results sug-

gested that climbers' intention to use social media for self-promotion was explained by their attitudes, behavior control, and subjective norms. The findings also revealed that female climbers have a higher intention to use social media for self-promotion compared to male climbers. Applying Goffman's front stage and backstage concepts involves analyzing how climbers present themselves on social media in different contexts and motivations behind these presentations. If we consider the front stage to consist of public posts, audience engagement, sponsorship and influence, then the backstage will include the preparation of the content, private interactions, and performance. Or the front stage examines the behaviors that climbers use to create a specific impression on their audience, while the backstage will delve into behaviors and preparations that are hidden from the public. However, in that case an emerging question that requires further examination, is to situate the actual act of climbing within Goffman's stage. Further investigation could be beneficial to understand the nuances not only beyond the binary gender view, but also among climbers with different skill levels of performance in the sport, which will not necessarily mean that better climbers are more famous than others, unless they are sponsored.

The scientific significance of the study, "More Likes, More Climbing" lies in its contributions to the fields of both sports management and marketing. The study's application of the Theory of Planned Behavior (TPB) within the context of niche sports like climbing offers valuable insights into how factors such as intention, attitude and subjective norm, may influence social media use among athletes. Additionally, contribution is made through complex methodology, incorporating existing and adapted scales together with a blend of theoretical perspectives. The findings, emphasizing gender differences in social media use, contribute to understanding the dynamics of the representation and participation of athletes. From a marketing perspective, the examination of climbers' use of social media platforms can inform digital marketing strategies and potentially, create branding endorsements and sponsorship opportunities. This leads to nuanced understanding of how social media can reshape motivation and visibility within niche sports communities. Overall, the research contributes to academic discourse by analyzing how social media impact cultural norms and values of the broader climbing communities. By examining these areas, the study provides a valuable framework for future research in sports sociology, digital marketing, and the role of social media in shaping contemporary athletic identities. Dealing with a less explored topic in a practical sense, this study can be beneficial for the increasing climbing population and contribute to the popularization of this sport.

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THE FACTORIAL STRUCTURE OF SPORTS INTEREST IN ADOLESCENTS[1]

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Abstract: The aim of this empirical study was to examine the latent structures of adolescents' interest in sports. The pertinent sample included (N = 144) male high school seniors from Valjevo, of average age 18.05 ± 1.82. The adapted version of the PS2 Questionnaire about Interests in Sports (Prot and Bosnar, 1999) was applied in this transversal research. The maximum mean value of the scores on the PS-2 questionnaire was noted in the preference for auto and motorcycle racing (M = 3.72), and the minimum one in gymnastics (M =1.10). Five main components were extracted by analyzing the main components (PCA) based on the Guttman-Kaiser criterion, with 6.91% of the total variance explained. The extracted five-factor structure of the latent dimensions was interpreted as: outdoor sports, combat sports and martial arts, fundamental and artistic sports, ball and racket sports, and precision sports. The linear correlations of the isolated common factors are statistically significant ($p \leq 0{,}05$), move in positive direction and are of low or moderate intensity, and that shows that the isolated latent variables are not independent, but that there is a relevant overlap between them. The preference of sports interests in the five-factor structure of adolescents is oriented towards "male" and partly towards "neutral" sports which points to the relevance of gender stereotypes in sports. This study also deals with the practical implications of the relevance of the isolated five-factor structure of sports interest in adolescents. This transversal research contributes to the existing literature and empirical data on this rarely examined phenomenon in Serbian sports population.

Keywords: *high school seniors, sports, latent structure, Promax factors*

INTRODUCTION

The last few decades in developmental psychology, but also sociology and other scientific areas have shown that sports interest have significant functions in all phases of human life such as – playing, studying, choosing a vocation, leisure, etc. (Maksić & Tenjović, 2008). The aforementioned authors believe that in the process of determining interests, an adolescent tests their psychophysical skills in the areas that would direct their talents and where they can make creative contributions, whereby the support of family and school plays a significant role.

The authors (Sampedro-Piquero et al., 2023) define *adolescence* as a special age which includes relatively long, interesting, but also complex period of development which each individual has to go through in order to develop from an originally biological organism into a mature person, but it also represents a risk and a chance for

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progress and further development on a complex road to adulthood. The authors also point out that adolescence is characterized by the intense transformations of physical, cognitive, emotional, and social functions.

Sport is a worldwide phenomenon. The initial components of defining sport come from ancient Greece and Rome. Modern sport is a popular social phenomenon and a constituent part of culture. Popular sporting events such as winter and summer Olympic Games, cycling race Tour de France, tennis tournament Wimbledon, FIFA World Cup, etc. are watched by millions of people of various age, gender, race and social status (Azimov et al., 2022). However, there is no consensus regarding the scientific definition of sport which makes operationalization of this term difficult (Brinkmann, 2021; Malčić, 2018). The definitions used in this paper are those by the authors (M. Ivanović & U. Ivanović, 2015) who define sports as "any highly structured physical activity conducted under the rules of fair play, which involves high level of commitment, contains certain elements of play, and includes competing against oneself or an opponent", and (on professional, amateur or school level) involves intense muscle effort to produce movement, promote harmonious physical development and boost work ability, health and the quality of life.

In terms of the significance of health, in China in 2500 BC, it was believed that body develops, stays healthy and ages slower if exposed to physical and athletic activities. Also, in Ancient Rome, the famous physician Galenus recommended physical activity as a way to preserve and improve health. On the other hand, physical inactivity was identified as a globally dominant mortality factor (WHO, 2022). For Serbia and the implications of this paper, the following data is exceptionally significant: in Serbia., every fifth adult is overweight, every third adult smokes, almost half of the population has hypertension, while only half of the population engages in physical activity every day, and 50% of the population does not engage in physical activity at all (Sports Development Strategy in Serbia from 2014 to 2018, 2015). Additionally, the empirical studies (Dorsch et al., 2022) have proven that regular sporting activity has a positive effect on the health of adolescents. However, according to these authors, engaging in physical activity is not at a satisfactory level among young people, even when there are optimal conditions for conducting sporting activities.

According to a recent study (Wang et al., 2022) sports interest in adolescence differs depending on demographic factors such as gender, age, location, lifestyle, season, family support, socio-economic status, media influence, etc. The authors believe that there is small chance that young people would show interest in sport which they have not engaged in before.

The need for a healthy and active lifestyle in adolescence is increasing due to excessively sedentary lifestyle at home and in school, as well as increased weight and obesity (WHO, 2022). However, even though adolescents are aware that sport and physical activity have positive effects on preserving and improving health, they are not physically active enough (Formica et al., 2019; Mišigoj-Duraković, 2018). The recent results (Currie et al., 2023) point out the lack of physical activity among children and young people. According to global data, 28% of people throughout the world (around 1.4 billion adults) do not engage in enough physical activity, i.e. 3,2 million people die each year due to lack of physical activity (WHO, 2022). Therefore, the World Health Organization recommends walking, cycling, swimming and other active recreational activities such as dancing, yoga, tai chi as most common physical activities. This study concludes that overweight adolescents will probably remain overweight in adulthood, which increases the risk of chronic illnesses and leads to increased chances of morbidity and mortality. A recent study has shown (Bull et al., 2020) that due to hypokinesia, over 80% of adolescents do not meet the minimum criteria for conducting physical activity necessary for preserving health. Therefore, with the aim of improving cardiovascular and locomotor system, fitness, decreasing the risk of illness and non-communicable diseases – brain aneurism, breast and colon cancer, as well as depression, the guidelines for adults recommend at least 150 minutes of moderate intensity physical activity weekly (WHO, 2022). In another research, (Grošić & Filipčić, 2019; Prot, 2011; Stojaković, 2019) it has been stated that 61% of adolescents from Zagreb said that they had never exercised regularly nor taken part in any sports competitions. Adolescents today are more connected via technology, media and the Internet than any other generation before. According to certain research findings (Martelli & Porro, 2018), in Italy, approximately 56% of people who quit sports are adolescents. The main reasons for which adolescents quit playing sports are: lack of interest (74,5%), family and economic reasons (15,6%), frustrations over competition (4,9%). Additionally, lack of fun and confidence, social pressure form coach, parents and friends, lack of time and money, injuries, etc. are also reasons for adolescents to quit sports (Sampedro-Piquero et al., 2023). The aforementioned authors have determined that the most influential factors are intrapersonal (lack of fun and enjoyment in sport) and interpersonal (pressure form coach), while those structural are less important, but the most important of them is lack of time.

Summing up the analyses of the aforementioned studies, one can see that the structure of sports interests differs, which largely depends on the operationalization of the research matter. The studies show that sports interest in adolescents is a relevant, but insufficiently explored field in both theory and practice, especially in Serbia. Therefore, based on the given issue, the aim of this transversal research was to examine, on the male adolescent population, the factorial structure of the Questionnaire about Interests in Sports (PS2), check the latent structure of adolescents' interest in sports, and determine the statistically significant relations between the extracted basic dimensions. In accordance with theoretical assumptions, the results of the previous studies and the aim of the research, an *alternative hypothesis* has been formulated (H) – to identify the factorial structure of sports interest and the correlates of the extracted basic dimensions of adolescent high school students. Considering the deficit of research in developmental psychology, especially ones dealing with male adolescents, as well as varying results, this transversal study is expected to provide a clearer insight and better understanding of the factorial structure of sports interest in adolescents.

METHOD

Participants and procedure

The research included the sample (N = 144) of male students from five high schools from Valjevo: Medical school, Valjevo Gymnasium, Technical school, Economy school, and Agricultural school. The average age of participants was 18.05 (SD =1.82). The sum of the scores did not show univariate ($z \geq 2.89$) or multivariate outliers ($\chi 2$ (13) ≥ 40.07, $p \leq 0.01$; Tabachnick & Fidell, 2007).

The research was approved by the science committee of the Serbian Academy of Innovation Sciences from Belgrade and was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Before the beginning of the research, the participants were informed of the research subject and the method of data anonymization, after which they gave their informed consent. The testing was conducted by trained professionals and supervised by a psychologist. The testing took approximately 30 minutes. The research began after the consent from a school principal had been acquired. The research was conducted in May 2023.

Questionnaire about Interests in Sports – PS_2 (Prot and Bosnar, 1999)

The aim of this questionnaire was to obtain insight into the content, intensity and the frequency of participants' interest in sports. The authors reduced the original measuring instrument that consisted of 54 variables to 25 sports that exist in the Kolubara district. The participants' task was to choose one answer on the five-point Likert-type scale which is used to assess how much each sport affects their sporting activity: 1) a sport that they would never, under any circumstances, want to play, 2) a sport they would not want to engage in unless they had no other options, 3) a sport they would engage in occasionally or under favorable circumstances, 4) a sport they would gladly do, and 5) a sport they would really like to engage in if they had a chance. Allowing them to choose only one option is a way of controlling socially desirable responding. The total score is measured as an arithmetic mean of the answers on all variables.

Data processing

The descriptive statistical methods and factorial analysis of the main components, with the Promax rotation and Kaiser's normalization were used in data processing. The acquired data were analyzed on the $\alpha \leq .05$ Statistics software IMB SPSS 23.

RESULTS

Table 1 shows the main descriptive statistica parameters of the analyzed manifest variables of the measuring instrument applied in the research on the entire sample of the participants.

