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Corresponding author: katemou@phed-sr.auth.gr

ATTITUDES AND INTENTIONS OF PHYSICAL EDUCATION TEACHERS TOWARD THE INCLUSION OF REFUGEE STUDENTS: THE ROLE OF MORAL COMPETENCE AND CONTEXTUAL FACTORS

Katerina Mouratidou[1], Kleio-Maria Xoulioumi[1], Dorothea Katsoura[1], Vassilis Barkoukis[2], Eirini Koidou[1]

Abstract: *Physical Education (PE) has been identified as a supportive context for the social inclusion of students with a refugee background. However, inclusive practice largely depends on teachers' psychosocial orientations and perceived competence. Guided by the Theory of Planned Behavior (TPB), this study examined Greek PE teachers' attitudes, subjective norms, perceived behavioral control (PBC), and intentions regarding the inclusion of refugee students, as well as their associations with moral competence and teaching experience. Participants were 225 PE teachers employed in Greek public primary schools. Data were collected through self-report questionnaires assessing TPB constructs and moral competence (C-index). Independent-samples t-tests, Pearson correlations, and regression analyses were conducted. Teachers reported high attitudes, subjective norms, and intentions, and moderately high PBC toward inclusion. TPB variables were strongly interrelated, while gender differences emerged only for subjective norms, with males reporting higher scores. Moral competence was negatively associated with subjective norms and PBC but not with attitudes or intention. Teaching experience was unrelated to study variables. Prior intercultural training negatively predicted intention, though with small explained variance. Findings highlight the importance of perceived competence and institutional support in promoting inclusive PE practices.*

Keywords: attitudes, intention, moral competence, refugee students, contextual factors

[1] Department of Physical Education & Sport Science at Serres, Aristotle University of Thessaloniki, Greece
[2] Department of Physical Education & Sport Science, Aristotle University of Thessaloniki, Greece

Introduction

The migrant and refugee crisis constitutes one of the most significant social issues of the contemporary era (Almustafa, 2022). Increasing refugee flows have led to a substantial rise in the number of students with a refugee background in host-country schools, creating new challenges for educational practice. In this context, the adoption of teaching practices that promote inclusion and ensure the psychosocial safety of all students is considered essential. However, successful inclusion largely depends on teachers' attitudes, their willingness to adapt their practices to the needs of all students, and their perceived ability to meet the demands of this new educational reality.

In this regard, Physical Education (PE) may play a crucial role due to its experiential, cooperative, and often non-verbal nature, as well as the opportunities it provides for meaningful interaction among students through group activities and games. International studies over the last fifteen years indicate that PE can function as a context for enhancing social interaction, psychosocial empowerment, and refugee students' sense of belonging (Bartsch et al., 2021; Cseplö et al., 2022; Dundar, 2019; Genç, 2024; Grimminger, 2012; Lleixà & Nieva, 2020; Papageorgiou et al., 2021). Specifically, Dundar (2019), in a study conducted in Turkish public schools, reported that the systematic participation of Syrian refugee students in PE was associated with improved levels of social interaction and adjustment, as well as a reduction in the negative effects of traumatic experiences. Similarly, Cseplö et al. (2022), adopting a salutogenic approach and focusing on Sense of Coherence (SOC), highlighted that students perceive PE as a comprehensible, manageable, and meaningful environment that promotes well-being and supportive social relationships. These findings support the view that PE can serve as a protective and supportive factor within the school context.

Nevertheless, the effectiveness of inclusion depends not only on the characteristics of the subject itself but also on teachers' attitudes, beliefs, and instructional choices. In this direction, Grimminger (2012) found that educational beliefs positively influence the intention to implement intercultural practices; however, intention does not always translate into actual teaching behavior, highlighting the well-known "intention–behavior gap." Similarly, Bartsch et al. (2021) reported generally positive perceptions among PE teachers regarding the inclusion of students from refugee backgrounds, with variations related to gender and educational level. Within the Greek context, Papageorgiou et al. (2021) noted that although PE is recognized as a means of social inclusion, the lack of training and institutional support limits the implementation of inclusive practices. Likewise, Lleixà and Nieva (2020) emphasized the influence of cultural stereotypes and institutional constraints on teaching decisions, particularly regarding the participation of girls with a migrant background. Finally, the study by Genç (2024) is of particular interest, as it showed that empathy is positively associated with and significantly predicts PE teachers' attitudes toward refugee students, suggesting that individual and psychosocial dimensions of their professional identity shape inclusive orientations. These findings can be interpreted through the lens of the Theory of Planned

Behavior (TPB; Ajzen, 1991), according to which intention is the most immediate predictor of behavior and is shaped by attitudes, subjective norms, and perceived behavioral control (PBC). In the context of including refugee students in PE, positive attitudes represent a necessary but not sufficient condition for adopting inclusive practices, as factors such as inadequate training and institutional constraints may reduce teachers' PBC (Lleixà & Nieva, 2020; Papageorgiou et al., 2021).

Furthermore, teaching is inherently a moral process, as educators are required to make decisions related to equality, justice, and the participation of all students. In the context of including students with a refugee background, the moral dimension of educational practice becomes even more critical, as it requires the combination of moral reasoning, empathy, and a sense of professional responsibility. According to Kohlberg's theory of moral development (1975), teachers often demonstrate higher levels of moral reasoning compared to other professional groups; however, these levels remain primarily within the conventional stage and do not guarantee consistent moral practice (Cummings et al., 2007; O'Flaherty & Gleeson, 2017). Thus, O'Flaherty and Gleeson (2017), using the DIT-2, showed that students in teacher education programs outperformed other groups, yet the majority remained at conventional levels of moral thinking, while the review by Cummings et al. (2007) highlighted the potential for enhancing moral reasoning through targeted interventions.

Overall, the existing literature highlights both the supportive role of PE in the inclusion of refugee students and the importance of teachers' attitudes, intentions, and perceived teaching competence. However, most studies (particularly within the Greek educational context) focus separately on attitudes or specific psychosocial factors, without adopting an integrated approach that combines demographic characteristics with the four components of the TPB (i.e., attitudes, intention, subjective norms, and PBC) regarding the inclusion of refugee children in school within a unified theoretical framework. At the same time, empirical investigation of the relationship between PE teachers' moral competence and their attitudes, subjective norms, PBC, and intention to include refugee children in their lessons remains limited, especially in the Greek context. Therefore, the present study aimed to examine PE teachers' attitudes, subjective norms, PBC, and intention regarding the inclusion of students with a refugee background, as well as the relationship between these variables and teachers' moral competence index and years of teaching experience. Additional objectives were to explore whether gender constitutes a significant factor for the four TPB components and whether a set of participants' contextual and experiential variables can predict their intention to include refugee children in their classes.

Methods

Participants

The sample of the present study consisted of 225 Physical Education (PE) teachers (119 males and 106 females) employed in public primary schools in Greece. Regarding teaching experience, 10 participants reported 1–3 years of service, 25 reported 4–9 years, 47 reported 10–15 years, 41 reported 15–20 years, 72 reported 21–25 years, 29 reported 26–30 years, and one participant reported 31 years of service. Furthermore, 60 PE teachers (26.7%)

reported that refugee students were currently enrolled in their school. In addition, 48 participants (21.3%) had received training in intercultural education, 52 (23.1%) had been trained in integration techniques, and 42 (18.7%) reported teaching experience in intercultural/minority schools (M = 0.60 ± 2.24 years).

Measures

Data were collected using a closed-ended self-report questionnaire consisting of three sections:

a) Contextual and experiential variables questionnaire. This section included items on gender, age, years of teaching experience, the presence of refugee students in the participants' schools, previous teaching experience with refugee students or in intercultural/minority schools, and prior training related to the inclusion of children from minority and/or socially vulnerable groups in the school setting.

b) Theory of Planned Behavior questionnaire. A questionnaire based on the TPB by Ajzen and Madden (1986) was used. It included 6 items assessing attitudes (introductory statement: *"For me, including refugee students in my PE lessons in the coming years is…"*, followed by six bipolar adjective pairs such as *"bad–good"* and *"undesirable–desirable"*), 3 items assessing subjective norms (e.g., *"My school administration is supportive of the inclusion of refugee students"*), 3 items assessing PBC (e.g., *"If I wanted to, I could include refugee students in my PE lessons"*), and 3 items assessing intention (e.g., *"I intend to include refugee students in my PE lessons in the coming years"*). Responses were provided on a 7-point Likert scale. For attitudes, 1 indicated the most negative perception and 7 the most positive perception. For subjective norms, intention, and PBC, 1 corresponded to *strongly disagree* and 7 to *strongly agree*.

c) Moral competence: To assess participants' moral competence, the modified Greek version of the Moral Competence Test (MCT; Mouratidou, Chatzopoulos, Goutza, & Karamavrou, 2003) was administered. The MCT is based on Kohlberg's structural-developmental theory of moral development (Lind, 1978, 2003). It was selected because it is the only available instrument that evaluates morality as a whole rather than examining isolated components. The test includes two moral dilemmas. The first concerns workers who illegally enter a company's administrative offices in order to obtain evidence for an allegation, while the second involves a doctor who assists a terminally ill patient in ending her life upon her request (assisted suicide). Participants are asked to rate 12 arguments for each dilemma (six in favor and six against) using a 9-point Likert-type scale ranging from -4 ("totally disagree") to +4 ("totally agree"). Each argument corresponds to one of Kohlberg's six stages of moral development. The main outcome measure of the MCT is the C-index, which reflects an individual's ability to evaluate arguments based on their moral quality rather than on personal preferences or other psychological influences (Lind, 2000, 2003). The validity and reliability of the MCT require the fulfillment of four key criteria: preference hierarchy, quasi-simplex structure, cognitive-affective parallelism, and correlation with educational level. According to Mouratidou et al. (2003), all these criteria were confirmed for the Greek version of the test.

Procedure

Data were collected electronically via Google Forms using the snowball sampling method. On the first page of the questionnaire, participants were informed about the purpose of the study and the confidentiality of their responses. Participation was voluntary, and no personally identifiable information was collected. Written informed consent was obtained from all participating teachers before accessing the survey instruments.
According to the institutional regulations of Aristotle University of Thessaloniki (AUTH), prior approval by the University Research Ethics and Integrity Committee (EHDE) was not required for this non-funded questionnaire-based study involving competent adult participants. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and the applicable provisions of the General Data Protection Regulation (GDPR).

Data analysis

Gender differences in attitudes, subjective norms, PBC, and intention were examined using independent-samples t-tests. Associations among moral competence (C-index), TPB constructs, and years of teaching experience were assessed via Pearson's r. Stepwise regression analysis was employed to determine whether contextual and experiential variables predicted PE teachers' intention to include refugee children. In all analyses a significance level of $p < .05$ was used. Analyses were performed using SPSS 20.0 (SPSS Inc., Chicago, USA)

Results

The results of the descriptive statistics indicated that, across the total sample, (relatively) high mean scores were observed for attitudes (M=5.71±1), subjective norms (M=5.25±1.25), and intention (M=5.67±1.16) and moderately high mean score was found for PBC (M=4.88±1.57), regarding the inclusion of refugee children in PE classes. More specifically, mean scores by gender ranged from 5.61 (men) to 5.81 (women) for attitudes, from 5.62 (men) to 5.73 (women) for intention, from 4.79 (women) to 5.66 (men) for subjective norms, and from 4.77 (women) to 4.98 (men) for PBC.

In addition, as demonstrated by the results of t-tests, gender was not a significant factor for attitudes [$t(213) = -1.462$, $p > .05$], for PBC [$t(223) = .987$, $p > .05$], and for intention [$t(223) = -.769$, $p > .05$]; however, this was not the case for subjective norms, as male participants exhibited a significantly higher mean score (M = 5.66±1.08) compared to female participants (M = 4.79±1.26) [$t(223) = 5.575$, $p < .01$].

Furthermore, Pearson correlation analysis, conducted to examine the relationships among the four TPB variables, participants' years of teaching experience, and their moral competence, revealed that only two parameters of TPB are significantly associated with PE teachers' moral competence. Specifically, the following findings emerged: (a) PBC and subjective norms were moderately and negatively associated with participants' C-index ($r = -.242$, $p < .05$ and $r = -.248$, $p < .05$ respectively); and (b) all four variables of TPB were strongly and positively associated with each other (see table 1 below).

Table 1. Pearson correlation analysis.

	1.	2.	3.	4.	5.	6.
Attitudes	1					
Intention	.771**	1				
Perceived behavioral control	.369**	.502**	1			
Subjective norms	.246**	.405**	.460**	1		
Years of teaching experience	-.004	-.069	-.010	-.050	1	
Moral competence	-.073	-.144	-.242*	-.248*	-.048	1

Note: * p< .05. ** p< .01.

Finally, a stepwise linear regression analysis was conducted to examine whether five contextual and professional background variables predicted teachers' intention. The initial set of predictors included: (a) presence of refugee students in participants' schools, (b) prior training in intercultural education, (c) previous teaching experience with refugee students, (d) previous teaching experience in intercultural or minority schools, and (e) prior training related to the inclusion of children from minority and/or socially vulnerable groups. Using the stepwise method (entry criterion: $p \leq .05$; removal criterion: $p \geq .10$), only *prior training in intercultural education* was retained in the final model. The remaining variables did not contribute significantly to the prediction of intention and were excluded from the model. The final regression model was statistically significant, $F(1,223) = 8.12$, $p = .005$, explaining 3.5% of the variance in intention ($R^2 = .035$, Adjusted $R^2 = .031$). The multiple correlation coefficient was modest ($R = .187$), indicating a weak association between the predictor and the dependent variable. Prior training in intercultural education emerged as a significant negative predictor of intention ($B = -0.531$, $SE = 0.186$, $\beta = -0.187$, $t = -2.85$, $p = .005$). The effect size was small ($f^2 = 0.036$), suggesting that although the association was statistically significant, its practical magnitude was limited. The final regression equation was: Intention = 6.621 − 0.531 × (Intercultural Training).

Discussion

The present study aimed to examine Greek Physical Education (PE) teachers' attitudes, subjective norms, PBC, and intention regarding the inclusion of students with a refugee background within the framework of the TPB. Additionally, it explored the relationship of these variables with moral competence and selected contextual factors

Overall, participants reported relatively high levels of positive attitudes, subjective norms, and intentions, and moderately high PBC concerning the inclusion of refugee students in PE classes. These findings are consistent with previous research indicating generally favorable orientations among PE teachers toward inclusion of students with refugee or migrant backgrounds (e.g., Bartsch et al., 2021; Papageorgiou et al., 2021). The strong positive intercorrelations observed among the four TPB variables further support the internal coherence of the model in this context. This finding aligns with the theoretical assumption

that attitudes, subjective norms, and PBC are positively associated with intention. Notably, attitudes were strongly associated with intention, reinforcing the central role of evaluative beliefs in shaping teachers' readiness to adopt inclusive practices. However, although teachers expressed positive orientations, PBC received comparatively lower scores, suggesting that confidence in their capability to implement inclusion may be more fragile than their attitudinal stance. This finding is consistent with previous evidence indicating that institutional constraints, limited training, and lack of structural support may weaken teachers' perceived competence, even when their attitudes are favorable.

Gender was not a significant factor for attitudes, PBC, or intention, but male teachers reported significantly higher subjective norms compared to female teachers. This finding may indicate that male participants perceive greater institutional or social support for inclusion, or interpret professional expectations differently. Previous literature has reported mixed findings regarding gender differences in inclusive orientations (e.g., Bartsch et al., 2021), suggesting that contextual and cultural factors may shape how normative pressures are perceived. Given the absence of gender effects on intention, however, the practical implications of this difference appear limited.

One of the most intriguing findings concerns the relationship between moral competence (C-index) and TPB components. Contrary to expectations grounded in moral development theory (e.g., Lawrence Kohlberg), moral competence was not positively associated with attitudes or intention. Instead, it was moderately and negatively correlated with subjective norms and PBC. This pattern may suggest that teachers with higher moral competence rely less on external normative pressures when forming their professional judgments. In other words, individuals with greater ability to evaluate arguments based on moral quality rather than personal preference may adopt a more autonomous stance. Consequently, they become less susceptible to perceived social expectations (subjective norms). The negative association with PBC may reflect a more critical and reflective appraisal of institutional realities. Teachers with higher moral competence might be more aware of structural barriers and therefore less confident in their capacity to implement inclusive practices under current conditions. This finding aligns with prior research suggesting that higher levels of moral reasoning do not automatically translate into consistent moral action, particularly when contextual constraints are present. On the other hand, years of teaching experience were unrelated to TPB constructs and moral competence. This absence of association indicates that inclusive orientations and moral reasoning capacities are not necessarily strengthened through professional longevity alone. Instead, targeted educational experiences and professional development may play a more decisive role than accumulated years of service.

The regression analysis revealed that among the examined contextual and experiential variables, only prior training in intercultural education significantly predicted intention, and notably in a negative direction. Although the effect size was small, this counterintuitive finding warrants careful interpretation. One possible explanation is that teachers who have received intercultural training may develop a more realistic or critical understanding of the complexities and challenges of inclusion, which in turn moderates their expressed intention. Rather than reflecting reduced commitment, lower intention scores may represent a more

cautious or context-sensitive stance. Alternatively, the content or quality of existing training programs may not sufficiently enhance teachers' perceived competence, thus failing to strengthen behavioral intentions. The limited explanatory power of the regression model (3.5% of variance) further indicates that intention to include refugee students is influenced by additional psychological, organizational, and structural variables not captured in the present study.

From a theoretical perspective, the findings of the present study support the applicability of the TPB framework in understanding inclusive intentions within PE settings. At the same time, the negative associations between moral competence and certain TPB components suggest that moral reasoning operates in a more complex manner than a simple positive predictor of inclusive orientation. Practically, the results underline the need for professional development programs that go beyond raising awareness and instead strengthen teachers' PBC through concrete pedagogical strategies, experiential learning, and institutional support. Enhancing structural conditions within schools may be essential to bridge the intention–behavior gap identified in previous literature.

Several limitations should be acknowledged. First, the use of a cross-sectional design precludes causal inferences. Second, data were collected through self-report measures, which may be subject to social desirability bias, particularly in morally salient topics such as inclusion. Third, the snowball sampling method limits generalizability beyond the present sample of Greek PE teachers. Finally, the study assessed intention rather than actual teaching behavior; future research should examine whether reported intentions translate into observable inclusive practices. Longitudinal and mixed-method designs could provide deeper insight into how moral competence, institutional conditions, and professional development interact over time. Moreover, qualitative exploration of teachers' interpretations of intercultural training may clarify the unexpected negative association with intention.

Conclusion

The present findings indicate that Greek PE teachers hold generally favorable attitudes, subjective norms, and intentions toward the inclusion of refugee students, although their perceived behavioral control remains comparatively lower, pointing to a gap between positive orientations and confidence in practical implementation. The strong intercorrelations among the four TPB components support the applicability of the theory within this educational context, while the unexpected negative associations between moral competence and subjective norms/PBC suggest that moral reasoning shapes inclusive orientations in a more complex manner than initially assumed. Contextual and experiential variables showed limited predictive value for intention, with only prior intercultural training emerging as a significant, albeit weak, negative predictor, underscoring the need to reconsider the content and quality of existing training programs. Taken together, these findings suggest that fostering PE teachers' inclusive practices toward refugee students requires not only positive attitudes but also targeted institutional support and professional development that strengthen perceived behavioral control and help translate favorable intentions into sustained classroom practice.

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Corresponding author: miladinokicic.2001@gmail.com

RELATIONSHIP BETWEEN BODY COMPOSITION AND MOTOR ABILITIES OF SOCCER PLAYERS

Miladin Okičić[1], Nenad Đokić[1], Dušan Stanković[1], Zoran Mašić[2], Milan Mihajlović[2]

Abstract

This research analyzed how morphological characteristics relate to physical performance in youth football players. Thirty-two male competitors aged 10 to 13 participated in the study. Anthropometric and tissue metrics evaluated were stature, total weight, body mass index (BMI), adiposity percentage (%BF), and skeletal muscle percentage (%MM). Physical performance was measured using linear speed runs (at intervals of 5 m, 10 m, 20 m, and 30 m), directional change capacity (T-test executed with and without a soccer ball), and lower-body reactive power (CMJ, CMJa, and SJ). Pearson's bivariate correlations mapped the links between body composition and athletic output. The analysis revealed that skeletal height had a notable positive link with vertical leap height ($r=0.438-0.548$, $p<0.05$) alongside moderate negative associations with times over 20 m and 30 m ($r=-0.324$ to -0.352, $p<0.05$). Adiposity percentage displayed the most stable correlations with linear speed times ($r=0.343-0.463$, $p<0.05$), indicating that elevated body fat impedes acceleration. In contrast, muscle percentage positively supported vertical jump scores ($r=0.378-0.451$, $p<0.05$), and its negative links with sprint times showed that greater muscle development boosts performance over brief acceleration distances. BMI failed to yield meaningful relationships with the majority of the physical fitness tests.

Keywords: body composition, body fat percentage, muscle mass, speed, explosive power

[1] Faculty of Sport and Physical Education, University of Niš, Niš, Serbia
[2] Faculty of Sport, University "Union – Nikola Tesla", Belgrade, Serbia

Introduction

In sports science, association football is recognized as a complex physical and tactical pursuit, holding a position as one of the globally dominant sporting disciplines (González-Fernández et al., 2022). Achieving elite standards in football demands a highly developed array of physical traits. Thanks to cutting-edge biomechanical monitoring, targeted dietary strategies, and sports medicine, players continually push their functional limits. The chaotic, intermittent nature of match-play imposes heavy physiological loads (Nicholas et al., 2000; Rienzi et al., 2000), requiring modern coaching to rely on rigorous scientific protocols. Over the past decade, football has evolved rapidly, showing faster game speeds and requiring superior physical preparation from its participants (Sever & Zorba, 2018). This evolution demands higher metabolic efficiency and endurance during competition, which is directly supported by optimized body composition and mechanical power. To sustain these high performance levels, coaches must closely monitor players' physiological indicators. Consequently, research heavily prioritizes body composition and motor skills as vital pillars of soccer success. While balanced physical development is necessary, the core determinant capacities remain linear speed, explosive leg power, aerobic stamina, change-of-direction speed, and coordination (Nurhidayat et al., 2019; Andrašić, 2021).

An individual's body composition reflects their overall health status and is defined by the relative distribution of skeletal muscle, adipose tissue, bone density, and other physiological structures within total body mass (Solway, 2013). Nutritional profiles and somatic dimensions dictate both general well-being and competitive capacity (Ackland et al., 2012). Indeed, reaching high-level athletic success is highly unlikely unless an athlete's physical makeup matches the specific physiological demands of their sport (Nikbakht et al., 2012). Mapping the physical features of athletes, alongside tracking differences across competitive classes, gives coaching staffs vital insights for managing different youth age brackets. While certain morphological metrics may not directly determine success, maintaining low adiposity levels and high relative skeletal muscle mass remains a primary goal for maximizing athletic output in football (Rienzi et al., 2000; Gil, 2007).

Motor skills represent the functional qualities of human movement capacity, often categorized in literature as physical, motor, or psychomotor attributes (Živanović et al., 2018). The foundational elements of physical fitness include force production, movement speed, systemic endurance, joint range of motion, and motor control. Because soccer is an acyclic, highly variable sport, competitive success is dictated by specialized movement patterns, individual motor characteristics, and tactical synergy among teammates (Talović et al., 2010). A variety of research projects have investigated how body composition shapes physical performance metrics in football (Atakan et al., 2017; Leão et al., 2002; Bangsbo et al., 2006). Multiple authors have verified that elevated body fat percentages hinder running speed, agility, and power generation (Pérez-López et al., 2015; Zanini et al., 2020; França et al., 2024). In contrast, fat-free mass and muscle volume show strong positive links with vertical jump height, short-distance acceleration, and change-of-direction speeds (Aurélio et al., 2016; Pérez-Contreras et al., 2021; Leão et al., 2022). Interventions also highlight the influence of

biological growth and physical development, as older cohorts consistently demonstrate superior athletic performance (Toselli et al., 2022). Longitudinal and cross-sectional work with youth athletes shows that basic capacities like strength and velocity grow continuously during maturation, whereas position-specific technical skills, like ball control, are highly prominent in midfielders at early competitive stages (Mujika et al., 2009). Additionally, targeted exercise programs—including core stability regimens—can positively alter both somatic characteristics and functional capacities (Yaraş & Harmanci, 2022; França et al., 2023). In particular, relative muscle mass strongly supports physical test outcomes (Corluka & Vasiljevic, 2018). Consequently, determining target body composition ranges is highly important for optimizing athletic progression in youth football players.

The aim of this study was to investigate the relationships between body composition metrics and motor capacities in a cohort of young football players. We hypothesized that morphological profiles, specifically adiposity (BF) and muscle percentage (MM), would show statistically significant associations with physical test results in youth players, with higher MM positively relating to performance and higher BF negatively associating with speed, agility, and explosive power.

Methods

Participants

The initial sample for this cross-sectional project comprised forty-one youth soccer players (mean age: 11.5\pm1.5 years, weight: 49.7\pm11.18 kg, and height: 157.82\pm10.10 cm). Following the attrition of nine participants who missed specific evaluation sessions, thirty-two competitors remained for the final dataset. Prior to testing, all players and their legal guardians received a detailed briefing regarding the study's scope, after which they provided signed informed consent. Inclusion required players to be in good health, actively training for a minimum of two years (with at least three sessions per week), and participating in regional or national tournaments. Anyone presenting with a lower-limb injury over the preceding trimester, active physical discomfort, or limiting medical diagnoses was excluded. The experimental design was aligned with the ethical standards of the Declaration of Helsinki, receiving formal clearance from the Ethics Committee of the Faculty of Sport and Physical Education, University of Niš (protocol code: 04-542/5).

Study Design

To ensure protocol compliance, all young players underwent a familiarization session where researchers demonstrated and explained every trial. Testing occurred in a highly structured sequence on the designated days, using uniform laboratory apparatuses overseen by the same research staff. Stature was recorded with a Swiss Martin anthropometer (GPM 101) to the nearest 0.1 cm. Somatic metrics—including body weight (BM), body mass index (BMI), relative adiposity (%BF), and skeletal muscle mass (%MM)—were recorded using a multi-frequency bioelectrical impedance platform (InBody 770; Biospace Co. Ltd, Seoul, Korea). Linear velocity was tracked over a 30 m distance, capturing intermediate split times at 5 m, 10 m, and 20 m using a wireless timing system (Witty, Microgate, Bolzano, Italy). Change-of-

direction agility was evaluated through the standardized T-test (performed both with and without dribbling a soccer ball) utilizing the same timing gates. Lower-extremity vertical power was examined via three jump protocols: Squat Jump (SJ), Countermovement Jump with hands fixed (CMJ), and Countermovement Jump with free arm swing (CMJa), recorded using a precision optical system (Optojump, Microgate, Bolzano, Italy).

Testing Procedures

Morphological evaluations were completed in a temperature-controlled laboratory, whereas physical trials took place on an outdoor natural turf pitch. To mitigate physical fatigue, the evaluations were divided across two back-to-back testing sessions. The initial day started with body composition profiling and basic anthropometrics (BH, BM, BMI, %BF, and %MM). Following these measurements, players completed a structured 15-minute dynamic preparation routine incorporating low-intensity running, active stretching, and quick directional changes (Soligard et al., 2008; Daneshjoo et al., 2013). This was immediately followed by the vertical power trials: first SJ, then CMJ, and finally CMJa. The second session focused on linear speed and agility evaluations, preceded by the same warm-up protocol. Running speed was assessed across the 5 m, 10 m, 20 m, and 30 m zones. To avoid circadian performance variations, all testing took place between 10:00 a.m. and 1:00 p.m. under the direction of two expert examiners who gave identical verbal prompts. All assessments were scheduled on mid-week days (Wednesdays and Thursdays) to guarantee a minimum recovery window of 72 hours after any competitive match. This exact timeline was repeated the subsequent week for the rest of the cohort over a total of four collection days.

Anthropometry

Somatic measurements adhered to the standard guidelines of the International Biological Program (Eston et al., 2009). A Swiss-made Martin anthropometer (GPM 101) was used to capture height (BH) to the nearest millimeter, and body mass (BM) was recorded with a calibrated electronic scale with 0.1 kg accuracy. BMI values were obtained by dividing mass by height squared (kg/m^2). The scientific validity and reproducibility of these anthropometric evaluations have been established in previous validation studies (Dehghan & Merchant, 2008).

Body composition

To assess tissue distribution, participants underwent bioelectrical impedance analysis using an InBody 770 system (BioSpace, Seoul, South Korea). This test estimated relative fat mass percentage (%BF) and muscle mass percentage (%MM) under controlled lab conditions. The reliability and clinical utility of BIA in athletic demographics have been verified previously (Dehghan & Merchant, 2008).

Speed Tests

Linear running speed was evaluated through max-effort sprints across 5 m, 10 m, 20 m, and 30 m intervals. Electronic timing cells (Witty, Microgate, Italy) captured running times to the nearest 0.01 seconds. In line with soccer-specific testing protocols (Mendez-Villanueva et al., 2011), participants set up in a split-stance standing start 0.5 m behind the initial sensor. On their own choice, they accelerated at maximum velocity past each intermediate gate. Timing

heights were set at approximately 1 m to avoid premature triggering by limbs. Players performed two complete sprint trials, separated by a 2-minute passive recovery window, with only the fastest run retained for statistical analysis.

Agility Test

Change-of-direction speed was evaluated using the T-test, which measures multidirectional coordination and acceleration. The protocol was performed following Semenick's (1990) design, requiring players to complete forward sprinting, lateral shuffling (left and right), and backpedaling, performed both with and without dribbling a ball. Cones were positioned in a "T" layout. Each player completed three maximal attempts, with the best trial selected for final processing. The psychometric properties of this agility assessment are well-documented in youth soccer cohorts (Sporiš et al., 2010).

Muscle Power Tests

Dynamic leg power was examined via three vertical leap conditions: countermovement jump (CMJ), countermovement jump utilizing arms (CMJa), and the classic squat jump (SJ). Vertical leap height was calculated via optical flight-time sensors using the Optojump platform, which is a validated system for jump height estimations (Glatthorn et al., 2011). For the CMJ trial, players started upright with hands fixed on their waist, performed a self-selected countermovement knee flexion, and immediately exploded upward. The CMJa used an identical jumping motion but allowed an active, free arm swing to maximize vertical height. For the SJ, participants descended into a 90^\circ knee flexion, held the static position for 2 seconds to eliminate elastic energy storage, and then jumped vertically on command without any countermovement. The maximum height (measured in centimeters) was recorded, with the validity of these jumping assessments supported by previous research (Glatthorn et al., 2011).

Statistical Analysis

All calculations were executed using the SPSS statistical software package (v26.0, SPSS Inc., Chicago, IL, USA). Standard descriptive metrics were calculated for every evaluated variable, and the normal distribution of the dataset was confirmed using the Kolmogorov-Smirnov test. Pearson product-moment correlations assessed the degree of association between somatic indices and motor variables. In line with Hopkins et al. (2009), correlation strengths were interpreted as: trivial ($0 < r \leq 0.1$), small ($0.1 < r < 0.3$), moderate ($0.3 < r < 0.5$), large ($0.5 < r < 0.7$), very large ($0.7 < r < 0.9$), and nearly perfect ($0.9 < r \leq 1.0$).

Results

The physical characteristics and body composition of the evaluated players (n = 32) are detailed in Table 1, while Table 2 outlines the performance means and standard deviations for the physical tests.

Table 1. Mean values ± SD for descriptive characteristics and body composition parameters of soccer players (n = 32).

Variables	Mean ± SD	Kolmogorov-Smirnov test
Height (cm)	157.82 ± 10.10	0.516
Body mass (kg)	49.70 ± 11.18	0.652
Body mass index	19.50 ± 3.19	0.566
Body fat (%)	9.10 ± 5.03	1.194
Muscle mass (%)	21.69 ± 5.34	0.527

Table 2. Mean values ± SD for motor abilities of young soccer players (n = 32).

Variables	Mean ± SD	Kolmogorov-Smirnov test
CMJ (cm)	25.58 ± 5.72	0.843
CMJa (cm)	30.49 ± 6.90	0.443
SJ (cm)	24.89 ± 5.99	0.532
5 m (s)	1.33 ± 0.12	0.596
10 m (s)	2.23 ± 0.16	0.610
20 m (s)	3.70 ± 0.27	0.472
30 m (s)	5.24 ± 0.42	0.661
T-test (s)	11.26 ± 0.68	0.596

Table 3 lists the bivariate Pearson correlation values between the body metrics and the physical fitness scores. These correlations are also visually mapped in Figure 1. In general, stature and muscle percentage displayed clear positive correlations with vertical leap heights (specifically CMJa and SJ). On the other hand, relative body fat showed a clear negative relationship with sprint performance (indicated by longer sprint times), along with a weak, non-significant negative association with jump height.

Table 3. Pearson's correlation coefficients between body composition and motor abilities.

Variables	CMJ	CMJa	SJ	5 m	10 m	20 m	30 m	T-test without ball	T-test with ball
Body height	+0.490**	+0.548**	+0.438*	-0.309	-0.354*	-0.324	-0.352*	+0.110	+0.068
Body mass	0.101	0.234	0.136	-0.163	-0.095	-0.064	-0.046	+0.202	+0.008
Body mass index	-0.223	-0.130	-0.168	+0.126	+0.174	+0.164	+0.208	+0.174	-0.017
Body fat (%)	-0.278	-0.300	-0.315	+0.343	+0.404*	+0.409*	+0.463**	+0.290	-0.010
Muscle mass (%)	+0.306	+0.451**	+0.378*	-0.435*	-0.352	-0.257	-0.273	+0.098	+0.031

Note. * $p < .05$, ** $p < .01$. + indicates positive correlation; - indicates negative correlation. CMJa = countermovement jump with arm swing; SJ = squat jump.

Pearson's correlation coefficients between morphological characteristics and motor performance variables are illustrated in Figure 1. Overall, body height and muscle mass percentage demonstrated significant positive associations with vertical jump performance (CMJa and SJ). Body fat percentage was significantly associated with decreased sprint performance, while also exhibiting a non-significant negative trend with jumping ability.

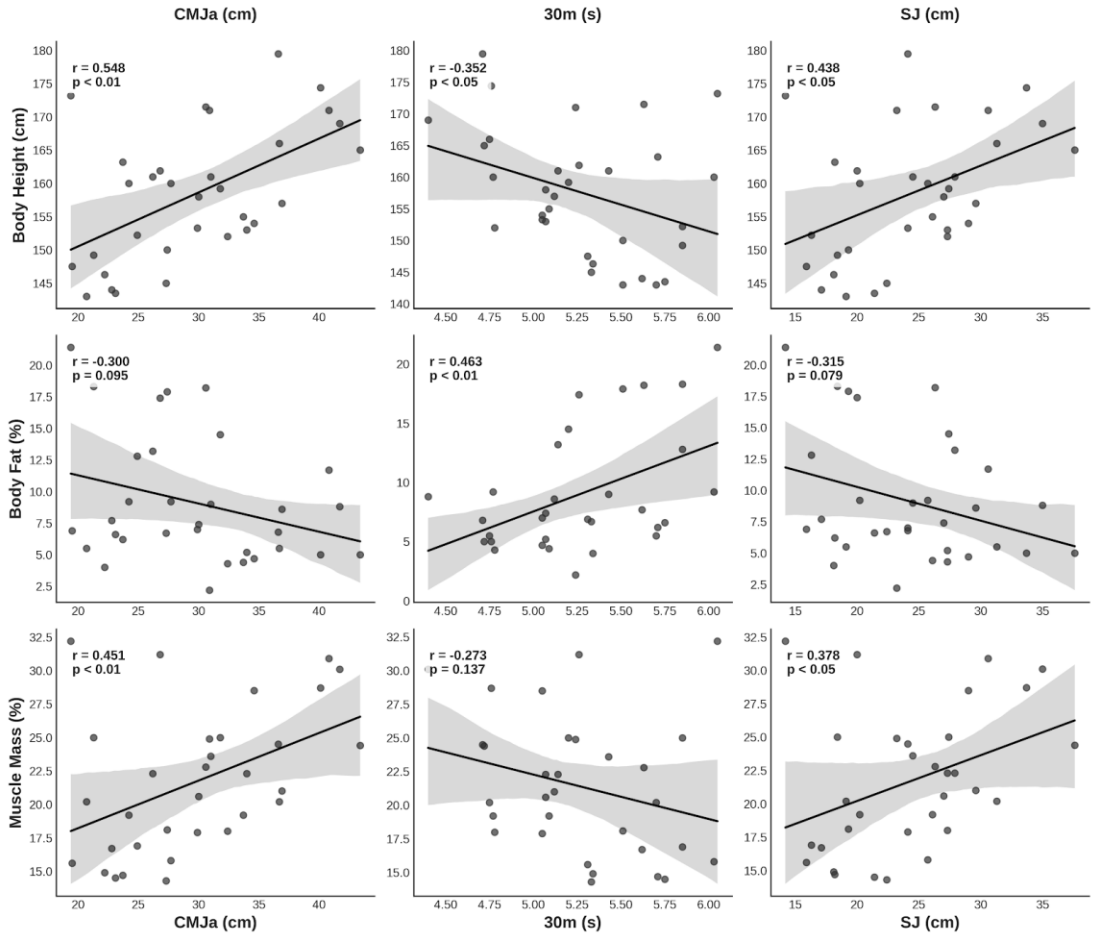


Figure 1. Correlation matrix between body composition and motor abilities.

Table 4 presents a summary of the multiple linear regression models.

Table 4. Multiple regression analysis for motor performance variables

Dependent variable	Predictor	SE	β	t	p
30 m sprint	Body fat (%)	0.01	0.56	3.99	<0.001*
30 m sprint	Body height	0.01	- .17	-1.16	0.258
30 m sprint	Muscle mass (%)	0.02	- 0.31	-1.78	0.086
CMJa	Body height	0.03	0.51	4.47	<0.001*
CMJa	Muscle mass (%)	0.07	0.33	2.97	0.006*
CMJa	Body fat (%)	0.06	-0.18	-1.69	0.098

Note: SE = standard error; β = standardized coefficient. * $p < 0.05$. Model summary: 30 m sprint $R^2 = 0.45$, $p = 0.001$; CMJa $R^2 = 0.52$, $p < 0.001$.

Discussion

The aim of this study was to investigate the relationship between body composition and motor abilities in young soccer players. The statistical analysis showed significant correlations between specific somatic variables (stature, weight, BMI, body fat, and muscle percentages) and motor tests (including short-distance sprints, explosive leg power, and agility). Regarding player height, we found positive associations with jump heights (CMJ, CMJa, and SJ), suggesting that taller athletes benefit from structural advantages when generating vertical force. This matches observations by Pérez-López et al. (2015), who noted that body proportions affect jump mechanics. Conversely, negative links between height and performance in the 20 m and 30 m sprints suggest that taller players may face mechanical disadvantages during early acceleration. This supports the views of Aurélio et al. (2016), who pointed out that longer lower limbs can slow down the initial strides of a run. Similarly, total body mass (BM) by itself is not a direct measure of physical ability. Although heavier players in this study did not perform significantly worse in sprint or agility trials, the correlation results indicate that body mass is best understood by looking at its internal components—specifically, the ratio of muscle to fat. These insights align with Atakan et al. (2017) and Esco et al. (2018), who noted that body mass is most informative when split into its fat and fat-free components.