Table 1. *Descriptive parameters of the analyzed variables of the Questionnaire about Interests in Sports*

Variables	*M*	*SD*	*Sk*	*Ku*	*Sk SE*	*KuSe*	*K-S*
Motorcycle racing	3.72	1.39	.07	.06	.12	.36	.79
Swimming	1.27	1.19	-.22	.98	.12	.36	.85
Skiing	4.01	1.28	.45	.11	.12	.36	.78
Sports fishing	2.43	1.40	.06	-.23	.12	.36	.63
Cycling	3.21	1.29	-.36	.45	.12	.36	.12
Sports aviation	2.96	1.49	.52	.03	.12	.36	.23
Karate	2.67	1.42	.67	.36	.12	.36	.64
Weightlifting	2.96	1.52	-.03	-.57	.12	.36	.18
Wrestling	2.78	1.39	.77	.28	.12	.36	.25
Boxing	3.39	1.40	.05	.34	.12	.36	.37
Judo	2.79	1.28	.28	.49	.12	.36	.45
Dancing	1.79	1.20	.13	.12	.12	.36	.28
Aerobics	1.88	1.25	.90	.05	.12	.36	.15
Athletics	2.59	1.50	-.03	.03	.12	.36	.33
Sports gymnastics	1.10	1.18	-.15	-.18	.12	.36	.46
Football	3.60	1.47	.30	.20	.12	.36	.56
Basketball	3.23	1.29	.26	.05	.12	.36	.24
Volleyball	2.99	1.19	.43	.36	.12	.36	.63
Handball	3.38	1.30	.09	.23	.12	.36	.44
Tennis	3.19	1.28	.35	.59	.12	.36	.70
Table tennis	3.20	1.30	-.48	.46	.12	.36	.28
Shooting	3.19	1.50	.05	-.33	.12	.36	.89
Archery	3.19	1.54	.88	.01	.12	.36	.75
Bowling	2.37	1.09	-.90	.60	.12	.36	.60

Legend: *M* = arithmetic mean; *SD* = standard deviation, *SK* = Skewness, *Ku* = Kurtosis, *SkSE* = Standard error of skewness; *KuSE* = Standard error of kurtosis; *K-S* = Kolmogorov-Smirnov test

The results reveal that the measuring variables show maximum arithmetic mean of the motorcycle racing variable (*M* = 3.72), and minimal on the sports gymnastics variable (*M* = 1.10). The highest value of standard deviation is of the archery variable (*SD* = 1.54), while the lowest dispersion of results can be seen on the bowling variable (*SD* = 1.09). The scores on the Kolmogorov-Smirnov test (*K-S*) for the normality of the data distribution and skewness and kurtosis range within normal values between ±1 (Demir, 2022). That means that there are no statistically relevant variations of the score distribution from the Gaussian distribution curve, which is a prerequisite for conducting further parametric statistical analyses.

For the purpose of better understanding of the measuring subject – adolescents' interest in sports, and if the conditions for factorization were met, two values were tested: Bartlett's test of sphericity which checks if there is statistically significant difference between the correlation matrix and the identity matrix where linear correlations between the variables equal zero, and The Kaiser–Meyer–Olkin test – KMO, which shows the proportion variance explained by the latent factors, or in different words, it measures the level of model adequacy (Wangensteen et al., 2015).

Analyzing the results has shown that the criteria for conducting factorization (χ 2 = 5081,35; KMO = .97; $p \leq$ .01) were met, and based on these parameters, with the risk of less than 1%, it is safe to say that the multivariate statistical method for data reduction can be conducted because the representativeness of the used questionnaire is high.

The multivariate method for data reduction including the principal component analysis (PCA) based on the Guttman-Kaiser criterion of eigenvalues was used, and Table 2 shows the extracted five main components, with ei-

genvalues, which surpass the border value ($\lambda \geq 1.00$), and explain 62.60% of the total variance – the average squared deviation of the results from the arithmetic mean, which is above the recommended value of 60% (Demir, 2022).

Table 2. *Eigenvalues of the factors and the percentage of the explained variance*

Eigenvalues			
Main components	Total	Variance percentage	Cumulative % of explained variance
1	11.26	34.15	34.15
2	3.45	10.50	44.64
3	2.72	8.30	52.90
4	2.02	6.20	59.10
5	1.14	3.49	**62.60**

The first main component, the linear combination of the observed variables, shows clear domination compared to other characteristic squared values because it includes the maximal variability segment of the original group of data and explains 34.15% of the variability, while the second explains 10.53%, the third 8.30%, the fourth 6.20%, and the fifth main component explains the minimal added part of the variation (3.49%). The values of the remaining latent dimensions are not responsible for the data structure and are not included in the final analysis, because their values do not surpass the value of one. Therefore, that information was not significant for the analysis of the observed data (Lam & Choy, 2019). Due to previously considered theoretical reasons, the method of multivariate analyses was conducted on the main components, and they were rotated using the Promax oblimin rotation.

Table 3 shows the correlation coefficients of the set-up and the structure of the five isolated common factors of interest in the 25 analyzed sports. The criteria for eliminating the items included statistically significant factorial saturations with theoretical limit ($\lambda \geq 30$), which means that the interpreted coefficients close to zero suggest that the original variable does not play significant role in creating the main component whose coefficients are being observed. Based on the value of the communality, i.e. the part of the total variance which variables share with factors, it can be concluded that coefficients on the five-factor solution are high, which implies homogeneity.

Table 3. *Factorial saturations with Promax Factors for the Questionnaire about Interests in Sports*

Variables	F_I		F_{II}		F_{III}		F_{IV}		F_V		h^2
	Set-up	Structure	Set-up	Structure	Set-up	Structure	Set-up	Structure	Set-up	Structure	
Motorcycle racing	**.58**	**.49**	.05	.19	.12	-.25	.09	-.29	.04	-.15	.63
Swimming	**.40**	**.47**	.24	.08	-.06	.22	.05	.17	.08	.27	.86
Skiing	**.50**	**.46**	.17	.11	.28	-.03	.16	.07	.29	-.01	.59
Sports fishing	**.62**	**.60**	-.01	.25	-.02	.24	.07	.22	-.05	.18	.83
Cycling	**.41**	**.59**	.13	-.29	.16	.09	.12	-.11	.29	.15	.60
Sports aviation	**.69**	**.66**	.26	.03	-.20	.08	.19	.23	.05	-.16	.85
Karate	.20	-.09	**.59**	**-.80**	.11	.09	.23	.29	.13	.02	.64
Weightlifting	.17	.06	**.60**	**.66**	.16	.25	.06	.15	.28	.03	.87
Wrestling	.19	.03	**.69**	**.73**	.19	-.07	.15	.20	-.02	.17	.50
Boxing	.05	.17	**.80**	**.77**	-.05	.18	.12	.26	.08	.26	.49
Judo	.19	.12	**.57**	**.65**	.19	.10	.22	.09	.26	.07	.84
Dancing	.09	.18	.19	.28	**.69**	**.58**	-.05	.24	-.13	.06	.70
Aerobics	.19	.18	.02	.12	**.58**	**.53**	.27	.05	.16	.23	.62
Athletics	.16	.26	.26	.04	**.65**	**.63**	01	.15	.29	.26	.55
Sports gymnastics	.18	.12	.25	.05	**.62**	**.60**	.19	.23	.26	.16	.73
Football	.28	.09	.17	.20	.08	.12	**.76**	**.73**	.23	.12	.56

Basketball	05	.23	.13	.26	.02	.18	**.67**	**.65**	.28	.09	.74
Volleyball	.27	.13	.04	.20	.15	.19	**.74**	**.72**	.06	.22	.65
Handball	.24	.16	.10	.05	.14	.25	**.64**	**.62**	.17	.02	.82
Tennis	.01	.22	.12	.24	.16	.07	**.68**	**.66**	.25	.18	.53
Table tennis	.23	.14	.19	.03	.12	.25	**.64**	**.62**	.09	.26	.48
Shooting	.21	.06	.18	.27	.15	.24	.22	.06	**.68**	**.73**	.72
Archery	.23	.14	.19	.05	.28	.15	-26	.09	**.65**	**.63**	.84
Bowling	.05	.23	.18	.12	.16	.26	.02	.20	.49	.60	.50
Water polo	.12	.23	.27	.16	.09	.20	**.70**	**.69**	.15	.23	.60
Badminton	.22	.08	.17	.26	.07	.25	**.61**	**.58**	**.62**	**.60**	.56

Legend: Promax factors: F_I – outdoor sports, F_{II} – contact and combat sports, F_{III} – ground and artistic sports, F_{IV} – ball and racket sports, F_V – precision sports; h^2 = communality after extraction; Significant factorial loads in the matrix of set-up and structure are bolded for clarity

Based on the matrix of the set-up and structure of the five-factor solution, hierarchically first latent dimension includes factorial saturations (correlations) of the manifest variables – sports (sports aviation, sports fishing, mountain climbing, motorcycle racing, skiing, cycling, and swimming) which play the biggest part in the total variance. In accordance with the saturations of the linear combinations, the most intense latent variable F_I is interpreted hypothetically as *outdoor sports*. On the second mutual latent dimension, the biggest correlation coefficients can be seen around the manifest variables: karate, wrestling, boxing, and judo. Based on the content of indicators this isolated F_{II} is defined as *martial arts*. The most important orthogonal projections of the vectors of the manifest variable on the third mutual latent dimension have the biggest factorial weights for the manifest variables: dancing, athletics, sports gymnastics, and aerobics. Based on the content of the items, they are grouped into the third latent variable F_{III} identified as *fundamental and artistic sports*. The most important orthogonal projections of the vectors of the manifest variable on the fourth mutual latent dimension have the biggest factorial weights for the manifest variables: football, volleyball, basketball, handball, water polo, table tennis, tennis, and badminton. They are hierarchically grouped in the F_{IV} and based on the factorial weights, named *ball and racket sport*s. Finally, the fifth mutual latent dimension of the greatest factorial saturation – correlation is seen with the manifest variables shooting sports, archery, and badminton. In the extracted five-component model the weakest F_V, with the lowest segment in the total variability, is theoretically interpreted as *precision sports*.

Correlations between the rotated factors of interest in sports are shown in Table 4. These latent dimensions can theoretically be regarded as orthogonal, even though some of them, on an empirical level, statistically significantly correlate.

Table 4. *Intercorrelations between the extracted factors of interest in sports*

Promax factors	F_I	F_{II}	F_{III}	F_{IV}	F_V
F_I	–				
F_{II}	0.37**	–			
F_{III}	0.50**	0.28**	–		
F_{IV}	0.42**	0.34**	0.33**	–	
F_V	0.59**	0.16*	0.44**	0.19*	–

Legend: Promax factors: FI – outdoor sports, FII – martial arts, FIII – fundamental and artistic sports, FIV – ball and racket sports, FV – precision sports; * $p \leq .05$; ** $p \leq .01$

The calculated positive values of the Pearson's correlation coefficients between the main isolated components are statistically significant, of positive direction, of low to moderate intensity, and range from .32 to .59. That shows good criterion value of the isolated five-factor structure. This type of correlations between the factors implies that the isolated latent variables are not mutually independent; instead, there are significant overlaps between them. The

maximum level of co-dependency in the matrix of intercorrelations is manifested between three Promax factors: *outdoor sports, fundamental and artistic sports,* and *precision sports*. On the other hand, minimal strength of the correlation coefficient on the level of statistical error of 5% can be seen between the isolated factors of F_{IV} – *ball and racket sports* and F_{V} – *precision sports*. Therefore, the calculated coefficients show that there is hierarchical correlation between the five isolated latent dimensions. The obtained relations on the examined adolescent population completely match the theoretically expected correlations between the extracted latent variables, which could have been expected due to low to moderate correlations between the variables included in the analyses (Fajgel, 2003).