BMI displayed the weakest overall correlations with the evaluated motor skills. This result is expected and agrees with previous studies (Esco et al., 2018; Mohammad & Tareq, 2016) showing that BMI fails to distinguish between fat and muscle tissues, making it an unreliable measure of physical fitness in athletes. Our data indicates that using BMI can lead to inaccurate conclusions about a youth player's actual fitness. Conversely, body fat percentage (%BF) was a major factor shaping motor performance. Higher fat percentages consistently related to slower sprint times across all tested distances, aligning with findings from Zanini et al. (2020), Esco et al. (2018), and Pérez-López et al. (2015). From a biomechanical perspective,

extra body fat increases inertia and limits rapid force development, which is essential for speed and agility. In this study, body fat was the most consistent negative factor for performance, a finding also supported by França et al. (2024), who highlighted fat percentage as the key negative factor for velocity and agility in youth players. In contrast, muscle mass percentage (%MM) was positively linked to jump scores (CMJ, CMJa, SJ) and negatively linked to sprint times, showing that greater muscle mass supports explosive power and running speed. These findings match the work of Pérez-Contreras et al. (2021), Leão et al. (2022), and França et al. (2024).

We conducted multiple regression analyses for variables with significant correlations. The model for the 30 m sprint was statistically significant ($R^2 = 0.45$, $p < 0.01$), accounting for 45% of the performance variance. Body fat percentage was the primary predictor ($\beta = 0.56$, $p < 0.001$), showing that higher adiposity leads to slower sprint times. Muscle mass percentage showed a marginal trend toward significance ($\beta = -0.31$, $p = 0.086$), whereas height did not make a significant contribution ($p > 0.05$). For the CMJa jump, the regression model was also significant ($R^2 = 0.52$, $p < 0.001$), explaining 52% of the variance. Stature ($\beta = 0.51$, $p < 0.001$) and muscle mass percentage ($\beta = 0.33$, $p < 0.01$) were key predictors, indicating that taller players with higher muscle mass jump higher. The remaining variance suggests that future studies should include a broader range of motor tests to fully capture how body composition influences youth player development. This study focused on male players aged 10 to 13, a development stage marked by major growth differences. Children at this stage may be in pre-pubertal, circ-pubertal, or post-pubertal growth phases, creating notable variations in speed, strength, and motor skills due to biological maturity. Additionally, playing positions likely influence physical profiles, meaning future studies should incorporate position-specific assessments. Key limitations of this study include the modest sample size, the inclusion of male participants only, and the absence of biological maturity markers. The cross-sectional approach prevents us from making causal claims, and bioelectrical impedance analysis can be affected by hydration and external factors. Future research should use larger samples, track maturity markers, and analyze positional differences.

Conclusion

Based on the analysis of the present study, it was demonstrated that body composition metrics correlate significantly with running speed, explosive power, and change-of-direction agility. The evidence indicates that higher relative body fat limits speed, agility, and power, while greater relative muscle mass supports physical fitness. Determining target body composition ranges for young players can significantly benefit coaching and talent development. Consequently, we recommend routine body composition monitoring using validated methods, paired with structured strength and power programs to optimize athletic performance. These findings offer practical insights for coaches and fitness staff designing youth training programs. Future research should involve larger, more diverse samples spanning various age groups and competitive tiers.

Declarations

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Ethical Approval Statement: This study was approved by the Ethics Committee of the Faculty of Sport and Physical Education, University of Niš (protocol code: 04-542/5).

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Conflict of Interest: The authors declare no conflicts of interest regarding this study.

Data Availability Statement: Data supporting this study is available from the authors upon reasonable request.

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Corresponding author: bojan.bjelica@ffvis.ues.rs.ba

THE INFLUENCE OF SOCIAL MEDIA ON MOTIVATION FOR PHYSICAL ACTIVITY AND SPORTS PARTICIPATION: A SYSTEMATIC REVIEW

Bojan Bjelica[1], Đorđe Hajder[1], Miroslav Smajić[2], Milan Milivojević[3], Nikola Aksović[4], Sanjin Saračević[5], Emir Musić[5], Hamza Turulja[5], Medžid Buljubašić[5], Aldin Sarajčić[5]

Abstract: *Background: Social media platforms have increasingly been used as tools to promote physical activity and sports participation through digital interventions and online social interaction. Objective: The aim of this systematic review was to examine the influence of social media-based interventions on motivation for physical activity and sports participation. Methods: A systematic search of PubMed, Scopus, Web of Science, and Google Scholar was conducted, and studies published between 2012 and 2025 were included according to predefined inclusion and exclusion criteria. A total of 15 primary studies were analyzed, and methodological quality was assessed using the PEDro scale. Results: The majority of included studies reported positive effects of social media-based interventions on physical activity outcomes, including increased moderate-to-vigorous physical activity, daily step counts, exercise adherence, and motivation. Facebook was the most commonly used platform, followed by mobile applications and hybrid digital interventions. Sample sizes ranged from 25 to 301 participants, and intervention durations varied from 3 weeks to 6 months. Conclusion: Social media-based interventions appear to be effective in improving motivation and participation in physical activity; however, heterogeneity among studies limits strong general conclusions.*

Keywords: Instagram, Facebook, online, digital, social media

[1] Faculty of Physical Education and Sport, University of East Sarajevo, Bosnia and Herzegovina
[2] College of Higher Vocational Studies, Sports Academy Belgrade, Serbia
[3] School of Economics Uzice, Serbia
[4] Faculty of Sport and Physical Education, University of Priština in Kosovska Mitrovica, Serbia
[5] Faculty of Sports and Physical Education, Universiy of Sarajevo, Bosnia and Herzegovina

Introduction

Physical inactivity is recognized as one of the leading global public health concerns and is associated with increased risk of cardiovascular disease, obesity, diabetes, and mental health disorders (World Health Organization [WHO], 2022). In recent years, the rapid expansion of digital technologies and social media platforms has significantly changed the ways individuals communicate, access health information, and participate in physical activity-related communities. Platforms such as Facebook, Instagram, TikTok, Twitter, and YouTube are increasingly used to promote healthy lifestyles, exercise participation, and sports engagement.

Social media enables users to share experiences, communicate with peers, and receive social support, which may positively influence motivation for physical activity (Centola, 2013). Previous studies have shown that online social interaction may increase exercise adherence, accountability, and engagement in health-related behaviors (Cavallo et al., 2012). Furthermore, social media-based interventions frequently incorporate behavioral change strategies such as goal setting, feedback, self-monitoring, and gamification, which may contribute to increased physical activity levels (Edney et al., 2020). The integration of social networking components into physical activity interventions has become increasingly common during the past decade. Several randomized controlled trials have demonstrated positive effects of Facebook groups, mobile applications, and online fitness communities on exercise participation and motivation (Maher et al., 2015; Looyestyn et al., 2018). In addition, wearable devices and smartphone applications connected to social platforms enable users to monitor progress and receive immediate feedback regarding their physical activity behaviors (Direito et al., 2015).

Young adults and university students represent one of the populations most exposed to social media platforms, making them an important target group for digital health interventions (Pew Research Center, 2021). Since sedentary behavior and insufficient physical activity are highly prevalent among young populations, social media may provide a practical and cost-effective strategy for promoting healthier lifestyles (Hebden et al., 2014). Moreover, the COVID-19 pandemic further increased the reliance on online exercise programs and virtual fitness communities, emphasizing the growing importance of social media in physical activity promotion (Stockwell et al., 2021). Despite the growing popularity of social media-based interventions, findings regarding their effectiveness remain inconsistent. While some studies have reported significant improvements in physical activity levels and exercise motivation, others have found limited or non-significant effects (Cavallo et al., 2012). Additionally, concerns have been raised regarding potential negative consequences of social media use, including body dissatisfaction, unhealthy social comparison, and exercise addiction (Vaterlaus et al., 2015).

Therefore, the aim of this systematic review was to examine the influence of social media-based interventions on motivation for physical activity and sports participation. In addition, the methodological quality of the included studies was assessed using the Physiotherapy Evidence Database (PEDro) scale in order to evaluate the strength and reliability of the available evidence.

Materials and Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The aim of the review was to examine the influence of social media-based interventions on motivation for physical activity and sports participation. Relevant studies published between 2012 and 2025 were identified, screened, and analyzed using predefined eligibility criteria.

Electronic database searches were performed using PubMed, Scopus, Web of Science, and Google Scholar. Only peer-reviewed articles published in English were considered for inclusion. Studies were independently screened based on titles and abstracts, followed by full-text assessment when eligibility was unclear. Duplicates were removed before the screening process.

The methodological quality of the included randomized and controlled studies was assessed using the Physiotherapy Evidence Database (PEDro) scale. The PEDro scale consists of 11 criteria evaluating methodological rigor, including randomization, allocation concealment, blinding, follow-up adequacy, and statistical reporting. Studies with higher PEDro scores were considered to have better methodological quality.

Data extracted from the included studies consisted of the following variables: author and publication year, study design, sample characteristics, population type, social media platform used, intervention duration, outcome measures, measurement tools, and main findings related to physical activity and exercise motivation. The extracted data were summarized and presented in tabular form.

Search Strategy

We performed a thorough literature search across several electronic databases, including PubMed, Web of Science, Scopus, and Google Scholar. The investigation targeted papers released from 2012 to 2025. We utilized combinations of keywords and Boolean terms to locate publications exploring how social platforms associate with bodily movement. The search query incorporated the following combinations: “social media” AND “physical activity”; “social networking” AND “exercise motivation”; “Facebook” AND “physical activity intervention”; “Instagram” AND “exercise behavior”; “TikTok” AND “physical activity”; “social media intervention” AND “sports participation”; “online platforms” AND “exercise adherence”.

Inclusion Criteria

Papers were selected for this systematic review based on the following eligibility parameters:

- First-hand research papers from peer-reviewed scientific journals
- Manuscripts written and published in English

- Designs including randomized controlled trials, non-randomized controlled trials, pilot trials, or experimental designs
- Projects evaluating digital, social-media-focused programs targeting sports engagement or bodily movement
- Investigations documenting results linked to exercise adherence, physical activity levels, sport involvement, or workout motivation
- Research published within the 2012–2025 timeframe

Exclusion Criteria We excluded studies if they met any of the following conditions:

- Syntheses (systematic reviews, meta-analyses), conference proceedings, opinion pieces, or individual case profiles
- Articles written in languages other than English
- Research lacking measurements of physical exercise or movement outcomes
- Interventions lacking any online community or social media elements
- Overlapping/duplicate datasets or unfinished drafts
- Papers with missing methodology that prevented scoring with the PEDro instrument

This systematic analysis ultimately incorporated 15 primary research papers, detailed in Table 1. These publications mostly utilized randomized controlled trials alongside experimental approaches to evaluate the effects of social media platforms on physical activity participation and exercise motivation. Most interventions utilized Facebook groups, mobile applications, or online social support components to encourage engagement in physical activity behaviors. Program lengths spanned from 3 weeks up to 6 months, observing diverse cohorts such as teenagers, college students, individuals with overweight, and active leisure participants. On the whole, most of the selected papers identified positive impacts of online social platforms on workout consistency, movement metrics, and motivational factors.

Table 1. Original empirical studies.

Study	Design	N	Population	Platform	Duration	Outcomes	Measure	Main Findings
Cavallo et al., 2012	RCT	134	Female students	Facebook	12 weeks	PA, social support	IPAQ	↔ PA, ↑ social support
Maher et al., 2015	RCT	110	Inactive adults	Facebook App	50 days	MVPA	IPAQ, pedometer	↑ MVPA
Valle et al., 2013	CT	47	Young adults	Facebook	8 weeks	Exercise participation	PA questionnaires	↑ PA
Turner-McGrievy & Tate, 2013	RCT	96	Overweight adults	Twitter + podcasts	6 months	PA motivation	Accelerometry	↑ adherence, ↑ motivation
Joseph et al., 2015	PS	25	African-American women	Facebook	8 weeks	Lifestyle behavior	Self-report	↑ adherence
Direito et al., 2015	RCT	51	Adults	Fitness apps/social media	8 weeks	Physical activity	Accelerometers	↑ PA
Fukuoka et al., 2015	RCT	67	Overweight adults	Facebook + mobile app	12 weeks	Daily steps	Pedometer	↑ daily steps
Hebden et al., 2014	PS/RCT	250	Young adults	Facebook + SMS	12 weeks	Lifestyle behavior	Online survey	↑ PA behaviors
Wójcicki et al., 2014	PS/RCT	57	Adolescents	Facebook	12 weeks	Moderate PA	Accelerometry	↑ moderate PA
Looyestyn et al., 2018	RCT	89	Recreational runners	Facebook group	5 weeks	Running adherence	Online tracking	↑ adherence
Edney et al., 2020	RCT	301	Adults	Social fitness app	3 months	Steps/day	Smartphone tracking	↑ steps/day
Kim & Glanz, 2013	IS	92	Adolescents	Social media program	10 weeks	Exercise motivation	Surveys	↑ motivation
Hansen et al., 2012	Web-based RCT	118	Adults	Online platform	16 weeks	PA adherence	Activity logs	↑ adherence

Pagoto et al., 2016	Observational	63	Adults	Twitter	12 weeks	Engagement & PA	Analytics + surveys	↑ engagement, ↑ PA
Carson et al., 2025	RCT	160	Latina adolescents	Instagram + mobile intervention	6 months	MVPA, daily steps, motivation	ActiGraph accelerometers, 7-Day PAR Interview	↑ MVPA, ↑ daily steps, ↑ motivation

Legend: ↑ statistically significant increase; ↓ statistically significant decrease; ↔ no statistically significant change; ↑* positive trend without statistical significance; RCT = randomized controlled trial; PA = physical activity; MVPA = moderate-to-vigorous physical activity; IPAQ = International Physical Activity Questionnaire; SMS = short message service; App = mobile application; PEDro = Physiotherapy Evidence Database scale; CT = Controlled trial; PS = Pilot study; IS = Intervention study.

Results

To improve the clarity and consistency of the findings, quantitative outcomes were reported whenever possible. However, due to differences in study design, intervention characteristics, social media platforms, and physical activity measurement tools, several findings were described qualitatively. While some studies explicitly reported changes in moderate-to-vigorous physical activity (MVPA), daily step counts, or exercise adherence, other outcomes such as motivation, social support, and behavioral engagement were presented descriptively. Greater standardization of intervention protocols and reporting methods in future studies may facilitate more accurate comparisons across social media-based physical activity interventions.

Literature Characteristics

The study selection process is presented in Figure 1 according to the PRISMA 2020 flow diagram. A total of 472 records were initially identified through database searching, including PubMed, Scopus, Web of Science, and Google Scholar. Additional studies were identified through manual searches of reference lists and other relevant sources.

The included studies primarily consisted of randomized controlled trials and intervention-based research examining the effects of social media platforms on physical activity participation and exercise motivation. Most interventions utilized Facebook groups, mobile applications, or online social support components to encourage engagement in physical activity behaviors. Intervention duration ranged from 3 weeks to 6 months, while study populations included adolescents, university students, overweight adults, and recreationally active individuals. Overall, the majority of studies reported positive effects of social media-based interventions on physical activity levels, exercise adherence, and motivational outcomes.

The characteristics of the included studies are presented in Table 1. A total of 15 studies published between 2012 and 2025 were included in this systematic review. The majority of studies used randomized controlled trial (RCT) designs (n = 9), while the remaining studies consisted of controlled trials, pilot studies, intervention studies, observational studies, and web-based randomized interventions 12 (Page et al., 2021).

Various social media platforms and digital communication tools were utilized across the included studies. Facebook was the most frequently used platform, appearing in eight studies (Cavallo et al., 2012; Valle et al., 2013; Joseph et al., 2015; Fukuoka et al., 2015; Hebden et al., 2014; Wójcicki et al., 2014; Looyestyn et al., 2018; Maher et al., 2015). Other interventions included Twitter-based programs, fitness mobile applications, online platforms, Instagram-supported interventions, and smartphone-based social fitness applications. Several studies combined multiple technologies, such as Facebook with SMS support or mobile applications integrated with social networking components. The included populations varied considerably across studies and involved adolescents, university students, overweight adults, recreational runners, African-American women, and insufficiently active adults. Sample sizes ranged from 25 participants in the study by Joseph et al. (2015) to 301 participants in the study conducted by Edney et al. (2020). Most studies included adult populations, while four studies specifically targeted adolescents or young adults.

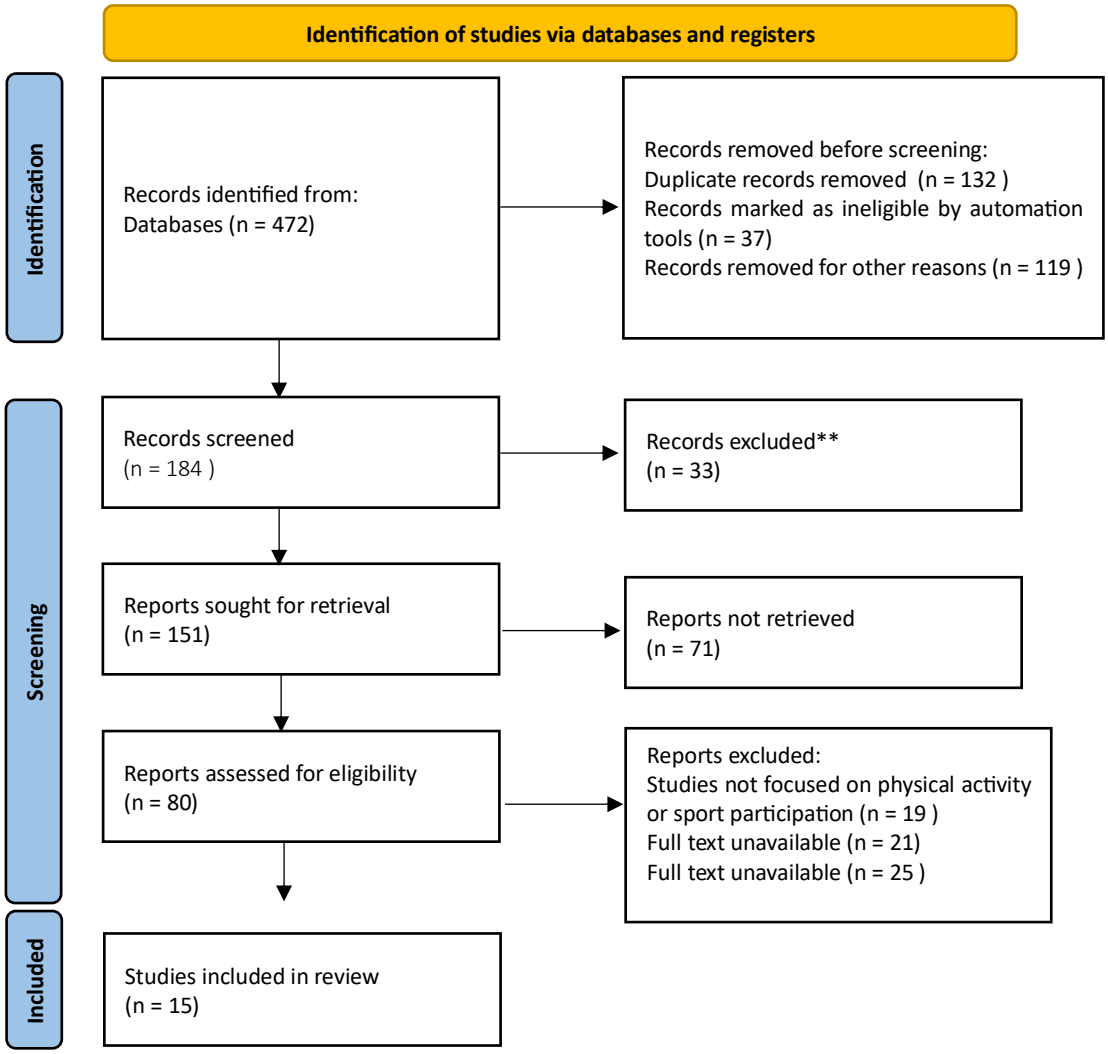


Figure 1. PRISMA Flowchart diagram of the study selection.

Intervention duration also varied substantially among studies. The shortest intervention lasted 3 weeks in the study by Stephens and Allen (2013), while the longest interventions lasted 6 months in the studies by Turner-McGrievy and Tate (2013) and Carson et al. (2025). Most interventions were conducted over periods ranging from 8 to 12 weeks, which represented the most common duration across the included studies.

Several different methods were used to assess physical activity outcomes and motivational variables. The International Physical Activity Questionnaire (IPAQ) was used in two studies, while accelerometry-based measurements were utilized in four studies. Other commonly used assessment methods included pedometers, smartphone tracking applications, activity logs, online questionnaires, self-report surveys, and accelerometer-based movement analysis. In addition, some studies assessed exercise adherence, social support, and motivational outcomes using validated behavioral and psychological questionnaires.

Overall, the majority of included studies reported positive effects of social media-based interventions on physical activity participation and exercise motivation. Fourteen of the fifteen studies demonstrated statistically significant improvements in at least one physical activity-related outcome, including increased MVPA, daily step counts, exercise adherence, or exercise motivation. Only one study (Cavallo et al., 2012) reported no statistically significant improvement in physical activity levels, although improvements in social support were observed. No studies reported statistically significant negative effects of social media interventions on physical activity participation.

The Methodological Quality Assessment of the Included Studies

The methodological quality of the included studies was assessed using the Physiotherapy Evidence Database (PEDro) scale and is presented in Table 3. PEDro scores of the included studies ranged from 5 to 8 points, indicating overall moderate to high methodological quality. The majority of studies achieved scores between 7 and 8 points, suggesting generally acceptable methodological rigor among the included randomized and controlled trials. Higher PEDro scores were primarily observed in studies that reported clear randomization procedures, baseline comparability between groups, appropriate statistical analyses, and adequate reporting of outcome measures. In contrast, lower methodological scores were mainly associated with the absence of blinding procedures, particularly blinding of participants, therapists, and assessors. Such limitations are common in physical activity and social media-based interventions due to the practical difficulty of concealing intervention allocation in behavioral research.

Most studies demonstrated appropriate between-group statistical comparisons and reported point estimates together with measures of variability. In addition, intention-to-treat analysis and adequate follow-up procedures were reported in several studies, further strengthening the methodological quality of the included evidence. Among the included studies, Pagoto et al. (2016) achieved the lowest PEDro score (5 points), primarily due to its observational design and limited methodological control. Conversely, several randomized controlled trials, including Cavallo et al. (2012), Maher et al. (2015), Direito et al. (2015), Edney et al. (2020), and Carson et al. (2025), achieved the highest PEDro scores (8 points), reflecting stronger

methodological quality and reduced risk of bias. Overall, the findings suggest that the available evidence regarding social media-based interventions and physical activity outcomes is supported by studies of generally moderate to high methodological quality.

Table 2. Evidence Database (PEDro) score of the included studies.

Reference	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	Total
Cavallo et al. (2012)	+	+	+	+	−	−	+	−	+	+	+	**8**
Maher et al. (2015)	+	+	+	+	−	−	+	−	+	+	+	**8**
Valle et al. (2013)	+	+	−	+	−	−	+	−	+	+	+	**7**
Turner-McGrievy et al. (2013)	+	+	+	+	−	−	+	−	+	+	+	**8**
Joseph et al. (2015)	+	−	−	+	−	−	+	−	+	+	+	**6**
Direito et al. (2015)	+	+	+	+	−	−	+	−	+	+	+	**8**
Fukuoka et al. (2015)	+	+	+	+	−	−	+	−	+	+	+	**8**
Hebden et al. (2014)	+	+	−	+	−	−	+	−	+	+	+	**7**
Wójcicki et al. (2014)	+	+	+	+	−	−	+	−	+	+	+	**8**
Looyestyn et al. (2018)	+	+	+	+	−	−	+	−	+	+	+	**8**
Edney et al. (2020)	+	+	+	+	−	−	+	−	+	+	+	**8**
Kim & Glanz (2013)	+	−	−	+	−	−	+	−	+	+	+	**6**
Hansen et al. (2012)	+	+	+	+	−	−	+	−	+	+	+	**8**
Pagoto et al. (2016)	+	−	−	−	−	−	+	−	+	+	+	**5**
Carson et al. (2025)	+	+	+	+	−	−	+	−	+	+	+	**8**

PEDro criteria: (1) eligibility criteria specified; (2) random allocation; (3) concealed allocation; (4) baseline comparability; (5) blinding of participants; (6) blinding of therapists; (7) blinding of assessors; (8) adequate follow-up (>85%); (9) intention-to-treat analysis; (10) between-group statistical comparisons; (11) point estimates and variability measures reported.

Discussion

This systematic review examined the influence of social media-based interventions on motivation for physical activity and sports participation, including 15 primary studies conducted between 2012 and 2025. Overall, the findings suggest that social media platforms can have a positive influence on physical activity levels and motivational outcomes, although the magnitude of effects varies depending on study design, population, and intervention characteristics. The majority of included studies reported improvements in at least one physical activity-related outcome, particularly MVPA, daily step counts, exercise adherence, and self-reported motivation. The dominance of Facebook-based interventions in the included studies indicates that earlier research primarily focused on established social networking platforms. Studies such as Cavallo et al. (2012) and Maher et al. (2015) demonstrated that Facebook-based interventions can improve social support and moderate-to-vigorous physical

activity, supporting the idea that online peer interaction plays a key role in behavior change. These findings are consistent with the broader literature suggesting that social support is a strong determinant of exercise adherence and long-term engagement in physical activity (Centola, 2013).

Similarly, more recent studies included in this review expanded beyond Facebook and incorporated mobile applications, hybrid platforms, and fitness tracking technologies. For example, Edney et al. (2020) and Direito et al. (2015) reported significant increases in daily steps and physical activity levels when social media features were combined with mobile tracking systems. This suggests that the integration of social networking functions with self-monitoring tools may enhance intrinsic motivation and behavioral adherence. The findings from this review are also consistent with intervention research showing that digital behavior change techniques such as goal setting, feedback, and gamification can positively influence exercise behavior (Michie et al., 2011). In particular, studies included in the present analysis that used multi-component interventions (e.g., Facebook + SMS or mobile apps) tended to report stronger effects on physical activity motivation compared to single-platform interventions. However, not all included studies demonstrated strong or consistent effects. For instance, Cavallo et al. (2012) reported no significant improvement in physical activity despite increased social support, suggesting that social engagement alone may not be sufficient to produce behavioral change. This aligns with previous evidence indicating that online interaction must be combined with structured behavioral strategies to effectively increase physical activity levels (Maher et al., 2015).

The heterogeneity of findings across studies may be explained by differences in population characteristics. Adolescents and young adults, who are highly active social media users, tended to show more pronounced motivational responses, as observed in studies such as Wójcicki et al. (2014) and Carson et al. (2025). In contrast, interventions targeting adults or overweight populations showed more variable outcomes, possibly due to differences in baseline motivation and exercise habits. Another important factor influencing outcomes is intervention duration. Short-term interventions (≤8 weeks) often reported immediate increases in engagement and motivation, whereas longer interventions showed more variable adherence over time. This suggests that maintaining long-term engagement remains a key challenge in digital physical activity interventions.

Measurement approaches also contributed to variability in findings. Studies using objective measures such as accelerometers and pedometers (e.g., Fukuoka et al., 2015; Edney et al., 2020) generally provided more reliable evidence of increased physical activity compared to self-reported measures, which may be subject to bias. This methodological difference is important when interpreting the strength of evidence across included studies. Overall, the results of this systematic review support the idea that social media can be an effective tool for increasing motivation for physical activity when combined with structured intervention components. However, the evidence also highlights that social media alone is not sufficient to sustain long-term behavioral change. Instead, successful interventions appear to be those that integrate social interaction, behavioral feedback, and self-monitoring mechanisms.

These findings are consistent with broader public health research emphasizing the importance of multi-component digital interventions in promoting physical activity (WHO, 2022). Furthermore, the inclusion of the recent 2025 study (Carson et al., 2025) strengthens the evidence that modern interventions combining mobile technology and social networking platforms may produce more robust motivational effects compared to earlier single-platform approaches. Despite promising findings, several limitations should be acknowledged. The included studies exhibited moderate heterogeneity in design, sample size, and outcome measurement, which limits direct comparability. Additionally, most studies were of short to medium duration, making it difficult to assess long-term sustainability of motivational effects. Future research should focus on standardizing intervention protocols and outcome measures, as well as exploring the long-term effects of social media-based physical activity interventions. Particular attention should be given to identifying which specific social media features (e.g., peer comparison, gamification, influencer engagement) are most effective in enhancing exercise motivation and sports participation.

This systematic review indicates that social media-based interventions have generally positive effects on physical activity motivation and participation, particularly when combined with behavioral support strategies. However, the variability in findings highlights the need for more high-quality, long-term randomized controlled trials to better understand the effectiveness of these interventions in different populations.

Limitations of the Study

Several limitations within this systematic review warrant careful consideration. First, the diverse nature of the included protocols—specifically regarding study design, participant demographics, program duration, and tracking metrics—prevented direct comparative evaluation or meta-analytical pooling. Additionally, a large share of the analyzed literature gathered data through self-report scales of physical activity and motivation, potentially introducing social desirability and recall inaccuracies. Lastly, most evaluated programs operated on brief timelines, with very few tracking subjects beyond 3 to 6 months. Consequently, drawing firm conclusions about the lasting habits formed through digital interventions remains challenging. Furthermore, the wide array of social media platforms and intervention components (such as custom mobile applications, Facebook groups, or blended formats) heightened the overall heterogeneity of the methodologies. The lack of blinding for participants and investigators—a common issue in behavioral trials—could also introduce bias into the reported results. Moreover, restricting the scope to peer-reviewed publications might introduce publication bias, favoring trials with statistically positive outcomes. Finally, because digital technology changes rapidly, older research findings may not fully reflect modern social platforms and shifting user behaviors.

Conclusion

This systematic review indicates that social media-based interventions generally have a positive influence on motivation for physical activity and sports participation. Most included studies reported improvements in behavioral and psychological outcomes such as exercise adherence, daily activity levels, and motivational factors. Facebook-based interventions were

the most frequently used approach, although more recent studies increasingly incorporated mobile applications and hybrid digital platforms.

The findings suggest that combining social interaction with behavioral change strategies such as feedback, goal setting, and self-monitoring may enhance the effectiveness of these interventions. However, the overall strength of evidence is moderated by variability in study design, population characteristics, and measurement tools. In addition, short intervention durations limit conclusions regarding long-term sustainability of observed effects.

Despite these limitations, the reviewed evidence supports the potential of social media as a cost-effective and accessible tool for promoting physical activity. Future research should focus on long-term randomized controlled trials and standardized outcome measures to improve comparability across studies. Particular attention should also be given to identifying which specific digital features are most effective in enhancing motivation and sustaining physical activity participation.

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Corresponding author: dalilapreljevic7@gmail.com

COMMUNICATION COMPETENCIES OF PHYSICAL AND HEALTH EDUCATION TEACHERS AS A FACTOR IN THE QUALITY OF THE TEACHING PROCESS

Šejla Ljajko Ahmetljerden[1], Dalila Preljević[2], Maja Vračar[2], Adem Preljević[2]

Abstract: *Teachers' communication competencies represent one of the fundamental components of teachers' professional competence and play a crucial role in ensuring the quality of the educational process, particularly in Physical and Health Education, where effective interaction and direct communication with students are essential. The aim of this study was to examine the importance of communication competencies of Physical and Health Education teachers as a determinant of teaching quality through a comprehensive review of relevant scientific literature. A narrative literature review was conducted using analysis, comparison, and synthesis of national and international studies addressing pedagogical communication, teacher competencies, and the specific characteristics of Physical and Health Education. The findings indicate that well-developed communication competencies significantly enhance teaching effectiveness by facilitating clearer knowledge transfer, improving classroom management, fostering a positive psychosocial climate, and increasing students' motivation for active participation. The analysis highlights the importance of verbal and nonverbal communication, constructive feedback, pedagogical sensitivity, and teachers' ability to adapt communication strategies to students' individual needs and developmental characteristics. Furthermore, effective communication contributes not only to improved educational outcomes but also to the promotion of positive attitudes toward physical activity, healthy lifestyles, and collaborative relationships within the school environment. The study concludes that communication competencies constitute a core element of professional teaching competence and should be continuously developed through both initial teacher education and lifelong professional development. Strengthening these competencies has the potential to improve teaching quality, student engagement, and the overall effectiveness of Physical and Health Education.*

Keywords: communication competencies, pedagogical communication, physical and health education teacher, student motivation, psychosocial climate, teaching quality.

[1] Primary School "5th October", Kruševo, Gora, Serbia
[2] State University of Novi Pazar, Serbia

Introduction

In the context of contemporary education, the teacher is recognized as one of the key factors influencing the quality, effectiveness, and outcomes of the educational process. Today, the teacher's role extends far beyond the mere transmission of teaching content and includes active participation in shaping students' personalities, attitudes, values, and approaches to learning (Darling-Hammond et al., 2020). In this complex process, the way a teacher communicates with students is of particular importance, as communication represents the fundamental means of achieving educational objectives.

Modern pedagogical and didactic perspectives indicate that the quality of teaching largely depends on the development of teachers' communication competencies (Šejtanić, 2019). Communication in teaching is not limited solely to the transfer of information; rather, it encompasses a wide spectrum of interactions that influence students' motivation, engagement, sense of security and belonging, as well as the formation of a positive psychosocial climate (Pianta, Hamre, & Allen, 2012). It is particularly important to emphasize that communication in the teaching process is realized through various forms, both verbal and nonverbal, which together contribute to understanding, encouragement, and guidance of students' behavior and activities.

Physical and Health Education, as a specific and dynamic teaching context, poses additional communication challenges for the teacher. Unlike classroom teaching, this form of teaching takes place in conditions of increased physical activity, movement, group work, and direct interaction, which require clear, timely, and appropriately adapted communication. In such an educational context, the teacher's role extends beyond a purely instructional function and includes continuous provision of feedback, fostering student motivation, and demonstrating pedagogical sensitivity toward students' individual abilities, needs, and emotional states. In such an educational context, the teacher's role goes beyond the mere instructional function and includes the continuous provision of feedback, the encouragement of student motivation, as well as the demonstration of pedagogical sensitivity toward their individual abilities, needs, and emotional states. Research indicates that the quality of teacher communication in Physical and Health Education significantly influences students' participation in activities, motivation, and the formation of positive attitudes toward physical activity and healthy lifestyles (Bailey, 2006; Chen et al., 2023).

In practice, significant differences can be observed in the ways Physical and Health Education teachers communicate with students, which directly affects the quality of the teaching process. While some teachers use communication solely as a means of control and discipline, others recognize it as an instrument for encouraging cooperation, trust, and active student participation. This difference in approach raises numerous pedagogical questions regarding the role of communication competencies in achieving educational objectives and their impact on students' overall experience in Physical and Health Education classes.

A question that naturally arises within this topic is how teachers' communication competencies contribute to improving the quality of the teaching process and to what extent

they influence student motivation, their attitudes toward physical activity, and the development of a positive classroom climate. In other words, the dilemma emerges as to whether effective Physical and Health Education can be achieved without well-developed pedagogical communication and to what extent communication represents a key prerequisite for successful teaching practice. Despite the importance of teachers' communication competencies, which has been confirmed in numerous pedagogical and psychological studies, it can be observed that existing knowledge is most often focused on the general context of teaching, while the specific characteristics of communication in Physical and Health Education are significantly less represented in the scientific literature. Existing research mainly addresses individual aspects of communication, such as feedback, student motivation, or classroom management, whereas studies that comprehensively examine teachers' communication competencies in Physical and Health Education as a factor in the quality of the teaching process are relatively scarce. This theoretical gap serves as the starting point for this paper.

Based on these considerations, the aim of this paper is to examine, through a theoretical analysis of relevant pedagogical and didactic literature, the importance of communication competencies of Physical and Health Education teachers as one of the key factors in the quality of the teaching process, with particular emphasis on their role in creating a stimulating, safe, and motivational learning environment.

Theoretical Consideration of the Significance and Definition of Communication Competencies in the Context of Physical and Health Education

In contemporary education, pedagogical communication represents a fundamental element of an effective teaching process, given that the quality of teacher–student interaction directly influences student motivation, engagement, and achievement. Through communication, teachers not only convey instructional content but also shape the psychosocial atmosphere in the classroom, encourage critical thinking, and develop students' social competencies (Šejtanić, 2019). In Physical and Health Education, the importance of this aspect is particularly pronounced, as the activities involved are interactive and require constant dialogue and feedback—whether verbal or nonverbal—in order to ensure safety, correct performance of exercises, and the development of healthy lifestyle habits (Vasileva, 2015).

The concept of competence was first mentioned in the journal *American Psychologist* in 1973 and was introduced by the American psychologist David McClelland. Dell Hymes (1966) was among the first authors to systematically approach this concept, emphasizing that communicative competence encompasses more than linguistic knowledge—it also includes social appropriateness within a specific context.

In this regard, Blašková (2011:108) defines competencies as "the set of all key professional and personal skills, talents, and behavioral patterns that an individual needs in order to successfully fulfill defined professional goals and duties."

Teachers' communication competencies can be defined as an integrated set of knowledge, skills, and affective abilities that contribute to effective, purposeful, and developmentally supportive interaction (Trivunović, 2017). They primarily include the ability to convey instructional content clearly and in an adapted manner, active listening, assertive expression,

empathy, adaptation to students' individual needs, and ethical conduct in all situations. For this reason, communication competencies are increasingly highlighted as one of the most significant professional aspects that directly influence the quality of teaching, the psychosocial climate in the classroom, and the holistic development of students.

In Physical and Health Education, communication competencies enable teachers to effectively manage group dynamics, motivate students to actively participate in physical activities, and ensure a safe and stimulating learning environment. These competencies include the ability to clearly convey content, use adaptable speech, and employ nonverbal signals that encourage active participation and the development of healthy habits among students (Chen et al., 2023).

Furthermore, effective classroom communication involves not only the transmission of information but also the creation of a supportive learning environment. The personality of a Physical Education teacher does not fundamentally differ from that of other educational professionals; however, the specific nature of their work arises from the particular characteristics of teaching and extracurricular activities. Understanding one's own role and pedagogical competencies enables the teacher to effectively direct their work, motivate students, and achieve established goals. One of the most important characteristics of a teacher is the ability to convey knowledge and instructions clearly and comprehensibly, using speech, gestures, facial expressions, graphic representations, teaching aids, and controlled body movements. Quality communication with students, as well as motivating messages that encourage activity beyond Physical Education classes, have a determining influence on students' motivation, engagement, and achievement (Martinović & Branković, 2012).

Teachers' communication competencies are closely related to the effectiveness of the teaching process. Well-developed competencies ensure that teachers provide clear instructions, respond appropriately to individual student needs, motivate students to actively participate, and offer an adequate level of feedback (Zlatić, 2022). In the context of Physical Education, this includes not only the transmission of knowledge about techniques and proper exercise performance but also fostering students' self-confidence, developing self-discipline, and promoting ethical behavior in sports. In Physical and Health Education, effective communication enables a better understanding of the importance of healthy lifestyles and encourages students to apply learned principles in everyday life (Šejtanić, 2019).

Teachers' communication competencies represent an integral part of professional identity and expertise, and their implementation in Physical and Health Education directly influences the quality of the teaching process and student development. The development of these competencies requires continuous professional training, self-evaluation, and adaptation to contemporary pedagogical and technological demands of schools in order to ensure interactive, motivating, and safe environments for students' learning and personal growth.

Based on the aforementioned theoretical definitions of teachers' communication competencies, it is clear that their importance does not remain at the level of definitions but achieves its full value only in concrete teaching situations. In this sense, the way teachers apply their communication knowledge and skills in practice is reflected through various types

and styles of communication they use in working with students, particularly within the specific conditions of Physical and Health Education classes.

Despite differences in their theoretical foundations, all of the aforementioned approaches define communication competence as a complex and multidimensional construct that, in addition to the transmission of information, encompasses the social, emotional, and professional aspects of interaction that are relevant to the successful implementation of the teaching process.

However, it can be observed that most existing conceptualizations have been developed at a general level and do not sufficiently take into account the specific characteristics of particular subject areas. This is especially evident in physical and health education, which differs from most school subjects in terms of both its organization and content.