DISCUSSION

Recent times have shown the intense interest in researching sports interest, and the aim of this research was to identify the factorial structure of the interest in sports of male population and define its basic dimensions. The findings of this empirical study reveal positive interest in sports among high school seniors from Valjevo. The average values of the descriptive statistics parameter reveal that adolescents show maximum interest towards *outdoor sports*: sports aviation, sports fishing, mountain climbing, motorcycle racing, skiing, cycling, and swimming, then towards ball sports such as football, basketball, volleyball, and handball, which is in accordance with the previous results (Martelli & Porro, 2018; Toselli et al., 2023). The high school seniors' interest in football and basketball on the examined sample is probably the consequence of the significant success of the teams from Valjevo and senior national teams which are one of the best in Europe. Identical results have been found in another research (Bosnar et al., 2004) where it has been determined, using the discriminant analysis, that there is higher interest in sports with participants from urban areas where there are proper conditions for certain sports, such as tennis, whereas participants from rural areas tend to show more interest in less attractive sports such as boxing, aerobics, and sports gymnastics. Clear differences in giving advantage to the aforementioned sports are explained by unequal conditions for practicing certain sports, and partly by old fashioned ways in rural areas where people tend to accept more traditional activities.

Bosnar et al. (2002) have analysed the main components in order to examine the factorial structure of sports interest based on age, and they reached the conclusion that the set-up of the interests develops depending on the age of participants, meaning that older students have different attitude towards sport which is manifested through sports that best suit their motor skills. Additionally, researching interest in sports, Gošnik et al. (2011) have found age-based difference. Adolescents manifested greatest preferences towards – football, basketball, table tennis, cycling, and tennis, with football being the most popular sport regardless of the age. Furthermore, other studies (Ding & Chen, 2020; Strandbu et al., 2019) have found that adolescents' interest in sport does not depend solely on demographic characteristics, but also on other elements such as professional experiences, environment and the type of educational program. The participants of this empirical study have shown less interest in artistic sports, which have minimum values of standard deviation, pointing to the homogeneity of the sample, and lower popularity of the so-called "female" sports characterized by flexibility of movement, rhythm and characteristic features of dance. Congruent results have been obtained in a foreign study (Guimarães et al., 2023). Certain studies (Barnett et al., 2018; Strandbu et al., 2019) classified a new transition category based on gender perception – *lifestyle*, positioned between "male" and "neutral" sports (cycling, mountain climbing, etc.) which include endurance as the dominant motor skill.

Applying the factorial analysis of the main components, reducing the results, the examined system of 25 manifest variables of sports was explained using five statistically significant latent dimensions, or the following common factors: (F_{I}) – *outdoor sports*, (F_{II}) – *martial arts*, (F*III*) – *fundamental and artistic sports*, (F_{IV}) – *ball and racket sports*, and (F_{V}) – *precision sports*. The extracted latent variables are in accordance with the previous findings (Lee et al., 2021; Sorkkila et al., 2020; Toselli et al., 2023; Vella et al., 2022).

Adolescents' interest in sport is oriented primarily towards "male" and partially "neutral" sports, where gender stereotypes appear relevant (Aljuhani & Sandercock, 2019; Ding & Chen, 2020). Sports such as parachuting, shooting, swimming, volleyball, table tennis, tennis, skiing, mountain climbing, archery, judo are usually classified as "neutral" (Bergh et al., 2019; Comeaux & Martin, 2018) and are perceived little lower than "male" sports. The relevance of gender "neutral" sports is that they are considered to possess significant capacity for improving gender equality. However, the obtained findings reduce the group of "neutral" sports with the dominance of "male", and indicate that adolescents mostly perceive them as male activities, which is in accordance to some previous stud-

ies (Guimarães et al., 2023). At the same time, one can see that their interests are oriented in opposite direction to gender-typing of sports. Beneficial effects can be expected only if greater balance is reached with adolescents within a certain sport. The aforementioned authors believe that if more adolescents exist within the examined population of a specific "male" sport, they will be perceived as less "male" and vice versa, the more male adolescents there are in "female" sport, such activity will be considered less "female".

The preferred sports which participants of this research are interested in are mainly "male" and to a smaller degree "neutral" sports. It is therefore assumed that the chosen activity is a sign of interest, and that playing such sport can be classified as sports interest (Dorsch et al., 2022). Sports which young people are most interested in are: football, basketball, and volleyball – team sports; karate – a martial art, and cycling – an outdoor sport, which is in accordance with earlier research conducted on a male adolescent population (Eime & Harvey, 2018). Additionally, the following sports were noted: mountain climbing, skiing, shooting, archery, motorcycle racing, and sports aviation, as high school seniors expressed significant interest in them.

The findings of the aforementioned study indicate that the difference in sports interest is greater than the difference in doing sports. There are no favourable weather conditions for skiing in the Kolubara district, which is a limiting factor for skiing. It is likely that a greater number of male high school students would go skiing in a nearby sky resort during winter if they were in a better financial situation. Another limiting factor for doing sports such as sports aviation and motorcycle racing are the financial costs of such activities. Increased prices for archery lessons are the reason why not many adolescents take up the sport even though there is significant interest for it. Finally, the limiting factor is also the residence of participants who live in rural areas, far from a sports airport. Researching the frequency of doing sports and sports interest has shown that providing content and lowering costs would result in increased sporting activity (Guthold et al., 2020). They assume that the following are the main reasons for not engaging in sports: 1) lack of talent for a sport, 2) health issues, 3) non-existence of sport clubs, 4) parental prohibition, and 5) unsuitable time for practicing.

Based on the results obtained in this empirical research the first *alternative hypothesis* tested is accepted (H), and it states: The latent structure of high school seniors' interest in sport is expected to be identified.

To conclude, this transversal study has certain *methodological limitations*, which partly condition the obtained results and need to be analysed while interpreting the results. Firstly, the pertinent sample is not representative of the entire population. In included only males from the same town, in one moment in time, which could have affected the results. This research included only the method of self-assessment for all variables which means that there could be some methodological variations. Seeing how this research was correlational, inverse relations between the examined variables are to be assumed, which prevents us from reaching the conclusion on the cause-effect correlation (Wall et al., 2022). However, despite the aforementioned methodological limitations, this cross-sectional study provided results that are important for future research, and therefore it also has practical implications. It has shown that the extracted factors of sports interest explain the significant part of the proportion of the variance in the period of adolescence, which can serve as a guideline for future research.

Future research should include participants of both genders of various ages, and from all over Serbia. Apart from using the well-known questionnaires to research sports interest, it is possible to take into consideration some other variables for assessing interest (parents, teachers, etc.). Additionally, participant sample should include all phases of adolescence to examine interest. Finally, future research should be longitudinal or experimental, which would enable clearer understanding of these complex structures of relations. The significance, or the contribution, of this research is that to the factorial "screening" of the latent structure of high school students' interest in sports, especially in Serbia because this aspect has not been explored much on Serbian population. Additionally, the research results enable diagnosing, or identifying, the model of factorial latent structure of adolescents' interest in sports. Besides, the PS2 measuring instrument used in this research has satisfactory validity and reliability, which increases the heuristic contribution of this paper, as well as the practical implications of the research. Therefore, the possible effect of the obtained relevant findings can serve other researchers from Serbia as an initial reference for further empirical research with an aim to obtain new information within the construct of the latent dimensions of high school students' interest in sport.

CONCLUSION

In accordance with the aim of the research and the tested hypothesis, the following has been found: (1) – adolescents show maximum interest towards motorcycle racing, team sports – football, basketball, volleyball, and handball, and the martial art of karate, while they show minimal preference towards gymnastics. Additionally, there is significant contribution of gender stereotypes in sport as male high school seniors are more oriented towards "male" and somewhat towards "neutral sports". (2) The factorial analysis of the main components, by reducing 24 manifest variables of sports, led to the extraction of five relevant latent dimensions: (F_I) – *outdoor sports*, (F_{II}) – *martial arts*, (F_{III}) – *fundamental and artistic sports*, (F_{IV}) – *ball and racket sports*, and (F_V) – *precision sports*. The linear connection of the extracted common latent variables is statistically significant on the level of .05, has positive direction and low to moderate intensity, which means that those latent dimensions are not independent, but that there is certain overlap between them.

To sum up, considering that there is relatively small number of studies on this matter with Serbian population as participant sample, this cross-sectional study is a humble contribution to the structuring of sports interest and identifying common factors which play part in creating such latent structure in male adolescent population in Serbia. The obtained data can serve as guidelines for future longitudinal research, with the inclusion of a greater number of variables and various samples form the entire country, and with the aim of finding latent variables of adolescents' interest in sports by using component factorial model with the significant percentage of the explained variance.

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ASSESSMENT OF STRIDE LENGTH AND FREQUENCY AT DIFFERENT RUNNING SPEEDS FOR MEN AND WOMEN[1]

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Abstract: Success in running depends on numerous factors, with two of the most important being stride length and stride frequency. The first goal of this study is to assess the differences in stride length and stride frequency between men and women at different running speeds. The second goal is to examine the correlation between the morphological characteristics of men and women with stride length and stride frequency. This study involved two groups of 37 recreational runners (22 men and 15 women). The participants ran on a treadmill, wearing two portable Prosense accelerometers on each ankle. The protocol included 10 minutes of running, consisting of 3 minutes of warming up at 8 km/h, one minute of running at 8, 10, 12, and 14 km/h (used for further analyses), and 3 minutes of running at 8 km/h. The main variables used were stride length and stride frequency. The results showed that women had a higher stride frequency than men at almost all running speeds ($p < 0.05$), but there was no difference in stride length between men and women. Additionally, men showed strong and statistically significant negative correlations between height and stride frequency ($r > -0.59 < -0.66$), as well as low to moderate positive correlations between height and stride length ($r > 0.17 < 0.46$). Among women, low to moderate negative correlations between height and stride frequency ($r > -0.28 < -0.43$) were found, along with low to moderate positive correlations between height and stride length ($r > 0.34 < 0.52$). The results of the study, as well as the modern technology used in this paper, would significantly improve the training process for recreational runners.

Keywords: *Accelerometer, biomechanics, running, kinematics, Smart4Fit*

INTRODUCTION

Over the years, recreational running has experienced a complete boom and has become recognized as the most widespread physical activity among recreational athletes (Scheerder et al., 2015). The same author notes that the very concept of recreational running has changed over the years and that modern society initially shied away from it. However, as the numerous health benefits of this form of physical activity have become apparent (Wirnitzer et al., 2022), it has become increasingly accepted and is now an integral part of modern community life. Besides its impact on physical health, it's important to highlight the significant benefits of recreational running on the psycho-

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logical well-being of exercisers (Marković et al., 2020). Modern technologies, which make life easier, are also an integral part of modern society. In the realm of recreational running, modern technologies offer exceptional opportunities to all users. One type of application of modern technology is the use of portable devices that track various physical activity parameters. The accuracy of the variables collected by these devices has been proven in previous studies (Germini et al., 2022; Xiang et al., 2022; Aleksić et al., 2023; Hadži Pavlović & Nikolić, 2024), providing recreational runners with a reliable means to monitor their progress and current physical fitness. However, there is still a limited number of studies that have collected stride length and frequency values using increasingly popular and readily available portable devices.

Success in running depends on numerous factors that influence different variables. Two of the most important factors in analyzing this activity are stride length and stride frequency. Stride length refers to the distance covered between two strides, while stride frequency refers to the total number of strides taken in one minute. An analysis of previous studies reveals a tendency for these two values to increase with running speed (Rajkumar, 2020). However, the same authors have pointed out an interesting difference in the tendency for these values to increase between male and female runners. Other studies highlight numerous kinematic, physiological, biomechanical, and even motivational differences between men and women during running (Bruening et al., 2020; Senefeld et al., 2021; Maksimović & Barić, 2022). Most of these differences undoubtedly stem from anthropometric differences between men and women, which lead to different strategies for handling higher running speeds on the treadmill.