Specifically, physical and health education is conducted within a unique environment characterized by intensive interaction between teachers and students, the demonstration of motor tasks, the continuous provision of feedback, the management of group dynamics, and the maintenance of student safety during physical activities. In such circumstances, communication competencies extend beyond the boundaries of clear and effective verbal expression and include the ability to appropriately employ nonverbal forms of communication, motivate students to participate actively, adapt communication to their individual characteristics and needs, and create a positive socio-emotional climate that fosters learning, cooperation, and students' personal development.

Building upon these theoretical considerations, it may be argued that an integrative approach to communication competencies provides the most comprehensive understanding of their role in physical and health education. This approach integrates the sociocultural dimension of communication, the professional requirements of the teaching profession, and the specific features of the educational context, thereby offering a more comprehensive framework for understanding communication processes in teaching. At the same time, it enables communication competencies to be viewed not only as a means of transmitting information but also as an important factor in achieving educational, developmental, and health-related objectives, fostering a positive classroom climate, and encouraging students' active participation in the teaching and learning process.

Verbal and Nonverbal Communication of Physical and Health Education Teachers

In Physical and Health Education classes, it is particularly important to establish high-quality and open communication between teachers and students, as the teaching process takes place under specific conditions that involve constant interaction, cooperation, and direct contact. Through various forms of communication, teachers operationalize their communication competencies and adapt them to the dynamics of the teaching process, the students' age, and the requirements of the instructional content. Students more easily develop motivation and a sense of security when they perceive the teacher as someone who genuinely cares about their physical, emotional, and social development. The most effective communication is achieved in an atmosphere of mutual trust, when the teacher actively participates in both

curricular and extracurricular activities as an equal member of the group, rather than exclusively as a transmitter of information (Šejtanić, 2016).

The most important component of a teacher's professional qualities is the ability to communicate with students, as the success of teaching partly depends on the quality of interaction with them. Every exercise represents a specific form of interaction between teacher and students, which must be adapted to the students' age, abilities, and current physical and psychological condition. Effective communication requires clear, concise, and understandable expression, logically structured information, and the possibility of two-way exchange between teacher and students.

Within pedagogical communication in Physical and Health Education, particular importance is given to forms of communication which enable direct interaction between teacher and students during dynamic and practical activities. Considering various types and styles of communication, it becomes evident that their implementation in teaching practice is primarily manifested through verbal and nonverbal communication. The manner in which teachers use verbal and nonverbal signals directly affects the understanding of instructional content, student motivation, and the quality of socio-emotional relationships within the class. Therefore, the analysis of verbal and nonverbal communication is of particular importance for understanding effective pedagogical communication in the teaching process.

Verbal communication in this context refers to the use of spoken and written language for educational purposes during Physical and Health Education classes. Effective verbal communication requires the teacher's ability to express themselves clearly, precisely, and appropriately, as well as to practice active listening and provide meaningful feedback. A teacher who possesses these skills can structure instructional content in an accessible manner, encourage critical thinking, ask targeted questions, and motivate students to actively participate in exercises and games (Sophia, Rustandi, & Sugiarto, 2024). Such communication contributes to a better understanding of techniques, correct task performance, and the development of trust in both the classroom and the gymnasium.

However, in the dynamic environment of Physical and Health Education, words alone are often insufficient to ensure complete understanding and effective task performance. In such situations, nonverbal communication assumes a key role, complementing verbal messages through facial expressions, gestures, tone of voice, body posture, and movement. This enables students to immediately recognize the correct way to perform exercises and to interpret the teacher's reactions to their activities. Nonverbal communication refers to the transmission of messages without words, whether intentional or unintentional. It complements or substitutes verbal communication and is used to express emotions, demonstrate attitudes, reflect personality traits, and reinforce or modify verbal messages. In other words, it involves conveying messages through means other than spoken language. A teacher who consciously uses nonverbal signals can direct students' attention, correct body posture and exercise technique, while simultaneously maintaining discipline and safety (Radenčić, 2013). In practical terms, nonverbal communication represents a key mechanism through which the teacher demonstrates movements and techniques, provides encouragement and correction without interrupting activities, thereby increasing the efficiency of the teaching process.

In the teaching process of Physical and Health Education, the alignment of verbal and nonverbal elements of communication is particularly important. When words and nonverbal cues function synchronously, the teacher's communication gains authenticity and persuasiveness, and students feel greater security and motivation to participate in sports activities. In contrast, inconsistency between verbal instructions and nonverbal signals may lead to confusion, reduce students' trust, and negatively affect the quality of task performance (Šejtanić, 2019). It follows that the integration of verbal and nonverbal communication represents a prerequisite for effective Physical and Health Education teaching, as it enables students to properly understand instructions, correctly perform exercises, and develop self-confidence in mastering motor and health-related competencies.

From this discussion, it can be concluded that the effective integration of verbal and nonverbal communication is not merely a technical aspect of teaching, but a key factor influencing students' perceptions, motivation, and achievement in Physical and Health Education.

Although verbal and nonverbal communication are interconnected and complementary, the specific characteristics of physical and health education highlight the particular importance of nonverbal communication. Unlike most school subjects, in which instructional content is primarily conveyed through speech, students in physical and health education acquire a substantial portion of information through the observation of movements, demonstrations, and the visual presentation of activities. Consequently, the effectiveness of teacher communication cannot be assessed solely on the basis of the clarity of verbal instructions, but also in terms of the teacher's ability to facilitate understanding, motivation, and the safe performance of motor activities through the appropriate use of nonverbal cues.

The significance of communication in teaching is reflected not only in its functional role during the implementation of instructional activities but also in the way it is perceived and evaluated by students. Students' perceptions of teacher communication represent an important indicator of its effectiveness, as they influence students' motivation, engagement, and attitudes toward both the teaching process and participation in physical activity.

Student Perception and the Effectiveness of Teacher Communication

Students' perception of their teacher represents one of the key indicators of the effectiveness of the teaching process, as it directly influences their motivation, engagement, and achievement. In the context of Physical and Health Education, the way a teacher communicates—through verbal instructions, nonverbal cues, and overall approach—plays a particularly significant role in shaping students' attitudes toward the subject, as well as their willingness to actively participate in curricular and extracurricular physical activities.

When considering the teacher's personality, it is important to emphasize that the way a teacher presents themselves and communicates with their environment significantly influences the relationships they establish with students, colleagues, and superiors. Students' perception of the teacher is often transferred to their attitude toward the subject itself; thus, a positive perception of the teacher can contribute to the development of interest and motivation for learning. In this context, students particularly value teachers who are able to connect instructional content with their own experiences, show understanding for their

feelings and needs, use appropriate humor, maintain a professional appearance, and cultivate an atmosphere of mutual trust and respect. Flexibility, spontaneity, and genuine enjoyment in the teaching process further contribute to students' positive perception of both the teacher and the subject as a whole.

From the students' perspective, an important segment of teacher communication also relates to classroom management. Clearly formulated expectations, encouragement of mutual interaction, the establishment and consistent implementation of rules of conduct, as well as stability and predictability in managing the teaching process, contribute to students' sense of security and trust (Stronge, 2007). When students perceive the teacher's actions as fair and consistent, a more positive perception of the teacher's communication develops, which is reflected in their behavior and engagement in class.

Based on these considerations, it can be observed that the teacher's personality, communication style, and approach to classroom management do not operate in isolation; rather, they represent interconnected factors that collectively shape students' overall experience in the learning process. The way a teacher communicates, sets expectations, and builds relationships with students directly influences their perception of the teacher, as well as the formation of attitudes toward teaching, learning, and school in general. For this reason, contemporary pedagogical research increasingly focuses on examining the characteristics of successful teachers and the ways in which they are perceived by students.

Regarding the characteristics of successful teachers, previous research highlights the importance of further study in this area. It has been shown that students' attitudes toward learning, teaching, and school, as well as their academic achievement, are associated with the way they perceive teachers' personal qualities (Đigić, 2013). Numerous authors emphasize that positive experiences in Physical Education classes can contribute to the adoption of physical activity as an integral part of students' lifestyles in adulthood (Sallis & McKenzie, 1991).

Research in the field of Physical Education indicates that teacher behavior significantly influences students' attitudes, both positively and negatively. Students who have had positive experiences with their Physical Education teacher are more likely to express favorable attitudes toward the subject and greater willingness to participate in instructional activities (Subramaniam & Silverman, 1999).

From the students' perspective, the effectiveness of teacher communication is not reflected solely in the transmission of teaching content, but primarily in the way the teacher builds

relationships and shapes students' experiences in Physical and Health Education classes. Students' perceptions of teachers' communication practices, personal qualities, and behavior in the teaching process significantly influence their motivation, sense of security, engagement, and attitudes toward the subject. When students perceive teacher communication as supportive, clear, and fair, they develop a more positive attitude toward teaching and physical activity in general, which may have long-term effects on their educational and life habits. Therefore, student perception can be considered a key indicator of the quality of teacher

communication and one of the essential prerequisites for effective Physical and Health Education teaching.

Challenges and Obstacles in Physical and Health Education Teaching

Communication of Physical and Health Education teachers takes place within a specific instructional context characterized by dynamic activities, outdoor work, increased noise levels, and the simultaneous engagement of a large number of students. In such conditions, teachers face numerous challenges that may hinder the effective transmission of information and the establishment of quality interaction with students. Limited spatial and time conditions, varying levels of students' motor abilities, and the need to simultaneously monitor safety and activity represent significant obstacles to achieving clear and consistent teacher communication.

One frequent challenge relates to adapting communication to students' individual characteristics. Differences in motivation, interests, physical abilities, and self-confidence may influence how students perceive and interpret teachers' verbal and nonverbal messages. If communication is not sufficiently adapted, misunderstandings may arise, student engagement may decrease, or negative attitudes toward the subject may develop (Xie & Derakhshan, 2021).

In analyzing the work of Physical Education teachers, it is particularly important to consider the possibility of misunderstandings between teachers and students during activities. Misunderstandings may occur with an individual student, a group, or the entire class. Differences in physical abilities, motivation, and self-confidence may affect how students interpret teachers' instructions and feedback. A Physical Education teacher must not allow such conflicts to escalate into hostility but must ensure productive and supportive communication with students. Escalating misunderstandings can significantly jeopardize the teaching process, student safety, and trust within the teacher–student relationship (Martinović & Branković, 2012).

Managing student behavior during Physical and Health Education classes also represents a particular challenge. Increased levels of activity, competitive spirit, and emotional involvement may lead to conflicts, rule violations, or reduced concentration. In such circumstances, the teacher must apply clear, consistent, and calm communication in order to maintain discipline while preserving a supportive learning atmosphere (Cothran, Kulinna, & Garrahy, 2009).

Communication challenges may also arise from organizational and materialistic conditions in which teaching is implemented. Insufficient equipment, large class sizes, and limited school resources may affect the quality of interaction between teachers and students. These factors often require a high level of flexibility and creativity in adapting communication strategies to specific working conditions. In such circumstances, the teacher must effectively convey instructions, maintain order and discipline, and ensure that every student is included in activities. Research indicates that large numbers of students and limited equipment reduce learning time and student activity while increasing the teacher's organizational workload,

which may negatively affect the quality of teaching communication and student engagement (Dyson & Casey, 2007).

Considering these aspects, it can be concluded that the challenges and obstacles in Physical and Health Education stem from the complexity of the teaching context, diverse student characteristics, organizational and material school conditions, and potential interpersonal conflicts. Overcoming these challenges requires the development of effective communication competencies, the application of adaptive and strategic communication approaches, continuous professional development, and awareness of the importance of adapting instructional interaction to students' needs, abilities, and motivation. Effective communication in this context is essential for maintaining safety, motivating students, and encouraging their active participation in instructional activities.

Methods

This paper represents a theoretical and analytical review of relevant pedagogical, didactic, and interdisciplinary literature addressing teachers' communication competencies and their significance for the quality of the teaching process, with particular reference to Physical and Health Education as a specific teaching context.

The methodological approach is based on descriptive and comparative analysis of scientific sources, with the aim of identifying fundamental theoretical perspectives on communication in teaching and highlighting key dimensions of teachers' communication competencies that are particularly significant in Physical and Health Education. The analysis included domestic and international scientific papers, monographs, doctoral dissertations, and relevant publications in the fields of pedagogy, educational psychology, communication studies, and sports pedagogy.

The selection of literature was guided by criteria of scientific relevance, timeliness, and thematic connection with the research subject. Particular attention was given to sources addressing pedagogical communication, verbal and nonverbal interaction in teaching, student motivation, psychosocial climate, classroom management, and the specific characteristics of Physical and Health Education.

The analysis involved procedures of identification, classification, and synthesis of key concepts and findings. The first step included defining the conceptual framework of teachers' communication competencies and positioning them theoretically within contemporary pedagogical approaches. The second step involved examining the specific characteristics of Physical and Health Education as an interactive and dynamic environment in which communication plays a pronounced functional and educational role. The third step encompassed analyzing the relationship between teacher communication, student motivation, and the quality of the teaching process, as well as considering challenges that may limit communication effectiveness in practice.

Based on the synthesis of relevant theoretical and research findings, conclusions were drawn emphasizing the importance of communication competencies of Physical and Health Education teachers as one of the fundamental factors of teaching quality, the development of

a positive psychosocial climate, and the formation of lasting student attitudes toward physical activity and healthy lifestyle habits.

The results of the theoretical analysis indicate that teachers' communication competencies represent one of the central professional determinants of successful teaching, particularly in the context of Physical and Health Education, where interaction, cooperation, and direct communication are indispensable elements of teaching. Unlike traditional classroom teaching, in which communication is often primarily directed toward verbal explanation and control of cognitive activities, Physical and Health Education takes place in conditions of increased dynamics, group activity, and the need for constant adaptation of teachers' instructions to specific situations.

In such a context, teacher communication is not merely a means of transmitting information but also serves to organize activities, manage group dynamics, motivate students, and ensure safety during the performance of motor tasks. For this reason, a competent Physical and Health Education teacher must possess well-developed skills of clear and timely instructional speech, as well as the ability to use nonverbal means—such as demonstrating movements, gestures, facial expressions, body posture, and eye contact—to guide students and correct task performance. Alignment between verbal and nonverbal messages enhances the authenticity of the teacher's performance and strengthens students' trust, whereas inconsistency may lead to confusion, insecurity, and reduced engagement.

A particularly significant aspect of teacher communication concerns feedback. In Physical and Health Education, feedback has a dual role: on the one hand, it serves as a tool for correcting motor activities and exercise techniques; on the other hand, it has a strong motivational and educational effect. Constructive, supportive, and progress-oriented feedback can foster students' self-confidence and positive attitudes toward physical activity. Conversely, feedback that is unclear, unfair, or directed at the student's personality rather than performance may reduce motivation, lead to avoidance of participation, and contribute to negative attitudes toward the subject.

Student motivation in Physical and Health Education is especially sensitive, as students often differ in motor abilities, physical fitness, and self-confidence. In this regard, teachers' communication competencies play a crucial role in creating an inclusive and supportive environment in which students are not evaluated solely based on results or athletic success, but on personal progress and effort. Contemporary pedagogical perspectives emphasize the importance of developing a motivational climate that encourages cooperation, self-regulation, and intrinsic motivation, rather than focusing exclusively on competition and external rewards.

Additionally, students' perception of the teacher and their communication has proven to be a significant mediating factor in the quality of the teaching process. Teachers who are communicative, fair, consistent, and empathetic are more likely to be perceived as supportive in students' learning and personal development, contributing to greater engagement and more positive attitudes toward instruction. This is particularly important in Physical and Health Education, where learning often occurs through practical activities that involve public

performance, the possibility of making mistakes, and fear of failure or peer ridicule. A teacher who demonstrates pedagogical sensitivity and communication maturity can significantly reduce these negative aspects by creating an atmosphere in which mistakes are accepted as part of the learning process.

Despite the recognized importance of communication competencies, practice shows that numerous obstacles may limit their effective application. Organizational conditions such as large class sizes, insufficient equipment, limited space and time, and increased noise levels may restrict opportunities for individualized communication. In such circumstances, teachers are often compelled to simplify communication and focus primarily on control and discipline, which may reduce the educational potential of class and weaken student motivation.

Based on the above, it can be concluded that the communication competencies of Physical and Health Education teachers represent not only an important pedagogical resource but also a factor that mediates between teachers' professional expertise and the actual outcomes of the teaching process. They enable teachers to make class content understandable, organize activities safely and efficiently, provide students with support and motivation, and develop a positive psychosocial climate within the group. In this regard, continuous professional development in the field of communication, the cultivation of reflective practice, and the adoption of contemporary communication strategies can contribute to improving the quality of Physical and Health Education teaching and fostering lasting positive attitudes toward physical activity and healthy lifestyles among students.

Although most authors emphasize the importance of a supportive and collaborative motivational climate, the literature does not provide complete consensus regarding how a balance between cooperative and competitive activities should be established in physical and health education. While some authors highlight the value of cooperative learning and students' personal improvement, others argue that moderate competition can serve as an important source of motivation and engagement. This suggests that teachers should adapt their communication strategies to the specific instructional context and the characteristics of their students.

Conclusion

Based on the analysis of the relevant literature, it can be concluded that teachers' communication competencies represent one of the key factors influencing the quality of the teaching process in physical and health education. Their importance is reflected not only in the effective transmission of instructional content but also in the establishment of a supportive learning environment, the motivation of students, the development of positive interpersonal relationships, and the creation of conditions that encourage students' active participation in the teaching and learning process.

The specific characteristics of physical and health education, manifested through direct teacher–student interaction, the demonstration of motor activities, the continuous provision of feedback, and the maintenance of safety during instruction, highlight the particular importance of communication competencies within this educational domain. The effective integration of verbal and nonverbal communication facilitates a clearer understanding of

instructional requirements, the proper execution of activities, the development of students' motivation and self-confidence, and the establishment of a positive socio-emotional climate.

The literature further indicates that students perceive teaching more positively and demonstrate higher levels of engagement when they view their teachers' communication as clear, supportive, fair, and responsive to their needs. In this regard, communication competencies may be considered an integrative factor that connects the professional, pedagogical, and social dimensions of the work of physical and health education teachers.

Accordingly, it can be concluded that the continuous development of communication competencies constitutes an important prerequisite for improving the quality of physical and health education. Therefore, greater attention should be devoted to the development of these competencies both within initial teacher education programs and through various forms of continuing professional development and lifelong learning.

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Corresponding author: mihailo.vranic7@gmail.com

A COMPARATIVE ANALYSIS OF SYNERGY SPORTS AND HUDL SOFTWARE IN BASKETBALL SCOUTING

Mihailo Vranić[1], Ivana Parčina[1]

Abstract

This paper examines the transformative role of video analytics in modern basketball through a comprehensive qualitative analysis of two leading software solutions Synergy Sports and Hudl. Employing a qualitative-descriptive methodology, the study evaluates both technical and methodological dimensions, including interface design and user experience, availability and customer support, as well as training and competitive applicability. Particular emphasis is placed on the pedagogical and tactical implications, exploring the extent to which such tools redefine preparation, decision-making, and performance evaluation in sports. The analysis reveals that Synergy Sports offers highly sophisticated functionalities tailored for professional leagues and elite competition, whereas Hudl, due to its flexibility and accessibility, occupies a central role in educational and amateur contexts. A SWOT analysis further highlights their strengths and weaknesses, pointing to distinct strategic niches where each system achieves maximum impact. The conclusions suggest that video analytics, while technologically mediated, does not substitute coaching intuition; rather, it expands the boundaries of tactical reasoning and introduces a new epistemology of sporting knowledge.

Keywords: video analytics, performance analysis, coaching practice, sports pedagogy

[1] Faculty of Sport, University "Union – Nikola Tesla", Belgrade, Serbia

Introduction

In contemporary sport, technological solutions play an increasingly significant role in shaping training and competitive processes (Yin et al., 2024). One of the most dynamic and influential components of this transformation is video analytics, a multidisciplinary tool that integrates sports practice, computer science, and artificial intelligence with the aim of enhancing the performance of athletes and teams. Video analytics is no longer a luxury reserved exclusively for elite clubs; rather, it has become an integral part of everyday sports practice at both professional and amateur levels.

The era of digital transformation in sport represents a period in which video analytics has become an indispensable tool for coaches, analysts, and sports organizations. Rapid advances in information technologies, particularly in the fields of artificial intelligence and computer vision, have enabled detailed and efficient analyses of sporting events (Yin et al., 2024). Recent developments in deep learning have considerably improved the accuracy of automated sports video analysis, particularly in player tracking and event recognition systems (Rangasamy, As'ari, Rahmad, Ghazali, & Ismail, 2020).

In basketball, a sport characterized by a high frequency of tactical decisions, visual complexity, and exceptional game speed, video analysis assumes particular importance (Jarraya et al., 2019). As an inherently dynamic and tactically rich sport, basketball benefits substantially from such technological innovations. Software platforms such as Synergy Sports and Hudl have fundamentally shifted the paradigm of game analysis, moving it from intuition-based observation toward data-driven insight. Adaptive AI systems increasingly contribute to this transformation through real-time analytical capabilities that support dynamic interpretation and decision-making processes in sport environments (Pu et al., 2024).

The integration of video analytics into the training process allows coaches to more precisely identify technical and tactical errors, tailor individualized approaches to athletes, and enhance team cohesion (Huang et al., 2024). Through features such as replay, action segmentation, and performance quantification, video analysis becomes a key tool for optimizing the training process. Furthermore, it enables athletes to better understand their own performance, as well as the behavior of opponents, through visual learning, thereby increasing preparedness and competitive intelligence. Beyond its practical application, video analytics also contributes to a transformation of roles within the sports system: analysts occupy increasingly prominent positions within coaching staffs, while decision-making processes rely on data more than ever before. In this context, sports organizations that successfully integrate analytical solutions into their operations gain a competitive advantage and adopt professional standards aligned with contemporary technological developments.

Within the broader process of digital transformation in sport, the subject of this research is the application of contemporary video analytics software in basketball performance analysis, with particular emphasis on the platforms Synergy Sports and Hudl. The research problem emerges from the need to critically examine how different technological solutions structure analytical processes, influence coaching practice, and shape tactical interpretation within

modern basketball environments. Accordingly, the aim of this paper is to comparatively analyze these two systems by evaluating their methodological foundations, technical functionalities, and pedagogical implications, while identifying their respective advantages, limitations, and potential complementary value. By situating this analysis within the current paradigm of data-driven sport, the study seeks to contribute to a clearer understanding of how digital analytical tools redefine performance evaluation and strategic decision-making in contemporary basketball practice.

Definition of the Theoretical Framework

The theoretical foundation of this study is grounded in established research on performance analysis and the pedagogical use of video in sport. Hughes and Franks (2004) emphasized the importance of systematic notational analysis as a basis for objective performance evaluation, highlighting the transition from subjective observation to structured analytical models. Their work laid the methodological groundwork for contemporary video-based performance systems.

Further research by Carling, Reilly, and Williams (2008) demonstrated that visual feedback enhances athletes' tactical awareness and supports learning processes in dynamic team sports. Video technologies are increasingly integrated into coach education and sport pedagogy, supporting reflective learning processes and enhancing coaches' ability to interpret and communicate performance information within applied coaching environments (Nelson et al., 2014; Taylor et al., 2017).

The broader technological evolution of sports analytics has been examined by Yin et al. (2024), who describe the integration of artificial intelligence and automated recognition models in video-based systems for team sports. These developments have enabled more efficient data processing and expanded the analytical depth available to coaching staff. In parallel, Wright, Atkins, and Jones (2013) documented the increasing institutionalization of performance analysts within elite sport organizations, reinforcing the structural significance of analytical technologies in contemporary coaching practice.

Collectively, these theoretical perspectives provide the conceptual framework for understanding how platforms such as Synergy Sports and Hudl operate within modern basketball environments.

Methodology

Modern sport increasingly relies on technology to improve game quality, decision-making, and athlete development. Video analytics, as one of the most significant tools within this transformation, enables a deeper understanding of the game through visual and statistical insights. Software solutions are particularly relevant in basketball, where speed, tactical complexity, and the need for precise analysis are especially pronounced. Within this context, understanding how these tools function and the extent to which they contribute to the sports process is essential.

This study employs a qualitative comparative research design grounded in structured SWOT evaluation and professional experiential analysis. Rather than applying statistical or inferential procedures, the research systematically compares Synergy Sports and Hudl across predefined

analytical dimensions, including interface design, analytical depth, training applicability, and user support. The comparative framework is therefore descriptive–analytical in nature, focusing on structural, functional, and pedagogical differences between the two platforms. Evaluating their contribution to match preparation, performance analysis, and tactical decision-making was the primary focus of the study.

The analysis included:

- An overview of the functionalities of Synergy Sports and Hudl based on available technical documentation, official sources, and practical examples from sports practice.
- A review of their application in basketball contexts through the examination of specific matches and training processes in which these tools were used (where video and statistical materials were available).
- A comparative analysis of key software features, including tagging and clipping capabilities, automated statistical generation, tactical visualization, and user interface design.
- An analysis of practical examples from clubs utilizing video analytics, with a particular focus on their impact on coaching decision-making.

The study was limited to available secondary sources and practical materials that were publicly accessible or provided by sports professionals through project activities or expert collaboration. Conclusions were drawn based on descriptive interpretation, analytical comparison, and critical reflection on the opportunities and challenges associated with the use of video analytics in modern basketball.

Comparative Analysis of Synergy Sports and Hudl in the Context of Basketball

In contemporary training environments, the selection of an appropriate game-analysis software system has become an increasingly important decision for coaching and analytical staff. Two dominant solutions frequently compared in basketball contexts are Synergy Sports and Hudl. Both widely used, yet based on distinct analytical philosophies and technical approaches. One of the persistent challenges within sports video analytics is the lack of standardization between different analytical systems, which often complicates the comparability and interpretation of performance data across platforms (Moreno, Garcia, & Chacon, 2023). While Synergy is known for its systematic and deeply structured analysis of team tactics, Hudl places greater emphasis on simplicity, visualization, and rapid content personalization, with a strong focus on individual athlete development. The present evaluation and SWOT analysis are grounded in professional experience derived from daily operational use of the Synergy platform, where similar analytical procedures are routinely conducted within the broader framework of video analytics and contemporary performance technologies.

At its core, Synergy software is designed as an analytical platform offering highly standardized game processing based on precisely logged possession sequences. This structure allows coaches to search, filter, and compare specific tactical patterns with exceptional accuracy. The

software enables automated filtering of various game aspects, from reviewing all pick-and-roll situations against a specific defensive scheme to analyzing shot attempts from particular court zones across different time intervals. Such in-depth processing extends beyond technical parameters to include strategic patterns, making Synergy particularly suitable for professional and collegiate teams that rely on detailed preparation and advanced decision-making methodologies (Synergy Sports, 2023).

Conversely, Hudl positions itself as a solution built on accessibility, flexibility, and visual intuitiveness. Rather than rigid systematization, Hudl offers a fluid and user-friendly interface that allows coaches and athletes to quickly tag sequences, add comments, draw directly on video, and share content almost in real time. Its data architecture is simpler, yet it facilitates unhindered collaboration among team members, even outside formal training environments. Athletes can independently review selected moments, receive direct feedback from coaches through the application, and reflect on their own decisions and technical execution features that are particularly valuable during developmental stages of an athletic career.

While Synergy's complex data models enable analysts to precisely reconstruct game structure and flow, Hudl prioritizes individualization and functional simplicity. Hudl has significantly contributed to the democratization of video analysis by enabling school, amateur, and local teams to apply analytical principles without requiring specialized expertise. This approach transforms video analysis from an elite specialization into an accessible, everyday coaching tool (Hudl, 2022).

In this regard, the two systems should not be viewed as mutually exclusive competitors, but rather as complementary tools reflecting diverse user needs, resources, and objectives. Synergy is well suited to environments that demand tactical precision, methodological rigor, and deep game interpretation, whereas Hudl meets the needs of users who prioritize accessibility, rapid feedback, and immediate visual communication. This diversification enhances the adaptability of digital analytics across a wide range of training and competitive realities, thereby significantly expanding its application in contemporary sport.

Interface and User Experience

The differences between the user interfaces of Synergy and Hudl extend beyond visual design to encompass their underlying usage philosophies and target user groups. Synergy features an interface tailored to highly structured and professional environments, where each function is directed toward tactical analysis, analytical searching, and consistent data categorization. Working within this system requires prior training and an understanding of possession-logging methodologies, making it particularly suitable for users with established analytical literacy. The visual presentation is functionally minimalist, emphasizing clarity and precision over aesthetic appeal. This engineering-oriented design enables complex game reconstruction, allowing users to access segments that meet highly specific tactical criteria, such as all pick-and-roll possessions against zone defense in the second quarter of an away game within just a few clicks (Synergy Sports, 2023).

Hudl, by contrast, is built around the principles of inclusivity and simplicity, representing a system that deliberately sacrifices technical sophistication in favor of immediacy, accessibility, and functional usability. Its interface is designed to accommodate users with minimal

technical background, relying on intuitive icons, simplified navigation, and logically structured menus. This design enables an easy entry into the domain of video analysis, even for individuals with no prior experience using such tools.

The system allows users to perform essential operations quickly and without prior training, including clipping and tagging video segments, adding tactical annotations, and applying visual tools to highlight key elements of play. Most importantly, these materials can be effortlessly shared with athletes across mobile and tablet devices. What further distinguishes Hudl is its ability to integrate seamlessly into the daily workflow of a sports organization without disrupting existing routines. Coaches can isolate a game sequence in real time, annotate it, and within minutes deliver targeted feedback to players who may review it while traveling from a game, during individual training sessions, or at home in their own time.

This level of flexibility supports continuity in learning and reflection, while ensuring that analytical content remains constantly accessible. Such accessibility is particularly valuable in sporting environments that lack the temporal or organizational capacity for formalized analytical sessions. Although Hudl is not designed to replace the complex, multi-layered analytical capabilities offered by Synergy, this limitation constitutes its primary strength. By prioritizing speed, clarity, and ease of use, Hudl enables coaches to conduct efficient, comprehensible, and motivating analyses within a very short timeframe.

Hudl therefore emerges as a tool that strongly supports the pedagogical and communicative dimensions of coaching practice, complementing traditional methods with contemporary visual instruments tailored to digitally native generations of athletes (Hudl, 2022). Video-based feedback has significant pedagogical potential, although its effectiveness largely depends on the way it is integrated into broader coaching and educational frameworks (Partington, Cushion, & Harvey, 2020).

In this way, the difference between the two systems lies not merely in their visual presentation, but more fundamentally in the logic of their use. While Synergy builds analytical depth through structure and precision, Hudl builds breadth through accessibility and intuitiveness.

User Support and Accessibility

Both systems provide robust and professionally designed user support, albeit grounded in clearly differentiated philosophies and target audiences. Synergy is primarily oriented toward elite users, top-tier professional clubs, collegiate programs, and national federations. Its support model operates on the principle of partnership: users are granted access to dedicated account managers who provide technical and strategic assistance throughout the season, including support with game logging, data interpretation, and the execution of advanced analytical procedures. While the platform offers extensive documentation and detailed user guides, these resources presuppose a high level of digital and analytical literacy. In this sense, Synergy's user support functions not merely as technical assistance, but as a systematic component of coach and analyst development (Synergy Sports, 2023).

Hudl, in contrast, structures its support ecosystem around the principles of accessibility and inclusion, with particular emphasis on educational and developmental environments where

expert assistance may be limited. The platform does not differentiate between professional and amateur users in terms of access to learning resources. All users benefit from a comprehensive library of digital guides, video tutorials, webinars, and frequently asked questions. This model enables coaches to rapidly acquire foundational competencies without prior experience in performance analysis, a feature of particular importance in settings that lack the financial capacity for specialized training.

Despite the absence of personalized consultancy services, Hudl fosters a strong culture of peer-based support grounded in shared learning and collective experience. Users exchange knowledge, develop localized tutorials, and collaborate through forums and platform-based communities. This approach not only expands access to video analysis but also promotes the development of digital literacy among coaches and athletes through informal learning processes. The knowledge base is thematically organized and scalable, allowing users to progress at their own pace by selecting between basic and advanced modules.

Within educational contexts, including schools and universities, Hudl is particularly valued for its ability to integrate analytical skills into teaching curricula, thereby enhancing the quality of sports education. Furthermore, Hudl's availability on mobile devices significantly facilitates its integration into daily training routines. Rather than requiring complex installations, users need only a stable Internet connection and basic digital competence. Hudl is also characterized by a high degree of cost accessibility: its modular pricing structure allows individual users, schools, and smaller clubs to select packages aligned with their financial and organizational capacities. Synergy, due to its complexity and infrastructural demands, remains primarily accessible to organizations with larger budgets and specialized staff. These differences in pricing and functionality strongly influence market distribution, with Hudl dominating youth, high school, and amateur sport, while Synergy represents the standard in professional and highly organized leagues (Hudl, 2022). Ultimately, both systems conceptualize user support not merely as a response to technical challenges, but as an integral component of their professional culture and identity.

For these reasons, the two systems should not be evaluated solely through the lens of technical efficiency, but also as representative examples of two distinct approaches to knowledge in sport: one grounded in centralized expertise, the other in horizontal learning and adaptive application. This diversity of approaches renders them not only complementary but equally valuable within the contemporary landscape of sports analytics, where technological accessibility must be matched by functional purpose and pedagogical alignment.

Training and Competitive Applicability of Software Systems

In contemporary sports practice, the ability of digital tools to adapt to training and competitive contexts is not a luxury but a fundamental prerequisite for functionality. In this respect, both Synergy and Hudl offer distinct models of integration into the daily operations of coaching staffs, shaped by their methodological philosophies and technical capacities.

Synergy stands out as a highly sophisticated analytical system that enables coaches and analysts to conduct in-depth evaluations of competitive performance at the team level, transforming visual material into precise and statistically valid insights. Its architecture is

based on detailed possession-by-possession logging, incorporating information on offensive structure, defensive schemes, action outcomes, shot locations, and other key parameters. This methodological granularity allows users to reconstruct game dynamics with a high degree of accuracy through multiple filtering criteria. For example, a coach can quickly isolate all situations in which the team executed a "horns" play against a switching defense and analyze outcomes depending on whether the final shot was taken by a perimeter or interior player.

Such precision enhances tactical planning and elevates the quality of feedback delivered to athletes. The system also enables the creation of temporal sequences that reveal changes in game rhythm, momentum shifts, and recurring patterns during critical phases such as end-of-quarter situations or post-timeout possessions, thereby providing insight into a team's psychological resilience. Within the training process, Synergy functions as a bridge between past performance and future preparation, allowing coaches to identify micro-level successes or failures and translate them into targeted corrective and developmental objectives. If, for instance, defensive rotations deteriorate after the third pass on the weak side, training sessions can be precisely structured to address compactness in that zone, with subsequent performance compared against previous benchmarks. In this sense, Synergy supports not only reactive analysis but also proactive training design as a platform for tactical adaptation, positioning itself as a catalyst for future performance development rather than merely a tool for retrospective evaluation (Synergy Sports, 2023).

Hudl, by contrast, operates as a system optimized for real-time application and high accessibility, making it particularly suitable for environments where speed and simplicity are decisive success factors. Its capacity to be used during, immediately after, or even prior to competition allows coaches to generate instant, clearly structured visual feedback. Through mobile devices and cloud-based platforms, coaches can isolate recent sequences, annotate errors or commend correct positioning, and distribute content to the entire team within minutes. Hudl is especially effective in the development of individual technical and tactical skills, as it enables athletes to access personalized content, whether for self-analysis, comparison with elite performance models, or autonomous video review.

This form of visual introspection becomes a central element of the training dialogue, complementing or replacing traditional verbal instruction, which is often constrained by context, emotion, and linguistic interpretation. Clearly visualized game situations foster deeper tactical understanding and encourage greater athlete responsibility in the learning process (Hudl, 2022). In competitive preparation, Hudl functions as an efficient scouting tool, allowing coaches to create concise scouting reels that highlight key behavioral patterns of opposing teams, including formations, offensive tendencies, and defensive vulnerabilities. These materials can be distributed digitally and reviewed collectively or individually, promoting active athlete engagement in the preparation process.

Moreover, the rapid creation of highlight compilations from a team's own matches enables the identification of habitual behaviors, unconscious patterns, and potential areas for improvement without reliance on third-party analysis. Hudl therefore, emerges as a tool best suited to contexts requiring fast, impactful, and visually compelling communication between coaches and athletes. Its strength lies in making video analytics an integral part of everyday

sporting practice, an empowering medium that reshapes coaching expression, learning processes, and competitive development.

Although they differ substantially in technical complexity, Synergy and Hudl both make a significant contribution to the modernization of the training process, transforming it from a routine execution of drills into a data-informed, dynamic system of learning and performance optimization. Synergy enables coaching staffs to derive reliable insights into team performance through precise segmentation and advanced tactical analysis, thereby supporting strategic training design, targeted remediation of identified weaknesses, and the development of a clearly structured, evidence-based style of play. Hudl, by contrast, facilitates direct, personalized, and visually supported communication between coaches and athletes, fostering reflective learning and the rapid application of corrective and developmental guidelines.

The differences between these platforms extend beyond their technical features, reflecting distinct pedagogical and methodological paradigms of coaching practice. Synergy promotes analytical reasoning and long-term tactical elaboration by emphasizing the systematic processing of collective performance data, whereas Hudl cultivates immediacy of response, visual interpretation, and pedagogical simplicity in communication. One system empowers the coach as an architect of complex game models; the other positions the coach as an adaptive pedagogue who responds quickly, clearly, and empathetically.

Table 1. Swot Analysis of the Software Solutions Synergy and Hudl.

Aspect	Synergy Sports	Hudl
Strengths	• High level of precision and standardization in event logging • Capability for in-depth tactical analysis • Suitable for professional and elite sports systems • Access to detailed statistics and player performance visualizations	• Intuitive user interface • Easy to use without formal training • Enhanced accessibility and mobility • Well-suited for schools, amateur teams, and individual coaches
Weaknesses	• System complexity requires user training • Limited flexibility for personalization • High implementation costs • Demands advanced analytical literacy	• Limited scope for in-depth analysis • No standardized database of logged events • Lack of professional expertise for handling large datasets
Opportunities	• Further development of AI support for automated event logging • Expansion into lower leagues and youth development programs • Potential integration with biomechanical and physiological sensors for comprehensive performance evaluation	• Integration with VR/AR technologies for interactive athlete education • Development of user communities and collaborative learning • Access via mobile applications and open platforms

Aspect	Synergy Sports	Hudl
Threats	• Limited scalability in non-professional environments • Growing competition from simpler software solutions • Dependence on highly skilled users	• Risk of analysis becoming superficial or trivialized • Potential insufficiency for high-level competitive contexts • Loss of consistency in data interpretation without standardization

The Synergy Sports software is distinguished primarily by its precision in event logging and performance analysis, positioning it as one of the most reliable tools for in-depth tactical evaluation of competitive games. A high level of standardization in data input ensures that every segment of play is consistently categorized, which supports comparative analyses across multiple games, seasons, or opponents. This methodological consistency makes Synergy particularly valuable for coaches who aim to base tactical decisions on objective and verifiable insights. The platform's capacity for deep tactical analysis is reflected not only in the volume of collected data but also in the advanced tools available for searching, filtering, and visualizing that information. Coaches can reconstruct complex offensive and defensive patterns, assess the effectiveness of specific formations, and develop strategies grounded in empirical evidence. Such capabilities are especially relevant in the preparation for high-stakes matches, where subtle tactical nuances may determine the outcome. Synergy proves particularly suitable for professional and elite systems in which the necessary infrastructure, human resources, and methodological culture exist to support the implementation of complex analytical tools. In this context, access to detailed statistics and visualizations of individual and team performance enables multi-layered communication between analytical and coaching staff, thereby significantly enhancing the level of professionalism within the sporting organization (Synergy Sports, 2023).