Given these differences in speed management strategies, the question arises as to whether there should be separate approaches in training male and female recreational runners. It is generally observed that recreational runners do not have a systematic approach to training, but rather see it as a form of relaxation and stress relief from modern life. This opens up an excellent opportunity for all manufacturers of portable devices, who, in conjunction with smartphones, can contribute to a more efficient training process for recreational runners by providing them with real-time information about increases or decreases in stride length and frequency without additional cognitive burden on the user. Certainly, the differences in the values of these two variables between men and women are rooted in the different movement of the body's center of mass and the different movement of the lower extremities due to the significant average height difference between the sexes.

In this context, the first goal of this study is to assess the differences in stride length and frequency between men and women at different running speeds. The second goal is to examine the correlation between the morphological characteristics of men and women with stride length and frequency at different running speeds. For both goals, ProSense accelerometer sensors and the Smart4Fit application were used. In line with these objectives, two hypotheses have been formulated. The first hypothesis is that as running speed increases, men will increase stride length, while women will increase frequency. The second hypothesis is that height will correlate highly positively with stride length, and negatively and highly with stride frequency in both men and women.

METHOD

Participants

The sample size was determined using the G*Power software. For an effect size of 0.25, an alpha level of 0.05, and a statistical power of 0.95, the total recommended sample size is 36 participants. Accordingly, this study involved 37 recreational runners divided into two sex-based groups (22 men and 15 women). All participants were informed about the protocol and purpose of the study before it began. They voluntarily agreed to participate and signed a consent form. The study was conducted in accordance with the Helsinki Declaration. The anthropometric measurements of the participants are presented in Table 1.

Procedures and Protocol

The study analyzed two main variables:

1. The average length of individual strides (stride length);
2. The number of strides per minute at each running speed (stride frequency).

Additionally, anthropometric variables such as height, body mass, and body fat percentage were analyzed.

Data on the participants' body composition were collected using the "Total InBody 720" body impedance analyzer (for body mass and fat percentage) and a Martin anthropometer (for body height). At the beginning of the testing, participants were asked to be barefoot and wear sports attire to ensure the equipment collected accurate data on their body composition. The first step is to measure the body height by having the subjects stand upright while their height is measured using a Martin anthropometer. The participants' ID number, body height, and age were entered into the program. Following the protocol suggested by the equipment manufacturer, participants stood still on the device and followed the instructions provided. It was necessary for the instructions to be timely and accurate to ensure proper contact between the body and the eight electrodes, two for each hand and foot. Once the correct position was secured, participants stood still, looked straight ahead, and waited for further instructions (Gibson et al., 2008).

The main part of the protocol involved running on a treadmill, modeled after previous studies that used the same equipment under similar conditions (Hadži Pavlović & Nikolić., 2024). It consisted of a ten-minute activity that included a three-minute warm-up (at a speed of 8 km/h), followed by four minutes of running. The running began at a speed of 8 km/h and increased by 2 km/h each minute—first to 10 km/h, then to 12 km/h, and concluding at 14 km/h. This was followed by a three-minute cool-down run at 8 km/h. The ProSense sensors were portable devices used to collect biomechanical parameters. One sensor was attached to each leg, as shown in Figure 1.

Figure 1. *"ProSense" Sensors During Treadmill Running*

The sensors are connected via Bluetooth to the Smart4fit Android application for smartphones. The phone screen displays physiological parameters such as heart rate and caloric expenditure. For the application to function properly, it is necessary to input the participant's exact body mass and height. The sensor is equipped with an accelerometer, gyroscope, and magnetometer, which provide data on acceleration, angular velocity, and magnetic field strength (of the Earth) at a sampling rate of 50 Hz. These sensors also provide data on kinematic parameters such as speed, force, energy, and power. Importantly for this study, they also provide data on instabilities (even slight ones) and variations between different body segments of the participants. After the run is completed, raw data on the biomechanical parameters of running—specifically stride length and frequency—are exported from the application.

Statistical Analysis

Before conducting any statistical tests, descriptive statistics were calculated as mean and standard deviation. The Kolmogorov-Smirnov (KS) test, along with visual inspection of histograms and QQ plots, confirmed the normality of the data distribution. Additionally, the T-test was applied for independent samples to examine differences between sexes in terms of age and anthropometric variables.

To test the first hypothesis, the two-way analyses of variance (ANOVA) were conducted for the variables of stride length and stride frequency to examine differences between running speeds (8, 10, 12, and 14 km/h), sex (men and women), and their interaction (running speed x sex). The Bonferroni post hoc test was conducted to further investigate differences within groups. Effect size was reported using eta squared (η^2), with values of 0.01, 0.06, and above 0.14 considered small, medium, and large, respectively (Cohen, 1988). The alpha level was set at $p < 0.05$.

To test the second hypothesis, Pearson's correlation was used to examine the relationship between anthropometric variables (height, mass, and body fat percentage) and both stride length and frequency at the four running speeds. The correlation coefficient was interpreted according to Sugiyono (2013) as follows: below 0.20 = very low correlation; 0.20 to 0.399 = low; 0.40 to 0.599 = moderate; 0.60 to 0.799 = high; and 0.80 to 1 = very high.

All statistical tests were conducted using Microsoft Office Excel 2007 (Microsoft Corporation, Redmond, WA, USA) and SPSS 26 (IBM, Armonk, NY, USA).

RESULTS

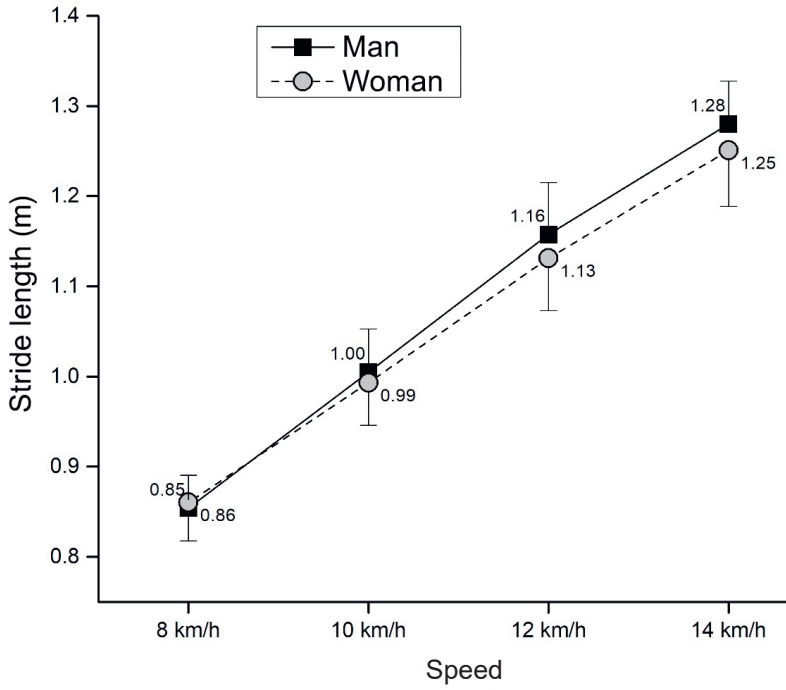
Table 1 shows the age and descriptive indicators of anthropometric characteristics of men and women. Additionally, differences between the displayed variables were examined using the T-test for independent samples.

Table 1. *Age, descriptive indicators of anthropometric characteristics of men and women, and di fferences between sexes in these variables*

Variable	Sex	N	Mean	Standard deviation	T-Value	Statistical significance (p)
Age	Men	22	23.18	2.28	-0.156	0.877
	Women	15	23.33	3.62		
Height (cm)	Men	22	182.50	5.03	7.614**	<0.001
	Women	15	169.86	4.86		
Weight (kg)	Men	22	82.77	11.16	6.150**	<0.001
	Women	15	62.80	6.94		
% Fat	Men	22	24.83	3.04	3.580**	0.001
	Women	15	21.73	1.70		

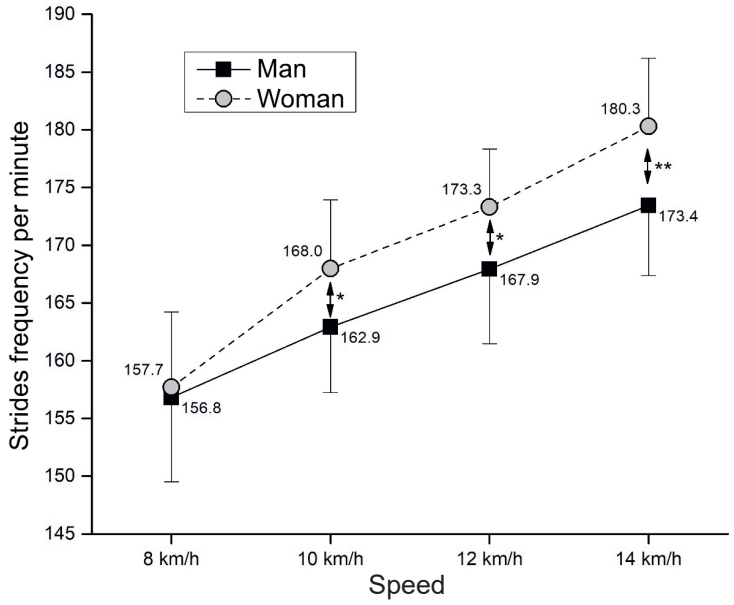
Two-factor ANOVA applied to the stride length variable revealed a significant main effect for running speed [$F(3,35) = 1116.1$; $\eta^2 = 0.97$; $p < 0.001$], but not for sex effect [$F(3,35) = 5.68$; $\eta^2 = 0.14$; $p = 0.023$] and the interaction of running speed x sex [$F(3,35) = 2.32$; $\eta^2 = 0.06$; $p = 0.091$]. The post hoc analysis (Graph 1) showed that stride length significantly increased with running speed for both men and women ($p < 0.001$). There were no differences in stride length between men and women ($p > 0.05$).

Graph 1. *Differences in stride length per minute for men and women running at different speeds*



Two-factor ANOVA applied to the stride frequency variable revealed significant main effects for running speed [$F(3,35) = 297.2$; $\eta^2 = 0.89$; $p < 0.001$], sex [$F(3,35) = 1.18$; $\eta^2 = 0.03$; $p = 0.284$], and the interaction of running speed x sex [$F(3,35) = 7.06$; $\eta^2 = 0.17$; $p = 0.001$]. Post hoc analysis (Graph 2) showed that stride length significantly increased with running speed for both men and women ($p < 0.001$). Additionally, women had a higher stride frequency at running speeds of 10 km/h ($p = 0.014$), 12 km/h ($p = 0.010$), and 14 km/h ($p = 0.002$).

Graph 2. *Differences in stride frequency per minute for men and women running at different speeds*



* $p < 0,05$; ** $p < 0,01$

Tables 2 and 3 show the correlations between anthropometric variables (height, weight, and percentage of body fat) and stride length and frequency at four running speeds, separately for men (Table 2) and women (Table 3).