This level of sophistication, however, is accompanied by certain limitations. The complexity of the system requires substantial user training, both in terms of software operation and in understanding the analytical principles on which it is based. Without such preparation, there is a risk of misinterpreting data or failing to exploit the platform's full potential. Furthermore, Synergy offers limited flexibility in personalization; it is fundamentally a closed system with predefined parameters for logging and visualization. Unlike modular platforms that allow users to create customized analytical templates, Synergy prioritizes standardization, which may constitute a constraint in contexts that demand more creative or adaptive solutions.

High licensing and implementation costs represent an additional barrier for many organizations. Moreover, contemporary discussions increasingly emphasize the risk of algorithmic bias and technological inequality in performance analysis systems, particularly between organizations with unequal access to advanced analytical infrastructures (Kassens-Noor & Lauermann, 2022). Successful adoption requires not only financial investment but also organizational support, making the software less accessible to smaller, school-based, or amateur teams. Finally, effective use of Synergy depends heavily on users' analytical literacy.

Coaches without specialized training or prior experience with quantitative methods may struggle to fully comprehend and apply the generated insights, thereby significantly reducing the system's practical value.

Future opportunities for Synergy lie in its capacity to integrate emerging technological trends. Advances in artificial intelligence open the possibility of automated event logging, which could substantially accelerate the analytical process and reduce reliance on manual data entry. AI-driven support could further enhance precision while making the software more accessible to users with lower levels of technical expertise. Another important opportunity concerns expansion into lower competitive levels and youth development programs. Through simplified versions of the system, Synergy could extend its reach to sectors of sport that have traditionally lacked access to such sophisticated analytical tools, thereby raising analytical standards in developmental contexts. Additional potential lies in integrating biomechanical and physiological sensors, enabling comprehensive performance evaluation through the combination of tactical, physical, and biomedical data. Such developments correspond with contemporary multimodal AI systems capable of integrating visual, auditory, and biomechanical data in order to generate more comprehensive interpretations of athletic performance (Othman, Delgado, Liu, & Rezaei, 2024). In this way, Synergy could evolve into a multidisciplinary platform central to personalized training and injury prevention.

These opportunities are accompanied by notable threats. One of the most significant challenges is limited scalability in environments lacking a developed digital ecosystem. In such contexts, the demanding nature of Synergy may result in low adoption rates and eventual replacement by simpler alternatives. Growing competition from software solutions emphasizing simplicity, mobility, and minimal training requirements may reduce Synergy's market share, particularly in school and amateur sport. Moreover, reliance on highly skilled users poses a risk in cases of staff turnover or insufficient opportunities for continuous education. In systems without stable analytical support, the software may lose its functional purpose and become merely an unused technological surplus.

One of Hudl's most distinctive features is its intuitive interface, which allows users to begin working with the system without prior technical knowledge. The interface is visually clear, functionally transparent, and designed to provide a sense of ease and efficiency. This user experience is particularly beneficial for coaches without analytical expertise who nevertheless seek an effective tool for evaluation and communication with their team. Another major strength of Hudl is its usability without formal training. System functions are logically organized, and many operationssuch as tagging sequences, adding comments, or drawing on video can be performed in just a few clicks. This allows coaches to focus on the pedagogical and tactical aspects of their work rather than technical complexity.

Enhanced accessibility and mobility further position Hudl as a contemporary tool for coaches and athletes on the move. Video content is available via mobile applications and cloud services, enabling analysis outside formal training settings, at home, while traveling, or immediately after matches. In this sense, Hudl becomes a tool that follows the coach and athlete, rather than the reverse. Hudl is particularly well suited to schools, amateur teams, and individual coaches. Its pricing model, flexibility of use, and capacity for content individualization make it ideal for resource-limited environments, where it functions not only

as an analytical tool but also as a means of education, motivation, and empowerment of the coaching role.

Hudl's simplicity, however, comes with analytical limitations. One of its main weaknesses is the restricted scope of in-depth analysis. Although Hudl allows for tagging and annotation, its capacity for complex tactical and statistical analysis remains limited. The absence of multi-layered segmentation, advanced filtering, and sophisticated visualizations makes it less suitable for professional training systems. Another limitation is the lack of a standardized database of logged events. Each analysis depends entirely on user input, introducing subjectivity, inconsistency, and potential imprecision. In environments where longitudinal consistency and multi-user reliability are required, this limitation may compromise decision-making quality. Furthermore, Hudl typically operates without professional expertise in large-scale data analysis. Its primary user is often a coach rather than an analyst, relying on intuitive visual assessment, which may lead to superficial interpretation and underutilization of video data.

One of the most promising opportunities for Hudl's future development lies in integration with virtual reality (VR) and augmented reality (AR) technologies. The growing relevance of immersive technologies in sports environments supports these developmental opportunities. Virtual and augmented reality systems increasingly enable interactive tactical learning and decision-making simulations within performance analysis contexts (Tang, Makransky, & Kee, 2020). Such integration could enable immersive athlete education, allowing players to experience tactical situations from a first-person perspective. These tools could significantly enhance knowledge transfer and render learning processes multidimensional. Another opportunity lies in strengthening user communities and collaborative learning. While Hudl already facilitates content sharing, further structuring of this community through forums, shared analyses, and tutorials could foster collective analytical literacy in sport. Mobile access and open platforms also contribute to the continued democratization of analysis. Open APIs, integration with other software solutions, and connectivity with performance-tracking devices position Hudl as a flexible foundation for more complex sporting ecosystems.

Due to its simplicity, Hudl faces the risk of analytical trivialization. When used without clear methodology, analysis may be reduced to visual demonstration without deeper interpretation, undermining its pedagogical potential. Another significant threat is its potential insufficiency at elite competitive levels. In professional systems requiring multi-layered evaluation and statistical validation, Hudl often cannot meet the demands of advanced modeling. Finally, inconsistency in data interpretation presents a major challenge. Because each user defines what is relevant, analytical standards may vary, creating confusion among coaching staff and complicating longitudinal performance tracking. Without centralized methodology, Hudl remains dependent on individual user competence, limiting its scalability in more demanding structures.

Discussion

The findings of this structured qualitative evaluation align with established research emphasizing the growing role of video analytics as a central component of contemporary coaching practice. As previously noted by Hughes and Franks (2004), systematic notational

and video analysis provides a structured foundation for objective performance evaluation. In this regard, Synergy Sports reflects the evolution of these early analytical principles into highly standardized and technologically advanced systems capable of reconstructing complex tactical structures with precision.

Similarly, Carling, Reilly, and Williams (2008) emphasized the importance of visual feedback in enhancing athletes' tactical and technical understanding, particularly in dynamic team sports. The present analysis confirms this pedagogical value, especially in the case of Hudl, whose accessibility and immediacy facilitate rapid feedback cycles and reinforce visual learning processes. This is particularly relevant in basketball, where, as highlighted by Jarraya et al. (2019), the speed of decision-making and tactical complexity demand clear and context-rich feedback mechanisms.

The growing institutional integration of performance analysts within coaching staffs, described by Wright, Atkins, and Jones (2013), is also reflected in the professional environments in which Synergy is predominantly implemented. Its methodological rigor and depth support analytically grounded decision-making and confirm the transformation of coaching structures toward data-informed models of practice. At the same time, the broader digital transformation of sport, as discussed by Yin et al. (2024), provides the technological framework within which both platforms operate, integrating artificial intelligence and computer vision into performance analysis.

From a pedagogical perspective, the findings resonate with the socio-pedagogical interpretations of video use in coach education proposed by Booroff, Nelson and Potrac (2016). Video analytics does not merely produce data; it mediates interpretation, reflection, and communication. This dimension is further reinforced by Groom, Nelson, and Potrac (2022), who argue that shared video analysis enhances reflective learning and supports the development of coaching knowledge. Hudl, in particular, exemplifies this reflective and dialogical function through its emphasis on accessibility and collaborative feedback.

Overall, the present study supports existing literature in demonstrating that video analytics enhances objectivity, supports tactical reasoning, and strengthens communication between coaches and athletes. However, it also extends previous research by comparatively positioning two leading software systems within distinct methodological and pedagogical paradigms. In doing so, the discussion highlights that the effectiveness of video analytics depends not solely on technological sophistication, but on contextual alignment with organizational structure, coaching philosophy, and performance objectives.

Conclusion

This study confirms that video analytics has become a structural component of contemporary basketball practice rather than a supplementary technological aid. The analysis suggests that Synergy Sports and Hudl represent two distinct yet complementary models of digital performance analysis: one grounded in methodological rigor, standardization, and tactical depth, and the other in accessibility, pedagogical flexibility, and communicative efficiency. The central contribution of this research lies in framing video analytics not merely as a technical instrument, but as a pedagogical and strategic resource that reshapes coaching logic, decision-

making processes, and athlete learning. By integrating technological, methodological, and educational perspectives, the study highlights how digital tools expand the boundaries of tactical reasoning while preserving the essential role of coaching expertise. Contemporary developments in real-time artificial intelligence further reinforce this transformation by enabling dynamic tactical interpretation and automated performance modeling during live competition (Vec, Tomažić, Kos, & Umek, 2024).

Ultimately, the findings suggest that the most effective application of video analytics does not depend on choosing between systems, but on aligning technological capabilities with organizational context, performance objectives, and coaching philosophy. In doing so, video analysis emerges as a foundational pillar of modern basketball development in the digital era.

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Corresponding author: gbigor86@gmail.com

PSYCHOSOCIAL PREDICTORS OF RETURN TO SPORT AFTER SPORTS INJURY: A SYSTEMATIC REVIEW

Igor Grbić[1], Milena Belić[1], Hana Sejfović[1], Adžlan Kurtanović[1], Denis Demirović[1]

Abstract: *Return to sports (RTS) activities after injury represents a complex process in which psychological and psychosocial factors play a significant role. This paper provides a comprehensive evaluation of the characteristics of these predictors and their impact on the course of recovery and the final outcome of RTS after injury. The selection of relevant research literature was performed through electronic databases: PubMed, Scopus, Web of Science, and PsycINFO, while the screening and literature selection process itself followed the established protocols of the PRISMA 2020 declaration. Nineteen original research studies tracking three thousand five hundred seventy athletes were identified. Qualitative synthesis showed that higher levels of negative psychological constructs, primarily fear of reinjury, anxiety, depression, and kinesiophobia, were associated with a longer course and more unfavorable recovery outcomes. Psychological readiness, confidence, self-efficacy, and motivation were recognized as predictors of successful RTS, but also of an increased risk of occurrence of reinjuries. Social support and adaptive coping strategies showed a protective effect through the improvement of psychological readiness and the reduction of emotional distress. RTS represents a multidimensional process that requires an integrated assessment of physical, psychological, and psychosocial factors.*

Keywords: sports injuries, return to sport, psychological predictors, psychological readiness, fear of reinjury, kinesiophobia, self-efficacy

[1] State University of Novi Pazar, Novi Pazar, Serbia

Introduction

The search for elite performance, and more demanding competitive schedules, compel athletes to make significant sacrifices and to sustain high levels of physical endurance during arduous training sessions and tournaments. These demands may surpass the physiological adaptation capacities of the athlete, diminish focus and raise the risk of reckless movements. Consequently, sports injuries are common and can have serious ramifications for an athlete's health, athletic performance, and future sporting career. The full functional recovery and effective RTS, defined as the resumption of training and competitive activities at the level obtained before injury (Ardern et al., 2016), are among the primary goals of sports injury treatment and rehabilitation. Traditionally, RTS decisions have been mostly driven by the assessment of physical healing and functional performance. Nevertheless, multiple studies have demonstrated that a significant minority of athletes do not return to their preinjury level of sport engagement, despite adequate functional recovery and meeting the criteria for medical clearance. In an updated systematic review, Ardern et al. (2014) found that 81% of athletes returned to some type of sport involvement following anterior cruciate ligament reconstruction (ACLR), 65% returned to their preinjury sport and just 55% returned to competitive sport. Webster and Feller (2019) observed similar results, with 82% of patients returning to some sort of athletic involvement, 63% returning to their preinjury sport, and just 44% returning to competitive activity following ACLR. These return rates differed from functional outcomes, with about 90% of patients achieving normal or near-normal functional performance. The results of these studies clearly indicate that effective RTS depends not only on physical recovery but also on the athlete's psychological readiness. Following these findings, research on the involvement of psychological elements in the RTS process has grown substantially. Psychological readiness has been identified as a key component of athlete recovery in contemporary literature reviews (Longo et al., 2023; Nedder et al., 2025) and not addressing this aspect may have detrimental consequences on RTS results and increase the chance of reinjury.

Mechanisms of sports injuries, principles of operative and non-operative treatment, rehabilitation procedures, and outcome assessment are detailed in professional and scientific literature. However, the significance of predictors of the injured athlete's mental state during the recovery phase is still not fully clarified. Numerous differences present in the type of sport and injuries, the injured segment, the observed study population, as well as the lack of standardized measuring instruments for evaluating the impact of psychological variables on injured athletes, contribute to the heterogeneity of previous findings. From these statements emerges the primary goal of this study – the recognition, clinical analysis, and summarizing of available information about psychological and psychosocial aspects associated with RTS after sports injuries.

Methods

This section outlines the systematic framework used to identify, select, and analyze the scientific literature regarding psychological outcomes in athletes. It details the precise search

protocols, eligibility criteria, and data synthesis methods applied throughout the entire review process.

Study design

This section outlines the systematic framework used to identify, select, and analyze the scientific literature regarding psychological outcomes in athletes, detailing the precise search protocols, eligibility criteria, and data synthesis methods applied. This comprehensive procedural structure serves to ensure that all selected data are evaluated with the highest level of methodological consistency.

Literature search strategy

Electronic databases: PubMed, Scopus, Web of Science, and PsycINFO were used in our research to find relevant bibliographic sources based on the evaluation of the impact of psychological and psychosocial determinants on the return of injured athletes to training and competitive activities. The search included papers published in English up to March 2026. For each database, subject mapping and keywords combined with and/or operators were used for terms related to return to sport, sports injuries, and psychological factors. The following keywords and their combinations were used: "return to sport", "return to play", "sports injury", "anterior cruciate ligament", "fear of reinjury", "psychological readiness", "confidence", "self-efficacy", "motivation", "social support", "coping", "athletic identity", "resilience", "anxiety", and "depression". These determinants were connected through the application of logical operators AND, as well as OR, while respecting the indexing and search methods within each database. To avoid potential omission of relevant studies, a manual check of the reference lists of the primarily selected papers was also performed.

Inclusion criteria

The selection of papers included in the study was performed based on predefined criteria:
- original scientific papers published in relevant peer-reviewed journals;
- articles published in English;
- studies that included sports injuries with a defined rehabilitation process;
- RTS or return to the previous level of sports participation as a primary or secondary outcome;
- assessment of at least one psychological or psychosocial factor associated with RTS.

Exclusion criteria

The following were excluded from the systematic review:
- review articles, systematic reviews, meta-analyses, and narrative reviews; case reports, conference abstracts, letters to the editor, and commentaries;
- studies that did not assess RTS as an outcome;
- studies conducted in non-athletic populations or studies that did not include sports injuries;
- articles in which psychological or psychosocial factors associated with RTS were not analyzed;

- studies with insufficient data for extraction or studies with overlapping samples.

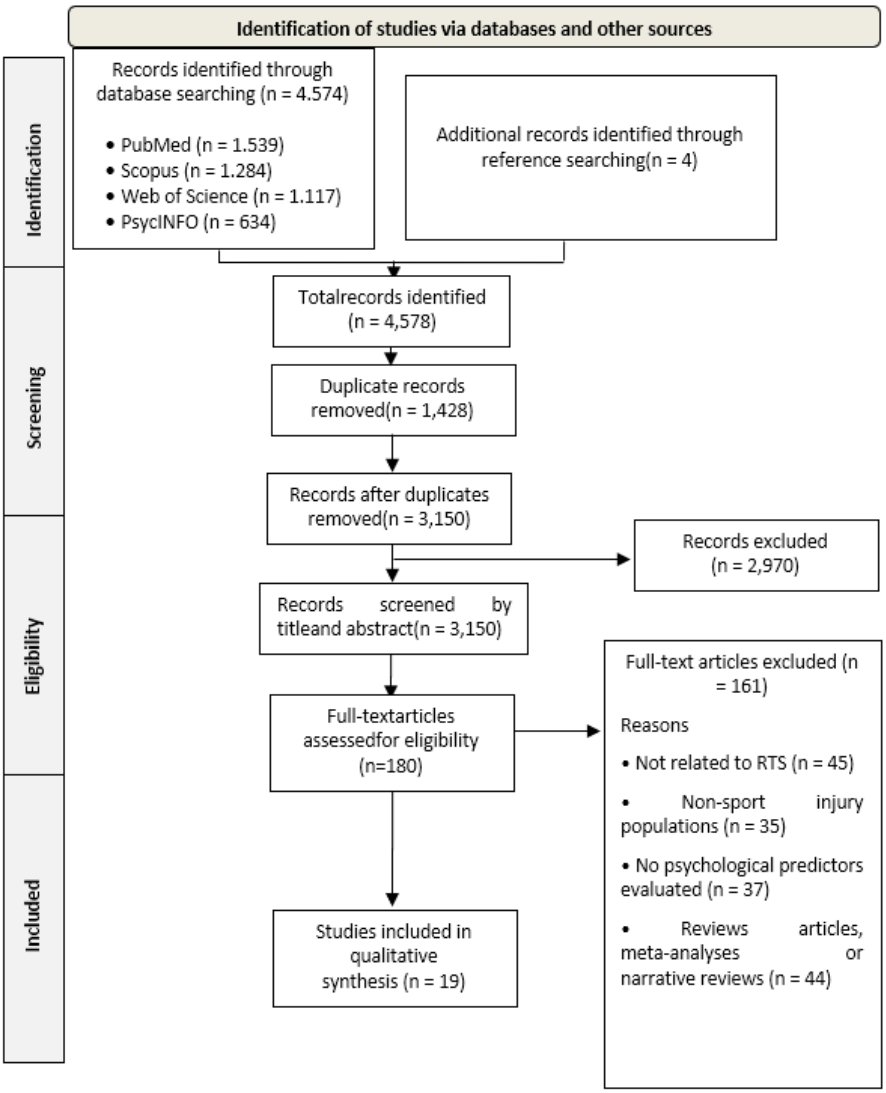
Study selection

The search of electronic databases yielded 4,574 records, and the manual search yielded an additional 4 records, which resulted in a total of 4,578 records. After removing 1,428 duplicate titles, 3,150 unique articles remained, which were subjected to further evaluation. initial evaluation. The analysis of titles and abstracts of these articles, with the application of established parameters during the first screening phase, removed 2,970 records. The evaluation of the remaining 180 publications with the aim of their methodological and conceptual suitability in relation to the subject of this paper was performed by reviewing the full texts. This method of selection led to the additional elimination of another 161 papers with the stating stating of specific reasons for rejection. At the end of the entire procedure, a total of 19 studies were selected that fully satisfied all defined requirements for conducting qualitative processing of the set research subject. The entire process of identification, selection, and final inclusion of articles is graphically documented within the PRISMA 2020 flow diagram (Diagram 1).

Data Extraction

Data extracted and systematized from each included study encompassed the author and year of publication, study design, sample size, type of sports injury, time of assessment, psychological instruments used, investigated psychological and psychosocial predictors, and main findings related to RTS. To measure these psychological predictors, the included studies utilized validated and standardized instruments, specifically targeting psychological readiness (ACL-RSI, I-PRRS, RSSIQ), fear of injury and kinesiophobia (AFAQ, TSK/TSK-11), anxiety and depression (RIAI/RIAI-R, CES-D, STAI), knee self-efficacy (K-SES), motivation, coping mechanisms (Brief-COPE, MCOPE, WCC-R), quality of life (KOOS-QOL), social support networks (PASS-Q, SSQ), and athletic identity (AIMS). The gathered information was subsequently used for qualitative data synthesis and to map out the characteristics of the included studies.

Figure 1. PRISMA flow diagram with reasons for exclusion.



Data Analysis

Due to the impossibility of significant unification of the included studies regarding design, participant characteristics, injuries, instruments, and definitions of RTS, it was not possible to use a meta-analysis, so a qualitative synthesis was applied along with thematic clustering of variables for a better presentation of key factors. For didactic reasons, the identified psychological and psychosocial variables were clustered into distinct thematic categories to provide a higher-quality presentation of the core elements driving RTS success.