Table 2. *Correlations between anthropometric variables and stride length and frequency at four running speeds for men*

Variable	**Height (cm)**		**Weight (kg)**		**% fat**	
Statistical Analysis	Co-relation coefficient (*r*)	Statistical importance (*p*)	Co-relation coefficient (*r*)	Statistical importance (*p*)	Co-relation coefficient (*r*)	Statistical importance (*p*)
Stride frequency (8 km/h)	-0.625**	**0.002**	-0.218	0.329	0.044	0.845
Stride frequency (10 km/h)	-0.590**	**0.004**	-0.164	0.465	0.075	0.740
Stride frequency (12 km/h)	-0.659**	**0.001**	-0.255	0.252	0.021	0.926
Stride frequency (14 km/h)	-0.602**	**0.003**	-0.208	0.352	0.047	0.837
Stride length (8 km/h)	0.458**	**0.032**	0.048	0.831	-0.143	0.526
Stride length (10 km/h)	0.175	0.437	0.116	0.607	0.051	0.822
Stride length (12 km/h)	0.376	0.084	0.171	0.448	0.000	1.000
Stride length (14 km/h)	0.446**	**0.037**	0.200	0.373	0.002	0.991

Table 3. *Correlations between anthropometric variables and stride length and frequency at four running speeds for women*

Variable	Height (cm)		Weight (kg)		% fat	
Statistical Analysis	Co-relation coefficient (*r*)	Statistical importance (*p*)	Co-relation coefficient (*r*)	**Statistical Analysis**	Co-relation coefficient (*r*)	Statistical importance (*p*)
Stride frequency (8 km/h)	-0.335	0.223	-0.367	0.178	-0.279	0.314
Stride frequency (10 km/h)	-0.279	0.314	-0.386	0.155	-0.337	0.219
Stride frequency (12 km/h)	-0.434	0.106	-0.377	0.166	-0.210	0.453
Stride frequency (14 km/h)	-0.305	0.268	-0.155	0.580	0.000	0.999
Stride length (8 km/h)	0.460	0.084	0.108	0.703	-0.186	0.508
Stride length (10 km/h)	0.343	0.211	0.182	0.516	0.007	0.979
Stride lengthm (12 km/h)	0.525*	**0.044**	0.231	0.408	-0.067	0.813
Stride length (14 km/h)	0.471	0.076	0.280	0.313	0.033	0.906

DISCUSSION

This study aimed to assess differences in stride length and frequency between men and women at various running speeds. The second goal was to examine the relationship between morphological characteristics of men and women and stride length and frequency at different running speeds. In this context, two hypotheses were posed. The first hypothesis, that men would increase stride length with running speed while women would increase stride frequency, was partially confirmed. Namely, women had a higher stride frequency than men at almost all running speeds, but there was no difference in stride length between men and women.The second hypothesis, that height would highly positively correlate with stride length and negatively and highly with stride frequency for both men and women, was also partially confirmed. For men, there were strong and statistically significant negative correlations between height and stride frequency, as well as low to moderate positive correlations between height and stride length. For women, there were low to moderate negative correlations between height and stride frequency and also low to moderate positive correlations between height and stride length.

As expected, both stride frequency and stride length increase with running speed, as seen in previous studies (Hunter et al., 2003; Barnes et al., 2013; Rajkumar, 2020). Body mass and percentage of body fat show very low correlations with stride length and frequency in men, and low and negative correlations in women, which partially aligns with findings from previous research (Šentija et al., 2011; Taylor-Haas et al., 2022).

This raises the question of which parameter men use to keep up with increased running speed. It is assumed that men significantly increase the force they exert on the ground (ground reaction force) to match the increased speed on the treadmill. As demonstrated in numerous studies (Schubert et al., 2014; Yong et al., 2018; Farina et al., 2021), a higher number of strides per minute drastically reduces the ground reaction force experienced during running, significantly reducing the risk of acute lower extremity injuries. It is important to note that differences between sexes are influenced not only by these parameters but also by other factors, such as variations in joint mechanics and the overall locomotor system, as evidenced in previous studies (Bruening et al., 2020; Ortega et al., 2021).

Based on the relationships between these anthropometric measures and the studied variables, it can be concluded that height has a greater impact on the number of strides in men compared to women. This further supports the hypothesis that men adjust to increased running speed by increasing the force they exert on the ground with each

stride. Additionally, we observe that in women, an increase in body mass is associated with a slight decrease in the number of strides, which aligns with previous research findings (Luedke et al., 2021).

A limitation of this study may be the use of new equipment (sensors and applications), which requires additional testing and validation to refine and broaden its comprehensive application. Despite this, the observed increases in both stride speed and frequency suggest that the system is sensitive enough to detect these expected changes. Additionally, a limitation of this study is the lack of investigation into other variables that could contribute to a better understanding of running mechanics in men and women.

CONCLUSION

The results indicate a significant impact of height on running strides frequency, while this effect is somewhat lower in women. Additionally, there is a moderate to low impact of height on stride length for both sexes, which is interesting compared to other studies that report a high correlation. Stride frequency and stride length increased in both groups of participants, but the increase in stride frequency was much more pronounced in women than in men. A higher stride frequency reduces the risk of injury as it eliminates the need for a drastic increase in ground reaction force. This highlights an excellent opportunity for further research that could examine the relationship between ground reaction force, stride frequency, and stride length. Modern technology used in this study could significantly enhance the training process for all its users through additional analysis of these variables.

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Original scientific paper

THE EFFICIENCY EVALUATION OF TAEKWONDO COACHES[1]

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Abstract: The aim of this research[3] was to explore the level of agreement between athletes and taekwondo coaches regarding their efficiency, as well as to investigate the deeper meaning behind coaches' responses regarding their preparation methods for regular training sessions and collaboration with other coaches. The research sample included ten coaches from the Taekwondo Association of Bosnia and Herzegovina and 265 taekwondo athletes. A quantitative-qualitative research approach was employed. In the quantitative part, research instruments such as a questionnaire for coaches and a five-point Likert scale were used for the assessment and self-assessment of taekwondo coaches' professionalism, along with an interview protocol for coaches. The qualitative part of the research utilized in-depth interview techniques. In line with specific research questions and qualitative coding methods, two areas and four categories with corresponding dimensions of taekwondo coaches' efficiency were identified in the final version of the codebook. The analysis of the obtained results suggests a positive assessment and self-assessment of taekwondo coaches' efficiency, with no significant difference between athletes' assessments and coaches' self-assessments of the given factor. In the qualitative part of the research, insights from coaches' responses revealed that the majority of coaches are efficient and dedicated in their coaching endeavours.

Keywords: *competence analysis, martial arts, coaches*

INTRODUCTION

In order to maintain professionalism and efficiency in one's profession, one must also be educated. Being an educated individual today is not the same as it was ten or more years ago (Mikanović, 2015). In contemporary education, the essence, understanding, and dedication are important, rather than simply acquiring a large amount of information that is rather inapplicable and ineffective in practice (Orlović-Lovren, 2012). With globalization, the role and understanding of coaching have changed. Lepir (2021) states that the role of a sports coach has evolved, and it is more appropriate to refer to a coach as a sports educator.

Modern sports represent a bio-psycho-social phenomenon with a large number of elements. To be effective in sports, diverse and not solely sports-related education is necessary. Improvements in other sciences such as medicine, psychology, pedagogy, sociology, and law are necessary (Singer 2002, cited in Lepir, 2021). The aspiration for a higher level of knowledge involves a lifelong acquisition of abilities and skills in accordance with current sports practices and innovations (Šormaz, 2018). The efficiency and professionalism of a coach are reflected in their personal abilities to make a sports-psychological impact on the development of children and the achievement of

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top sports results (Nović & Čančarević, 2015). Through their actions and efficiency in the training process, a coach influences the formation of the child's overall personality (Bubbs, 2019).

Professional competencies of coaches can be developed through various forms of continuous education. Continuous education represents permanent and continuous improvement and enrichment of knowledge, skills, and abilities of adults (Marić, 2012). Authors mention three ways in which coaches improve their effectiveness and professional abilities:

a) Gaining experience in practice: Coaches enhance their knowledge and abilities through continuous participation in training practice (experience forms an important part of their professional development).
b) Formal education: This entails various types of courses. By attending courses, coaches attain formal qualifications and various forms of certificates.
c) Action research: this has become increasingly popular among researchers (previously applied only in education and physical education, but now used in sport, as well) (Evans & Light, 2007).

Grk (2010) investigated the relationships between the advancement conditions provided by sports organizations for coaches and their awareness of the importance of professional development and enhancing coaching effectiveness. The obtained results show a positive correlation between the conditions provided by the sports organization to the coach, their personal advancement, and their awareness of the importance of progressing towards greater coaching efficiency (Grk, 2010). Vujanović (2015) states that coaches generally express the need for a greater number of professional seminars and educational courses aimed at improving coaching effectiveness, which is reflected in achieving top sports results.

Nash and Sproule conducted research in the United Kingdom. The sample of respondents included nine elite coaches in swimming, hockey, and football. Coaches believed that formal education was not crucial for the development of their careers. According to the coaches, crucial factors for personal advancement are experience and mutual collaboration among coaches. Researchers concluded that there is a "need to support and nurture networks between coaches at the local and regional levels" (Nash & Sproule, 2009, 135). Although personal experience and mutual collaboration among coaches are essential, we can conclude that a coach must do more than just perform their job. Through their work, coaches should strive for advancement and the development of professional and pedagogical skills. Through continuous dedication and improvement, coaches become more effective in their work and ensure the progress of all members within the club (Simic & Vardo, 2018).

Sports coaches carry many responsibilities that far exceed their sporting competencies (O'Neil, 2011). Vukadinović and Rađević (2019) conducted a study aiming to gather opinions on the positive and negative factors of coach-athlete relationships. Variance analysis shows that the interaction between athlete gender and type of sport is significant for all three subtests (social support, depth, and conflict). Significant differences relate to the social support that young athletes receive from coaches. Athletes in individual sports showed a higher level of social support than athletes of the same age in team sports. The results indicate that athletes in individual sports develop a more complex relationship with their coaches than female athletes, whereas in team sports, the results are opposite. Female athletes expressed a higher level of conflict with their coaches in individual sports. In team sports, males are more susceptible to conflict. All factors investigated in this study relate to the complex component of coaching effectiveness. Scientists studying sport strive to determine, through collaboration with coaches, the most important segments in identifying and developing young talented athletes (Arsić, 2017).

Through efficient work and great responsibility, coaches encounter the phenomenon of burnout syndrome. Burnout syndrome is the result of accumulated stress, arising from excessive work and dedication to the job. This syndrome occurs in many professions, most commonly in professions involving direct interaction with people. In sport, burnout syndrome is not uncommon because sport requires discipline, persistence, and perseverance over many years. Trifković (2022) addressed the patterns, symptoms, and consequences of burnout syndrome in a conducted study. It was concluded that in sport, it is necessary to take preventative action through collaborative efforts between coaches and psychologists. With the help of psychologists, athletes and coaches would work on: eliminating stressors, valuing recovery time and rest, monitoring the body's condition, and thereby raising awareness of suppressed defence mechanisms.

Athletes and coaches are known for their perseverance, resilience, and focus on victory. They are always expected to achieve top results, indicating years of stress, hard work, and dedication (Trifković, 2022). Karaleić (2019) notes that stress and athlete overload can lead to anxiety and aggressive behaviour. Athletes may experience lower self-esteem and love for the sport. These aspects manifest in weakened coaching performance, resulting in less ef-

fectiveness in training and inferior sports results. Therefore, coaching effectiveness is a complex segment of various personal competencies of coaches and personal development. To be effective in their work, coaches need years of training, self-assessment, and acceptance and correction of their errors (Martins, 2014). Effectiveness is a variable process, and all coaches should strive for progressive improvement in this process.

The aim of this research was to examine the level of congruence between athletes and taekwondo coaches regarding their effectiveness, as well as to investigate the deeper meaning of taekwondo coaches' responses regarding preparation for regular training and collaboration with other coaches.

METHOD

The methods employed in this research were selected in accordance with the defined problem, objective, and tasks of the study: the theoretical analysis and synthesis method, and survey or the descriptive research method. Depending on the applied research methods, and particularly on the context of the study and examination of variables, the following scientific research techniques were utilized: survey technique, scaling technique, in-depth (qualitative) interview, documentation analysis, and content analysis.

Participant sample

The sample of this research was selected from the population of taekwondo coaches and taekwondo athletes of Bosnia and Herzegovina. The sample consists of a total of 265 athletes from a population of approximately 2500 taekwondo athletes, and 10 male coaches out of 155 licensed taekwondo coaches. The age range of athletes is from 8 to 17 years. The average age of coaches is 41 years. Coaching experience ranges from 6 to 30 years.

Variables

In this non-experimental study, dependent and independent variables were defined. Dependent variables include: coaches' attitudes and self-assessment of personal effectiveness, as well as athletes' attitudes and assessment of the effectiveness of taekwondo coaches. Independent variables include: club, coaching experience, coaches' age, frequency and mode of collaboration with parents, and the number of official taekwondo seminars attended.

Procedure

Quantitative-qualitative research and field data collection were conducted during 2022. Prior to completing the research instruments, athletes and taekwondo coaches received necessary instructions and information about the research.

Instruments

For the purposes of this research, independently created instruments were used: 1. "Self-Assessment Scale of Taekwondo Coaches' Pedagogical Competencies" (SSTLPK), 2. "Athletes' Attitudes Scale on Coaches' Pedagogical Competencies and Motivation for Continuous Education" (SSPKMTT), 3. Questionnaire for Coaches (APT), and 4. Interview Protocol for Coaches (PIT) (Njegovan, 2022).

The first two instruments represent a five-point Likert scale where taekwondo coaches and athletes indicated their level of (dis)agreement. For each statement, athletes and coaches circled a number expressing their degree of agreement with the statement on a scale from 1 to 5. The numbers represent the following: 1 - Strongly disagree, 2 - Disagree, 3 - Uncertain, 4 - Mostly agree, and 5 - Strongly agree. This precise scoring method ensures objectivity in the assessment scale. For negative statements, the scoring direction is reversed. Recoding is done according to the following principle: 1 to 5, 2 to 4, 3 remains 3, 4 to 2, and 5 to 1.

The “Coaches' Self-Assessment Scale of Pedagogical Competencies” (STLPK) consists of 50 statements where taekwondo coaches indicated their level of (dis)agreement with each statement. The "Athletes' Attitudes Scale on Coaches' Pedagogical Competencies and Motivation for Continuous Education" (SSPKMTT) comprised 60 statements. The first 50 statements aligned with the coaches’ scale, with adjustments made to the wording and meaning to suit the athletes' age. Through these initial 50 statements, athletes assessed coaches' pedagogical com-

petencies by indicating their level of (dis)agreement. The last 10 statements (from 51 to 60) pertain to the athletes' indirect assessment of coaches' motivation for improvement and continuous education (Njegovan, 2022).

The reliability of the instrument was established on a sample of 10 coaches from the Taekwondo Federation of Bosnia and Herzegovina, yielding a reliability coefficient of r = 0.93. The validity of the instrument was confirmed through expert analysis for methodological relevance of the instrumentation and with the aid of factor analysis.

Through the Varimax rotation, seven nearly equal and dominant factors were extracted, explaining 54% of the variance of the variable, attitudes towards coaches' pedagogical competence. The second extracted factor is the efficiency of taekwondo coaches (Table 1). This factor is determined by statements numbered: 14, 15, 16, 17, 18, 21, 22, 24, 46, and explains 6.7% of the variance of the variable, possessing characteristics of a dominant factor (Njegovan, 2022).

Table 1. *Efficiency of Taekwondo Coaches*

The efficiency of a taekwondo coach is determined by the following statements:
14. I am respected as a top coach and expert in my sport in sports clubs throughout RS/BH.
15. I always come prepared for training, with a clear plan for organizing the training session.
16. I have a good relationship with parents.
17. I have a very good knowledge of our sport.
18. I worry too much, even about trivial things.
21. I feel uncertain when it comes to making quick decisions.
22. I lack self-confidence (faith and assurance in myself).
24. I train competitors who are winners of European and world medals.
46. After a defeat, I provide comfort and motivation to athletes for progress.

The questionnaire for coaches consists of six open-ended questions aimed at collecting necessary objective and subjective data. The questionnaire is anonymous to encourage coaches to be as honest as possible when filling it out. The questions defined in the questionnaire are: 1. Coach's club, 2. Coach's gender, 3. Coach's age, 4. Coaching experience (How many years has the coach been coaching), 5. How often does the coach collaborate with parents, and 6. How is collaboration with parents realized (Njegovan, 2022).

The interview protocol for coaches (Table 2) consists of 10 pre-established questions. Two groups of questions are defined: those related to the pedagogical competencies of taekwondo coaches (in this case, to the efficiency of taekwondo coaches, the second determined factor) and questions related to the assessment of taekwondo coaches' motivation for continuous education. The protocol is designed for individual and indirect examination of the coaches' attitudes towards their effectiveness in their work and coaching profession. The obtained data are processed through an analysis involving five steps: transcription, coding, analysis, drawing conclusions, and report writing.

Table 2. *Interview Protocol for Taekwondo Coaches - PITT*

Questions:
1. How do you prepare for regular training sessions?
2. How often do you study sports literature (books, encyclopedias, videos, etc.)?
3. Do you study pedagogical-psychological literature?
4. How do you approach athletes when they are defeated?
5. How often do you give praise to athletes?
6. Do you collaborate with other coaches? What is your relationship like?
7. How do you motivate athletes?
8. What motivates you for personal development? How often do you attend seminars?
9. How do you separate your private life (issues) from training?
10. Are there any differences in your relationship with younger/older athletes or between boys/girls? Explain!

Source: Njegovan, 2022.

Data Analysis

The entire statistical data processing was carried out using the software package "SPSS" (SPSS 20.0 for Windows) and the statistical program "JASP" (JASP 0.16). In the process of data processing and application of descriptive statistics, the following parameters were obtained: mean (M), significance (p), and sum (∑). Comparative results were obtained using the Mann-Whitney test (MW) (Njegovan, 2022).

RESULTS

One of the research tasks was to examine whether there is a significant difference in the assessment and self-assessment of taekwondo coaches' efficiency. The results of the examined factor are presented in tabular form in the following work (Table 3).

Table 3. *Efficiency of Taekwondo Coaches*

Coaches' self-assessment	∑t	26	27	28	31	31	33	35	37	38	39
Athletes' assessment	*Ms*	32.31	35.36	32.60	33.73	34.66	37.50	35.35	36.33	34.13	36.31
	Ns	35	25	15	30	20	40	20	15	30	35
	∑*t-Ms*	-6.31	-8.36	-4.60	-2.73	-3.66	-4.50	-0.35	0.67	3.87	2.69

∑t (sum of coaches' self-assessment); Ms (mean athletes' assessment); ns (athlete sample); ∑t-Ms (difference between sum of coaches' self-assessment and mean athletes' assessment)

Based on a logical analysis of the presented results, it can be stated that most coaches underestimated their efficiency compared to the athletes' assessment. The difference between athletes' assessment and coaches' self-assessment of taekwondo coaches' efficiency is 0.35 (-0.35). The average difference between coaches' self-assessment and athletes' assessment of taekwondo coaches' efficiency is -23.27.

Based on the obtained results, it can be concluded that there is a positive assessment by athletes and a positive self-assessment by taekwondo coaches regarding their efficiency. Individual results ∑t and Ms are greater than 24 (Table 4).

Table 4. *Differences in Assessment of Taekwondo Coaches' Efficiency*

Group	*n*	*M*	*W*	*P*
Coaches	10	32.50		
			901.00	0.85
Athletes	265	34.92		

n (sample); M (mean); W (Mann – Whitney test); p (significance)

The hypothesis has been confirmed. There is no significant difference between athletes' assessment and taekwondo coaches' self-assessment regarding their efficiency (p=0.85), the significance level exceeds the usual threshold of 0.05.

DISCUSSION

A qualitative coding method was used to construct a code tree with corresponding domains, categories, and dimensions. In the final version of the code tree, two domains and four categories with their respective dimensions were defined (Table 5).

Table 5. *Code Tree - Preparation of Taekwondo Coaches for Regular Training and Collaboration Between Coaches*

CATEGORIES	CATEGORIES	DIMENSIONS
1. Coaches' preparation for regular training sessions	1. Preparing sports equipment 2. YouTube and videos as a tool for coaches' preparation 3. Discussions with other coaches	• Before the training, necessary equipment such as: dobok, focus mitts, stopwatch, scales, etc. is packed. • Prior to the training, information is disseminated through the Internet and other media. • Interactions with other coaches for the purpose of information exchange.
2. Collaboration among coaches	4. Collaborative and friendly relationships based on respect	• Coaches' relationships are based on agreement and collaboration. • Mutual respect and friendship among coaches

In accordance with specific research questions and the qualitative coding method, the defined areas, categories, and dimensions, as well as the opinions of taekwondo coaches on sports effectiveness, preparation for regular training, and collaboration with other coaches, are presented in tabular form.

1. Coaches' preparation for regular training

The first area is related to coaches' preparation for regular training. Based on the responses of ten taekwondo coaches, the following categories were identified:

Packing necessary equipment

[T6] "I have a certain order, for years now. Personal preparation, packing equipment, wearing a tracksuit or dobok, if needed I bring a scale or something similar... The focus mitts are in the gym."

[T2] "Preparation is routine, I bring dobok, belt, necessary equipment, water, etc. to training sessions" Gathering information through the Internet and other media

[T1] "Sometimes I watch a video on the internet, it is good for new ideas and applying new exercises, it breaks the monotony."

[T3] "I research YouTube or Instagram profiles of professional athletes, coaches, or clubs that post videos from training sessions."

Interactions with other coaches

[T4] "I consult with a fitness trainer or call one of the more experienced and knowledgeable coaches."

[T8] "I seek advice from other coaches and sports experts. I gladly watch the training sessions of my colleagues. I often notice some new exercises."

2. Collaboration between coaches

The second defined area pertains to collaboration between coaches. In this area, taekwondo coaches provided approximately similar responses, thus only one corresponding category was defined. Collaborative relationships are based on mutual respect, consideration of opinions, and jointly solving possible problems (Reeve, 2010).

Collaborative and friendly relationships based on respect

[T5] "They are my old friends, the relationship is excellent. We collaborate on various issues, we are there for each other, we are one big family."

[T10] "I collaborate, the relationship is good. I'm in better relationships with some. We strive to always make decisions together, none of us is in conflict."

When discussing sports-psychological competencies, we can say that they refer to various types of abilities that a sports pedagogue needs to apply in their work with young athletes (Kostović–Vranješ & Ljubetić, 2008). Due to its multifunctionality, psychological competency can be divided into eight dimensions. These dimensions are

as follows: personal, communicative, analytical, social, emotional, intercultural, developmental competency, and problem-solving skills competency (Juričić, 2014). In individual sports, athletes often demonstrate greater closeness, dedication, and complementarity with the coach compared to team sports (Rhind & Jowett, 2012), which is confirmed by the results of the aforementioned studies (Vukadinović & Rađević, 2019).

The effectiveness of a coach is reflected in the application of professional knowledge aimed at improving the training process and social connection with the athlete (Eccles & Tran, 2012). In this case, the effectiveness of a taekwondo coach relates to their knowledge of the sport and taekwondo techniques, coaching approach towards children, parents, other taekwondo coaches, the method of preparing and organizing regular training sessions, and self-assessment by the coach to apply appropriate pedagogical approaches.

Researchers Greblo-Jurakić and Keresteš (2017) conducted a study to assess the effectiveness of positive aspects of a coach's leadership style. They also examined whether athletes from team and individual sports differ in their assessment of their coach's effectiveness. The results indicate that athletes in individual sports experience significantly fewer negative behaviors and a higher degree of positive behaviors from the coach compared to athletes in team sports. Many coaches are overly ambitious, and parents often have unrealistic expectations of their children, wanting them to achieve top results. Many talented young athletes often end their sports careers due to inadequate training, injuries, and insufficient intrinsic motivation (Čoh, 2019). Consequently, being a professional and efficient coach means having adequate knowledge and being able to choose values, methods, and skills based on the specific situation and the individual athlete (Zamfir, 2017). Every coach should respect the psycho-physical abilities of the athlete.

A sports pedagogue should feel love and stability in the training process. Through personal satisfaction and a pleasant relationship with athletes, the coach will be able to meet contemporary sports needs and effectively perform their job (Milanović et al., 2006). If the coach is satisfied and committed to progress, it can be assumed that the same emotions will be transferred to young athletes, and through joint and efficient work, top sports results will be achieved. Coaches should be aware of the importance of continuous education and lifelong learning. With globalization and the rapid development of sports knowledge, equipment, and technology, they should strive for continuous and lifelong learning (Kulić et al., 2010).

One of the limitations of this study could be the small sample size of taekwondo coaches. In future research, a larger sample of taekwondo coaches could be included to obtain more reliable statistical data. However, considering that the study examined the alignment between athletes' assessments and taekwondo coaches' self-assessments of their effectiveness, it can be said that the obtained results are of satisfactory nature and were as expected at the beginning of the research. The advantage of this study lies in the qualitative part, which involves in-depth interviews with coaches. Through these conversations, a deeper understanding of coaches' attitudes towards their effectiveness in work, preparation methods, and collaborative relationships with other coaches was achieved. All these factors are directly related to achieving top results for both coaches and athletes.

CONCLUSION

The professional competencies of coaches are reflected in their comprehensive work, psycho-physical impact on young athletes, achievement of sports results, and coaching effectiveness. Coaching effectiveness entails the continuous application of integrated professional, interpersonal, and intrapersonal knowledge aimed at enhancing competence, self-confidence, social connection, and the character of the athlete (Lepir, 2021). A coach must have an active and effective role in the overall development of young athletes' personalities. In sport, victory and defeat are often considered the best criteria for assessing coaching effectiveness, while coaches' negative behaviours are often being ignored. The situations in which such behaviors are usually ignored are those associated with success in sports (MacKinnon, 2011). However, through the training process, a coach also acts as an educator who influences the psycho-physical development of young athletes. Negative behaviours should be avoided, and the emphasis in effective coaching should primarily focus on the health and happiness of athletes.

The conducted research led to the conclusion that the majority of coaches of the Taekwondo Federation of Bosnia and Herzegovina are effective in their coaching work, indicating a positive assessment and self-assessment of coaches regarding their effectiveness. Seven out of ten surveyed coaches underestimated their effectiveness in comparison to the athletes' assessment. In the qualitative part of the research, it was concluded that the majority

of coaches of the Taekwondo Federation of Bosnia and Herzegovina regularly prepare for the training process. Coaches' preparation mostly includes: preparing sports equipment, using social media (mostly YouTube and watching other online videos), and discussing and sharing experiences with other coaches. Additionally, coaches of the Taekwondo Federation of Bosnia and Herzegovina have positive collaborative relationships based on mutual respect and progress.

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Book review

Živanović, N. (2024) *FIEPS SPECIALIZED MULTI–LINGUAL DICTIONARY - PHYSICAL CULTURE, PHYSICAL EDUCATION, SPORT, PHYSICAL RECREATION. BOOK I* [1]

Publisher: Association of Pedagogues of Physical Education and Sport FIEPS, Niš, Serbia; 484 pages; ISBN 978-86-80984-11-7

The publication of the multi-lingual terminological dictionary, Book I, beautifully apostrophizes the existence of the International Association of Physical Education and Sport (FIEPS), which operates all over the planet, with the aim of keeping people and their physical movement - exercise - at the center of the profession.

The dictionary was created to honor a great jubilee - the centenary of the existence of the FIEPS. The editor-in-chief, Nenad Živanović, has been working on the idea of improving the terminology of physical culture for many years, with constant reflection and expertise, striving to improve the profession. The multilingual dictionary is the response of the editor-in-chief and all authors to the permanent development of the theory and practice of sport and physical education, i.e. physical culture, which also required continuous work in the language of the profession, that is, professional terminology. The special contribution of this dictionary is a balanced view of the profession, the selection of professional terms and its conceptual content, which illuminates the so-called "Eastern" and "Western" view of the profession. This is how a "terminological" dictionary was created, instead of a simple dictionary, because such a definition allows one term to be listed with several definitions and several different conceptual contents.

The Book I of the terminological dictionary is divided into two language units: the English and Serbian sections. Translations into French, Russian, Spanish, Arabic and Chinese are underway. Upon completion of the complete structure, this will be the first project of such a grandiose scale in the field of physical culture and all its sub-fields. Semantic ambiguities in the first published part were avoided by defining the term in different ways, which is stated on page 10 of the Dictionary in the introductory part:

1. Directly quoting from the source (citing);
2. Through restatement of the source which explains the term;
3. Combining several source texts on the same term or different views or approaches to the term;
4. Independent definition of the term by the editorial board members.

The authors made an effort to select definitions that contain all the necessary elements for a clear, precise and unambiguous determination of its semantics.

In the introductory part of the Dictionary, the authors state the complete structure of the terms covered, so that the reader can see from the examples given what is inside the covers:

1. Term in a single field of study

premet m – [gim]vrsta metanja (preskoka, saskoka), kada se telo obrće oko frontalne ili sagitalne ose opruženim telom (Petrović et al., 1994, 63).

2. Term with the same meaning in various fields of study

kros m – [atl, fv] trka na duge staze koja se odvija preko neravnog terena (Sportovi, 2007, 9).

[1] Paper received: September 7, 2024; accepted for publication: September 9, 2024.

3. Term with multiple definitions

Sport m – 1. organizovan sistem fizičkog vežbanja, agonističkog karaktera, kojim se teži usavršavanju ličnosti radi postizanja maksimalnih sportskih rezultata (N.Ž., 2020); 2. dobrovoljni i uobičajeni kult intenzivnog mišićnog vežbanja zasnovan na želji za napretkom koji može da ide do rizika (P. de K.); 3. Svaki fizički napor, individualan ili kolektivan, vršen u cilju pobedničkog afirmisanja superiornosti pojedinaca ili ekipa nad samim sobom ili nad nekim nepokretnim protivnikom (vreme, prostor, bilo kakav otpor), ili živim protivnikom (čovek ili životinja) (V.B.).

4. Term with sub-terms

kifoza ž – [kg] devijacija kičmenog stuba u sagitalnoj (antero-posteriornoj) ravni u torakalnom delu kičmenog stuba sa konveksitetom prema nazad; kongenitalna kifoza – kifoza sa kojom se osoba rađa, urođena; akvirirana kifoza – kifoza stečena u toku života kao posledica različitih promena koštano-zglobnog aparata i mišićnog sistema; funkcionalna kifoza – kifotično loše držanje, poremećaj isključivo lociran na muskulaturi; strukturalna kifoza – deformacija koja je zahvatila muskulaturu, ligamente i koštane segmente; kongenitalna kifoza – v. kifoza. akvirirana kifoza – v. kifoza. funkcionalna kifoza – v. kifoza. strukturalna kifoza – v. kifoza.

5. Term of the same basic meaning with variations by area

kugla ž – [atl, kug, pet, knt, bil, snk] predmet u obliku geometrijskog tela kugle, izrađen od čelika, drveta, kosti ili drugog materijala; atl. prečnika 11–13cm i težine 7.257kg za muškarce i 9.5–11cm prečnika i 4kg težine za žene; kug. prečnik 22cm i težina 7.258kg; pet. prečnik 7.1-8cm i težina 650-800g; knt. – prečnik 11.6-13.4cm, težina 1.59kg

6. Term with different meanings in different areas

kolo s – [sp, gim, pl] I sp. niz takmičarskih susreta u nekoj sportskoj disciplini kao stepen, etapa takmičenja; II gim. dva premaha izvedena jedan za drugim bez prekida kretanja (Petrović et al., 1994, 64); III pl. osnovni oblik narodnih plesova sa međusobno kružno i u nizu povezanim neograničenim brojem plesača; zatvoreno kolo – kolo koje nema ni početak ni kraj, kada plesači čine zatvoren krug u kome uz istovetno držanje svi izvode iste pokrete i kretnje; otvoreno kolo – kolo koje je na jednom mestu prekinuto, pa mu se samim tim zna početak i kraj (V.M., 2000, 27); zatvoreno kolo – v. kolo III. otvoreno kolo – v. kolo III.

7. Combinations

penal m – [I (fud, fut, ruk, vat), II (odb)] I kazneni udarac koji se izvodi zbog načinjenog prekršaja u golmanskom prostoru; fud. 11 metara, fut. 6 metara, ruk. 7 metara, vat. 5 metara (Sportovi, 2007, 235); II odb. najbrži oblik upućivanja lopte u polje protivnika, kada se lopta koja je dignuta iznad nivoa mreže hvata u skoku u najvišoj mogućoj tački i što većom brzinom i što strmije upućuje u protivničko polje (https://www.ossrb.org/recnik-odbojke-nj-z.html).

vođenje lopte s – [koš, ruk, fud, fut] individualni tehničko-taktički element koji se koristi u fazi napada kao način racionalnog prenošenja lopte sa jednog na drugi deo terena neograničenim brojem udaraca lopte o podlogu (košarka, rukomet) ili kontakta sa nogom igrača (fudbal, futsal).

The introductory part of the Dictionary lists all abbreviations: linguistic, sports, as well as persona, i.e. the initials of collaborators/authors of definitions.

The author of the first, English section, Ken Hardman, begins this section with the term:

abacus (srb. абакус) - 1 a calculation and counting board in ancient civilizations, but still used in some parts of the world, especially in Far Eastern countries. 2 a ceremo- nial table for precious utensils in ancient Rome.

The first section ends on page 245, with terms starting in the last letter of the alphabet – Z, and the last term is: *zygomatic fracture* (srb. прелом зигомата) – a fracture of the cheekbone caused by a heavy blow characteristic of combat sports (boxing, kickboxing, karate, etc.).

The author of the second, Serbian section, Nenad Živanović, together with co-authors: Peter Pavlović, Nebojša Ranđelović and Dejan Milenković, begins this section with the term:

> *abazija* (en. abasia) – 1 nemogućnost hodanja zbog ograničenja ili odsustva mišićne koordinacije. 2 nemogućnost hodanja zbog oštećenja motoričke koordinacije.

The first term in the English language, *abacus*, is here in the second place, due to the mismatch of the alphabetical order, which the authors logically followed in the Cyrillic script.

> *abakus* (en. abacus) – 1 tabla za računanje i brojanje u drevnim civilizacijama, ali još uvek korišćena u nekim delovima sveta, posebno u zemljama Dalekog istoka. 2 svečani sto za dragoceno posuđe u starom Rimu.

There was no way to list the same terms in the structure of the terminological dictionary under the same ordinal numbers in the English and Serbian language sections.

The last term in the Serbian section is a rather vocal term: *šušunova* (en. schuschunova) – u gimnastici, prelet preko pritke na dvovisinskom razboju – prednjihom u nathvatu sa okretom za 180 stepeni oko uzdužne ose izvodi se raznožni prelet preko pritke sa dodatnim okretom za 180 stepeni oko uzdužne ose tela, njenim puštanjem i ponovnim hvatanjem (V.V. et al.).

In the continuation of the project, it is expected that after the term, in each language section (Serbian and English), its translations into the five other mentioned languages will be given in brackets, which would make it easier to find the term in each section, i.e. in each language, which will certainly facilitate the use of the complete terminological dictionary.

Here is an example that will not leave indifferent anyone who puts their hands on this grandiose work in the future:

> *Sport* / fr. Le sport; ru. Спорт; es. Deporte; ar. رياضة; ch. **運動** / Le sport / ru. Спорт; es. Deporte; ar. رياضة; ch. **運動**; en. Sport/ Спорт / es. Deporte; ar. رياض; ch. **運動**; en. Sport; fr. Le sport/ Deporte / ar. رياضة; ch. **運動**; en. Sport; fr. Le sport; ru. Спорт/ رياضة / ch. **運動**; en. Sport; fr. Le sport; ru. Спорт; es. Deporte/ **運動** / en. Sport; fr. Le sport; ru. Спорт; es. Deporte; ar. رياضة/

In the very introduction, the author emphasizes the practical application of this terminological dictionary, which is reflected in: the correct use of professional terminology both in official communication, and in everyday, casual communication; application in the systematized metalanguage of physical education; correct understanding of the denotations covered by a specific term in textbooks and other professional literature; eliminating or at least minimizing the possibility of errors and omissions in the two-way translation of literature from this field.

By publishing the Book I of the terminological dictionary, the author Nenad Živanović made an immeasurable contribution to the profession in today's time, when it is somewhat forgotten, as he himself says: "that the terminology of a profession is its ornament, and that professional ornament does not depict not only its present, but all those epochs throughout which it developed and became an ornament of a nation's culture and its civilizational asset".

This terminological dictionary will be valuable to all who are professionally engaged in the profession, at school, at the university, in sports clubs and sports organizations, students of vocational colleges and faculties, journalists and publicists.

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UDK: 796/799(038)=111=163.41(049.32)
796/799(038)=163.41=111(049.32)

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SPORT – SCIENCE AND PRACTICE

INSTRUCTIONS FOR THE AUTHORS

The scientific journal SPORTS – SCIENCE AND PRACTICE is an official publication of the College of Sports and Health from Belgrade, and from December 2023, of the Faculty of Sport and Psychology - Tims from Novi Sad, as well. It was established in 2009, and it publishes original scientific, review and professional papers from areas analogous with sports and health (http://sportnaukaipraksa.vss.edu.rs/snp-en.asp).

The journal is published online twice a year, in June and December, in Serbian and English. On the list of the Ministry of Education, Science and Technological Development of the Republic of Serbia, it is in the category of **National journals - M53** (https://mpn.gov.rs/nauka/nauka-i-istrazivanje-u-srbiji/kategorizacija-naucnih-casopisa/).

The journal is indexed by the Serbian Citation Index (SCIndeks), in the **C1 category – Distinguished journal of national importance and high publishing quality in Social sciences research area** (https://scindeks.ceon.rs/journaldetails.aspx?issn=1821-2077&lang=en).

In addition, **the journal is indexed in DOAJ – international Directory of Open Access Journals**.

When writing and publishing papers, the authors are obliged to respect scientific and ethical principles, in accordance with international and academic standards. The journal's publication policy is described in detail at the link: https://scindeks.ceon.rs/PublicationPolicy.aspx?issn=1821-2077&lang=en.

All manuscripts are to be submitted electronically, via a system for online editing and publishing of journals - ASEESTANT (https://aseestant.ceon.rs/index.php/snp/). In exceptional cases, a manuscript can be submitted to the following email address: redakcija@vss.edu.rs.

The manuscripts must be previously unpublished (the exceptions are abstracts from scientific conferences, lectures and academic theses), and not undergoing editing in another journal. When the manuscript is accepted for publication, it must not be published in another journal in Serbian, English or any other language. **All manuscripts are screened for plagiarism immediately after submission**.

A cover letter is sent with the manuscript, its aim being to present the authors and point to the essence, significance and original scientific and professional contribution of the paper. The letter is to include the first and last names of the authors, date of birth, the affiliation, academic title and position, email address (business email, if possible) and a phone number. **A paper can have a maximum of three co-authors**, and in case of original scientific papers that involve collective research on field, five co-authors are allowed.

After reading the manuscript, the editor makes a decision regarding further proceedings. The manuscript is sent to the reviewers or back to the author with appropriate comments, or rejected. A paper is not accepted for publication if it does not comply with the standards of the journal, if the topic of the paper is not relevant, or if a paper with a similar topic has already been published in the journal.

All manuscripts undergo editing. The identity of the reviewer and author is anonymous (*double-blind review*). There are two reviewers for each manuscript, from the relevant scientific area. After the review, the manuscripts are accepted for publication or refused, or returned to the authors for changes according to reviewers' suggestions. **The manuscript needs both reviews to be positive to be accepted for publication**. In cases of completely opposing views of the reviewers, a third reviewer may be hired.

After receiving a positive review and formatting the final version of the paper in Serbian, the authors are obliged to submit the English version, which must be true to the original. Therefore, it is necessary to submit **quality and professionally translated papers**; otherwise, the translation will be returned for revision.

The papers are sent in *MS Word*, using the *Times New Roman 12pt* font. The papers should not exceed 15 A4 pages, including all tables, diagrams, charts, graphs and references. The texts are usually monospaced, and all four margins (upper, lower, left and right) are 2.54 cm.

THE STYLE AND STRUCTURE OF THE TEXTS

The following format is used for writing original scientific papers: INTRODUCTION, METHOD, RESULTS, DISCUSSION, CONCLUSIONS, REFERENCES.

The bibliographical-speculative method is used and deviations from the suggested structure for original research papers are allowed, while the author will adapt the structure to the contents of the prepared material, taking into account the proper marking of chapters and subsections. The numbering is the same as with the original papers (1. XXXX, 2. YYYY, 2.1. Yyyy, 2.2. Yyyy, etc.). Every claim, new classification, or synthesis of knowledge, should be based on the results of previous researches.

THE TITLE OF THE PAPER

The title should contain the following information:
- a precise and informative title which does not contain abbreviations
- in the case of empirical scientific papers, it is necessary to specify the variables and the nature of their links with the title
- the first and last names of all authors, without their titles
- the institution where the author works, as well as the city and state, should be noted underneath the name of every author
- a footnote notes the email address of the author for possible correspondence

ABSTRACT AND KEYWORDS

The abstract should include a general review of the topic. It must contain a defined aim and objective of the paper, a short description of the applied research proceedings, the most relevant results and conclusion. The abstract should be from 150-250 words.

Up to 5 keywords are given below the abstract.

INTRODUCTION

The introduction should contain a short review of the relevant research. **All the used bibliographical sources are to be mentioned in the references at the end of the article**, as well as in the text, noting the last names of the author and the year of publishing in parentheses. For example: (Lazarević and Havelka, 1981). Bibliographical sources SHOULD NOT be mentioned in the text in a footnote.

The topic and aim of research should be precisely defined, as well as the scientific validity and professional relevance of the researched topic.

In order for the paper to be more understandable to less informed readers, the editorial staff recommends that a short explanation of the basic concepts is given in this segment of the paper.

METHOD

This part should give a detailed description of the methodological procedure which would enable other researchers to repeat the testing.

It should contain the following subtitles: Samples, Variables, Techniques for data collecting, Testing procedures, Statistical analysis.

Every instrument used (survey, interview, scale, test etc.) must be shown in its integral form or illustrated in a shortened version.

RESULTS

In this part, it is necessary to concisely show the most important results, with short and clear instructions. It is possible to separate several parts, depending on the nature and complexity of the data. If shorter parts are used, it is necessary to label them precisely.

The results need to be presented and statistically processed (avoiding raw data). In the aim of a better assessment of results, it is optimal to use tables, graphs and images, and not repeat the data analyzed in the text. **Each table, graph, or image must be clearly numbered and mentioned in the text**. For example: Image 1, Graph 1, Table 1, Table 2, etc.

Tables, diagrams and images are always numbered precisely and consistently. They are an integral part of the text, and not an addendum. The numbering and labeling of the tables, diagrams and images (the name explains the contents), are given **above the diagrams**.

DISCUSSION

The discussion should comment on the results of the research in regards to the initial expectations and hypotheses set in the paper. It should also be professional and based on data obtained in the research.

CONCLUSION

The conclusion contains a short description of the research and a concise revealing of the main results, as well as the possible further line of research and the potential of a practical application of the obtained results.

REFERENCES

A reference list of the used bibliographical units mentioned in the text is given at the end of the paper, according to the APA referencing model: https://apastyle.apa.org/style-grammar-guidelines/references/examples

- The bibliographical sources are quoted according to alphabetical order, using the last name of the author.
- Every bibliographical source is numbered.
- Bibliographic sources that are not mentioned anywhere in the paper cannot be included in the list of references.

Examples of papers in periodical publications (journals, bulletins, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). Title of paper. *Title of journal*, volume(number), pages.

Amanović, Đ., Milošević, M., Dopsaj, M., & Peric, D. (2006). Modeling variability of the assigned level of force during isometric contractions of the arms extensor muscles in untrained males. *Facta universitatis – Series: Physical education and sport*, 4(1), 35-48.

Examples of non-periodical publications (textbooks, monographs, scripts, books, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). *Title of research paper*. Edited by: Editor.

Cohen, M., & Nagel, E. (1982). *An Introduction to Logic and Scientific Method*. Beograd: Zavod za udžbenike i nastavna sredstva.

Examples of chapters in non-periodical publications (textbooks, monographs, etc.)

Author, A.A., Author, B.B., & Author, C.C. (year). Title of chapter. U: A. Editor, B. Editor, C. Editor, *Book title*. Edited by: Editor (pp. xxx-yyy).

Puczkó, L., & Rátz, T. (2007). Trailing Goethe, Humbert, and Ulysses – Cultural Routes in Tourism. In: G. Richards, *Cultural Tourism – Global and Local Perspectives*. New York: The Haworth press, Binghamton (pp. 131-148).

Examples of references published in proceedings books from congresses and symposia

Author, A.A., Author, B.B., & Author, C.C. (year). Title of chapter. In: A. Editor, B. Editor, C. Editor (Eds.), *Name of conference, congress or symposium* (pp. xxx-yyy). Published by: Editor.

Perić, D. (2003). Factorial structure of modern basketball. In: A. Naumovski (Ed.), *International conference of sport and physical education* (pp. 256-260). Skopje: Faculty of physical culture.

Example of quoting sources from the Internet

Vujičić, I. (2020, July 21). *Kako pokreti ruku utiču na efikasnost trčanja?* Trčanje.rs. https://www.trcanje.rs/trening/uticaj-kretanja-ruku-na-trcanje/

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Designing and marking tables

- The tables must be simple and easy to understand.
- The data analyzed in the text should not be repeated in the tables.
- Refer the data mentioned in the tables to the text in the paper.
- Number the tables (for example: Table 1, Table 2).
- While marking the tables, after their numbering, make a mention of the data in the tables.
- The number and title of table are written above it.
- The tables are always marked and numbered in the same way.
- The tables are an integral part of the text.

Designing and marking diagrams

- It is desirable to include diagrams, charts, graphs, etc. in the paper.
- The data analyzed in the text should not be repeated in the diagrams.
- Refer the data in the diagrams to the text in the paper.
- Diagrams are to be listed by number (e.g.: Diagram 1, Graph 1).
- After their listing, mention the data they contain.
- The numbering and titles are noted under the diagram, chart, graph, etc.
- Diagrams are always numbered and marked in the same way.
- Diagrams are an integral part of the text.

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THE REVIEW OF THE BOOK

The journal can also publish a review of the relevant professional literature from the area corresponding to sports and health recently published. The review in a clear and fundamental way points to the significance and current validity of the book, as well as a review of the most important parts and contents. The title of the review must contain information references according to APA standards, these being the last name and initials of the author, the year of publication, the title (*italics*), the publisher, place of issue. Also included are the page number, the ISBN and COBISS number. The author of the book review signs it, along with a mandatory mentioning of the affiliation.

Example of the title of a book review:

Book review
Havelka N. and Lazarević Lj. (2011). *Psychology of sports management.*
Publisher: College of Sports and Health, Belgrade, Serbia; 384 pages;
ISBN 978-83687-14-5; COBISS.SR-ID 184385036