Results

The paper analyzed 19 scientific studies involving 3,570 participants. According to the type of study, 11 prospective cohort studies, 4 cross-sectional studies, 2 retrospective studies, one qualitative study, and one randomized controlled trial were identified. In the structure of injuries, anterior cruciate ligament (ACL) injury overwhelmingly dominated, in 11 studies, while the remaining papers addressed injuries to other parts of the musculoskeletal system. In terms of analyzed psychological factors, fear of injury and kinesiophobia were the subject of the largest number of investigations, a total of 8 studies. Psychological readiness and athlete confidence were analyzed in 7 studies each, while the impact of social support was tracked by the authors of 4 papers. Clinical psychological barriers in the form of anxiety and depression symptoms, the impact of intrinsic motivation on the recovery process, and coping mechanisms were analyzed in 3 studies each. Athletic identity was evaluated in 2 scientific papers. The characteristics of the included studies are presented in Table 1 and Table 2.

Out of a total of 226 Gaelic games players, a significant presence of fear of injury was recorded in 73 of them, with an average AFAQ score of 22.6 ± 5.3 (O'Connor et al., 2021). This fear was significantly more pronounced in athletes with more severe injuries (P=0.008, r=0.40), with 70% of them expressing psychological unreadiness for RTS. A direct correlation between reinjury anxiety and the RTS timeline was pointed out by Wadey et al. (2014). The highest rate of unachieved RTS (54.2%) in the profile of athletes with intense fear of reinjury, stress, kinesiophobia, anxiety, depression, and the lowest confidence in the knee was recorded by Caumeil et al. (2024). This RTS rate, compared to another profile from the same study with low levels of these negative predictors, was significantly higher (P=0.001). In its indirect effect on RTS, an increased level of reinjury anxiety affects the level of ACL-RSI (R^2=0.21) Forsdyke et al. (2022). A moderate negative correlation between kinesiophobia and psychological readiness (r = -0.305; P = 0.02), as the only significant predictor (P = 0.002) of a negative impact on RTS, was stated by Ohji et al. (2023).

Athletes who met RTS criteria during testing conducted 9 months after ACLR had higher ACL-RSI scores compared to unready ones (69 versus 51; P<0.001) (Faleide et al., 2021). During the next testing of the same group of athletes 24 months after surgery, no injury was registered among the athletes who successfully passed the first test, with statistical significance on the remaining parameters holding at p=0.37. Pediatric athletes achieved a significantly higher RTS rate 8 months after ACLR (70%) compared to adolescents (39%) and young adults (35%), demonstrating significantly higher overall RTS values (P=0.0004) (Thorolfsson et al., 2023). Ueda et al. (2024) showed that athletes with an ACL-RSI score ≥65 achieved RTS in 90% of cases, compared to 73% of those with lower scores. However, a higher rate of secondary ACL injuries was simultaneously registered in athletes with a higher level of ACL-RSI (17.6% versus 3.4%). Sun et al. (2026) highlighted that cognitive-behavioral physical therapy in patients

Table 1. Characteristics of the included studies.

First author	Study design	Population (N)	Injury	Time of assessment
Baltassat et al. (2024)	Retrospective study	Sports group, N=118; non-sports group, N=158	Rotator cuff tear	Final assessment after surgery
Bouveau et al. (2022)	Retrospective cohort study	Various sports, N=40	Chronic lateral ankle instability	Pre-op; ≥12 months post-op
Caumeil et al. (2024)	Prospective cohort study	Various sports, N=162	ACL injury	3–6 months post-op; 2 years post-op
Ebert et al. (2025)	Prospective cohort study	Various sports, N=232	ACL injury	2 years post-op
Faleide et al. (2021)	Prospective cohort study	Various sports, N=103	ACL injury	9 months post-op; 2 years post-RTS clereance
Flanigan et al. (2021)	Case series	Various sports, N=184	Knee injuries	Pre-op; median follow-up of 10.7 months post-op
Forsdyke et al. (2022)	Cross-sectional study	Soccer players, N=150	Sports injuries (≥8 weeks of absence from sport)	Post-RTS (retrospective assessment)
Hilliard et al. (2017)	Cross-sectional study	Collegiate athletes, N=80	Musculoskeletal sports injuries	During rehabilitation
O'Connor et al. (2021)	Cohort study	Gaelic football and hurling athletes, N=226	Various sports injuries	Immediately after injury and at RTS
Ohji et al. (2023)	Cross-sectional study	Various sports, N=105	ACL injury	One day pre-op
Paterno et al. (2019)	Qualitative study	Various sports, N=10	ACL injury	After rehabilitation and RTS
Paterno et al. (2022)	Prospective cohort study	Various sports, N=163	ACL injury	At RTS clearance; 24 months post-RTS
Senorski et al. (2017)	Registry study	Various sports, N=157	ACL injury	6–18 months post-op (mean: 10 months)
Sun et al. (2026)	Randomized controlled trial	Various sports, N=61	ACL injury	Pre-op; 6, 12, and 24 weeks post-op
Thorolfsson et al. (2023)	Registry cohort study	Various sports, N=691	ACL injury	8, 12, 18, and 24 months post-op
Ueda et al. (2024)	Prospective cohort study	Amateur / Competitive N=169	ACL injury	3, 6, 12, and 24 months post-op
Wadey et al. (2014)	Cross-sectional study	Various sports, N=335	Various sports injuries	During rehabilitation and post-RTS
Yang et al. (2014)	Prospective cohort study	Collegiate athletes, N=387 (594 injuries)	Various sports injuries	During rehabilitation and at RTS

Zarzycki et al. (2024)	Secondary analysis	Level I/II female athletes, N=39	ACL injury	Post-rehabilitation; pre-RTS clearance

Note: ACL = anterior cruciate ligament; N = sample size / number of participants; Post-op = postoperative; Pre-op = preoperative; RTS = return to sport. For Yang et al. (2014), N represents the number of tracked athletes, while the total number of recorded injury cases is indicated in parentheses.

after ACLR significantly improves their psychological readiness for RTS, achieving a clinically important difference and a higher level of long-term resilience.

Among athletes with high confidence in the knee following ACLR, a higher probability of meeting RTS criteria was recorded (54.2% versus 17.2%) (Paterno et al., 2022). The same author, in this group of athletes during the 24 months post-RTS, also tracked the occurrence of secondary injuries and determined that confident participants who met all RTS criteria had a 10 times higher probability of sustaining a repeated ACL injury (P=0.02). Female athletes who sustained a repeated ACL injury within two years had significantly higher overall ACL-RSI scores (P = 0.03) and met RTS criteria earlier (P = 0.04) (Zarzycki et al., 2024).

A combination of high confidence and low negative psychological predictors achieved a successful RTS rate of 77.8% (Caumeil et al., 2024). Conversely, a lack of confidence in the knee and fear of reinjury caused 17.4% of athletes to completely give up on sports after ACLR (Ebert et al., 2025).

Based on the measured elevated present and future K-SES values in injured athletes, Senorski et al. (2017) established a critical role of self-efficacy in the process of returning to their physical level before the injury. A positive correlation of the synergy between self-efficacy and psychological readiness with the RTS outcome, through elevated total K-SES values, was also pointed out by Thorolfsson et al. (2023).

Bouveau et al. (2022), tracking athletes with an ankle injury, determined that high preoperative motivation represents one of the strongest predictors of faster and more frequent RTS (P=0.001), whereby from the group of highly motivated athletes, 92% of them returned to their preoperative sport compared to 50% of less motivated respondents (P=0.007). Highly motivated athletes also achieved a shorter time to RTS (4.5 versus 6 months). Conversely, Ebert et al. (2025) determined that a significant loss of interest in sport was the reason for discontinuing sports participation in 21.7% of cases.

Young injured athletes and their parents highlighted the social support provided by physical therapists and institutional systems during rehabilitation as the most significant predictor of a successful RTS (Paterno et al., 2019). A positive effect of the combined action of social support and psychological readiness on RTS (r=0.43; P=0.014) was also determined by Forsdyke et al. (2022). At the same time, the indirect negative impact of injury anxiety on this effect was highlighted (R^2=0.32) (Forsdyke et al., 2022).

Table 2. Psychological predictors and main findings of the included studies.

First author	Psych. predictor(s)	Main finding
Baltassat et al. (2024)	Anxiety,depression	A history of anxiety and depressive disorders was associated with slower RTS and a greater likelihood of permanent sport discontinuation.
Bouveau et al. (2022)	Motivation	Higher preoperative motivatio correlated with higher probability of RTS and a shorter time to RTS.
Caumeil et al. (2024)	Reinjury anxiety,fear of reinjury,confidence;	Greater fear, anxiety, and lower confidence led to unsuccessful RTS, while higher confidence increased reinjury risk.
Ebert et al. (2025)	Fear of reinjury, confidence, motivation	Fear of reinjury and low confidence were major reasons for unsuccessful RTS, whereas loss of interest was the main reason for sport discontinuation.
Faleide et al. (2021)	Psych. readiness	Elevated ACL-RSI values correlated with RTS to the preinjury sport level, whereas functional tests did not predict RTS.
Flanigan et al. (2021)	Coping; fear of reinjury	Positive reframing predicted a higher rate of RTS and diminished movement anxiety, especially among younger competitors.
Forsdyke et al. (2022)	Social support, fear of reinjury, psych. readiness	Greater social support was associated with lower reinjury anxiety and higher psychological readiness for RTS.
Hilliard et al. (2017)	Athletic identity	Higher athletic identity was associated with rehabilitation overadherence, whereas negative affectivity was associated with faster RTS.
O'Connor et al. (2021)	Fear of reinjury,psych. readiness	Severe injuries led to higher fear avoidance and lower readiness; 47.9% were not psychologically ready for RTS.
Ohji et al. (2023)	Kinesiophobia, athletic identity, psych. readiness	Greater kinesiophobia was associated with lower psychological readiness, whereas athletic identity was not associated with RTS.
Paterno et al. (2019)	Motivation,confidence, social support	Motivation, confidence, and social support were identified as key factors for successful RTS.
Paterno et al. (2022)	Confidence	Greater confidence correlated with successful completion of RTS criteria, yet simultaneously carried an elevated vulnerability to a secondary ACL rupture.
Senorski et al. (2017)	Self-efficacy, motivation	Higher self-efficacy was associated with RTS and higher future physical activity goals.
Sun et al. (2026)	Psych. readiness, self-efficacy, Kinesiophobia	Cognitive behavioral physical therapy improved psychological readiness and self-efficacy but had no effect on kinesiophobia.
Thorolfsson et al. (2023)	Psych. readiness, self-efficacy	Pediatric patients demonstrated greater psychological readiness, higher self-efficacy, and higher RTS rates than older groups.
Ueda et al. (2024)	Psych. readiness	Elevated ACL-RSI scores (≥65) were linked to greater RTS rates, while concurrently introducing a higher probability of a secondary ACL tear.

Wadey et al. (2014)	Reinjury anxiety,coping	Lower reinjury anxiety and greater use of adaptive coping strategies were associated with better psychological RTS outcomes.
Yang et al. (2014)	Social support, Ddpression,anxiety	Greater satisfaction with social support was associated with lower symptoms of anxiety and depression at RTS.
Zarzycki et al. (2024)	Psych. readiness,confidence	Positive ACL-RSI findings contributed to earlier achievement of RTS criteria, but also to a greater probability of a second ACL tear.

Note: ACL = anterior cruciate ligament; ACL-RSI = Anterior Cruciate Ligament–Return to Sport after Injury; CBPT = cognitive behavioral physical therapy; Psych. = psychological; RTS = return to sport.

Flanigan et al. (2021) highlighted in their case series study that positive cognitive reframing had a significant impact on a greater likelihood of RTS in athletes younger than 32 years (OR=2.36; P=0.009), greater satisfaction with the rehabilitation outcome in athletes younger than 20 years (OR=6.21; P=0.02), and lower kinesiophobia (r=-0.53; P=0.02). A significant mediating role of this predictor between reinjury anxiety and RTS, using multiple mediation models, was also highlighted by Wadey et al. (2014).

In collegiate student-athletes, total AIMS scores were positively associated with rehabilitation adherence (r=0.29; P=0.009) (Hilliard et al., 2017). On the same sample, negative affectivity was designated as the only significant predictor of attempts at an accelerated RTS (β=0.33; P=0.01).

Injured patients with a shoulder injury and present signs of depression and anxiety achieved a 17 ± 8.2 weeks slower RTS and a 2.8 times higher probability of completely giving up on sports (Baltassat et al., 2024). Conversely, athletes satisfied with the social support provided during rehabilitation showed a significantly lower probability of developing depression symptoms (OR=0.13) and anxiety symptoms (OR=0.12) at RTS (Yang et al., 2014).

Discussion

When summarizing the results of this paper, it is clear that a successful and rapid RTS is not determined solely by physical recovery and a healed injury. On the contrary, this entire process depends heavily on a range of interconnected psychological and social factors.

Fear of Reinjury and Reinjury Anxiety

The findings of this paper confirm that fear of injury and anxiety of reinjury act as primary psychological barriers to a successful RTS. The significant presence of fear recorded by O'Connor et al. (2021) shows that psychological trauma is extremely active at the moment of testing for RTS. This fear was significantly more pronounced in athletes with more severe injuries, along with a high percentage of expressed psychological unreadiness for RTS. These findings are also confirmed by Shaw et al. (2025), claiming that more severe sports trauma triggers longer-lasting and more intense postoperative fear-avoidance responses during the RTS phase. Wadey et al. (2014) pointed out a direct correlation between reinjury anxiety and RTS timeline, which matches the findings of Meier et al. (2020) that persistent models of fear directly inhibit functional recovery. When these factors remain unresolved, the risk of permanent sport abandonment increases. Ebert et al. (2025) state a high rate of sport

discontinuation due to fear of reinjury and a lack of confidence in the knee, and Caumeil et al. (2024) explain this with intense reinjury anxiety, kinesiophobia, and depression. A strong impact of fear of reinjury on permanent withdrawal from sport is also confirmed by the latest data stated by McPherson et al. (2024), designating postoperative fear as the main non-physical predictor of career termination during RTS approval. The negative correlations that we established in our research in the papers of Forsdyke et al. (2022) and Ohji et al. (2023) are in complete agreement with the classical study by the author Kvist et al. (2005) who identified kinesiophobia as a key barrier for RTS.

Psychological Readiness and Confidence

The evaluation of psychological readiness and confidence in the knee after a surgical procedure indicates a deep gap between injury healing and successful functional recovery on one side, and the mental preparedness of the athlete for a competitive level of sports participation on the other. Faleide et al. (2021) proved that athletes who met RTS criteria earlier compared to unready ones had significantly higher ACL-RSI scores and did not register repeated injuries. This finding that an early high level of psychological readiness is a key predictor of safe RTS was also confirmed by the highly cited meta-analysis published by Ardern et al. (2014), as well as the latest clinical tracking by the author McPherson et al. (2024), proving that objective scores of psychometric scales directly separate successful athletes from those facing chronic delay of RTS. The age aspect and additional modification of these outcomes, in which pediatric athletes achieve a significantly higher RTS rate after ACLR, were confirmed by Thorolfsson et al. (2023). On the other hand, a dangerous clinical trend is observed when subjective confidence overcomes objective neuromuscular recovery. Ueda et al. (2024) established that athletes with a high ACL-RSI score achieve RTS in a high percentage, but simultaneously register a drastically higher rate of secondary ACL tear compared to those with a lower score. This confidence paradox is also confirmed by Paterno et al. (2022), proving that confident participants who pass all functional tests have even a 10 times higher probability of a repeated ACL tear during 24 months, as well as Zarzycki et al. (2024) proving that female athletes who experienced a repeated ACL injury within two years met RTS criteria earlier and had significantly higher overall ACL-RSI scores. These findings provide empirical confirmation for the "unrealistic confidence paradox" described in the literature by Ardern et al. (2014), Grindem et al. (2016), and Grooms et al. (2025), where premature return to competition and an aggressive playing style, caused by a false sense of security, directly lead to repeated injury before the complete return of neuromuscular control. To neutralize this risk, targeted interventions are necessary; Sun et al. (2026) emphasize that cognitive-behavioral physical therapy in patients after ACLR significantly improves their psychological readiness for RTS, through achieving a longer-term higher level of resilience. Finally, achieving a successful profile of a returner to sport requires achieving a combination of high confidence and low negative psychological predictors (Caumeil et al., 2024). Conversely, a lack of confidence in the knee and fear of reinjury in a large number of cases lead to complete abandonment of sport (Ebert et al., 2025).

Self-Efficacy and Motivation

Intrinsic motivation and the self-efficacy of an individual represent key driving factors that directly determine rehabilitation speed and the success rate of RTS. The established elevated values of present and future K-SES (Senorski et al., 2017), as well as the values of total K-SES (Thorolfsson et al., 2023) had a significant impact on the positive correlation of self-efficacy and psychological readiness on one side, and the successful return of athletes to their physical level before injury on the other. These findings directly correspond with the results of a recent study by Meredith et al. (2025) that a high level of postoperative self-efficacy represents a stable cognitive shield that allows an athlete to persevere through demanding phases of functional training, unlike low levels which lead to early dropout. When it comes to motivational indices, high preoperative motivation proved to be one of the strongest predictors of an increased frequency and a significantly shorter period of RTS in patients with an ankle injury (Bouveau et al., 2022). Conversely, a drop in motivation and a change of priorities lead to sports dropout becoming permanent (Ebert et al., 2025). This dichotomy between high motivation and permanent loss of interest fully supports the self-determination theoretical model in sports traumatology, revised by Meredith et al. (2025), which proves that intrinsic motivation acts as the primary psychological engine that ensures high compliance with recovery protocols.

Social Support and Coping

The combined action of the external social environment and internal coping mechanisms significantly helps the transition from functional rehabilitation to full RTS. The statement of injured pediatric athletes and their parents that social support from physical therapists during rehabilitation is the most significant predictor of a successful RTS (Paterno et al., 2019) is in line with the claim of Podlog et al. (2015) that quality interaction with medical staff accelerates cognitive adaptation. However, Forsdyke et al. (2022) also emphasize the indirect negative impact of injury anxiety on the protective link between social support and psychological readiness, with evidence that intense fear can block the athlete's cognitive resources and prevent them from utilizing the available support from the environment. These findings are in line with the work of the authors Nwachukwu et al. (2024), who emphasize that the social isolation of an injured athlete during clinical recovery directly obstructs the restoration of their mental readiness and delays the moment of obtaining clearance for RTS. When athletes face obstacles during this process, the positive side of applying adaptive coping strategies in controlling rehabilitation outcomes was highlighted by Flanigan et al. (2021) and Wadey et al. (2014). In their research, multiple mediation models were used, utilizing readiness assessment scales relying on the validation established by Glazer (2009). This role of cognitive restructuring is fully supported in the latest works of Meredith et al. (2025) and Nwachukwu et al. (2024), which prove that athletes who successfully reframe the risk of injury into a challenge show a higher degree of protocol adherence and faster restoration of functional performance.

Athletic Identity

A strong identification with the role of an athlete significantly influences behavior during recovery, but it also carries specific risks. The link between the total AIMS score and adherence to the rehabilitation program, established by Hilliard et al. (2017), is also confirmed by the study of Meredith et al. (2025), which states that athletes with a high athletic identity experience rehabilitation as the only way to regain their social status, which further motivates them to strictly adhere to protocols. However, this predictor shows its negative side in the same sample – negative affectivity was recognized as the only significant predictor of attempts at an accelerated RTS (Hilliard et al., 2017). This finding corresponds with the latest RTS research conducted by Shaw et al. (2025), which proved that athletes with extremely high AIMS scores often consciously hide pain and simulate a false readiness to force an earlier clearance to return to the field, thereby drastically increasing health risks.

Anxiety and Depression

Clinical psychological barriers in terms of anxiety and depression have the heaviest impact on the timeline of physical recovery and the rate of sport dropout. The research results of Baltassat et al. (2024) that patients with signs of anxiety and depression achieve a slower RTS and show a greater tendency to give up on sports completely match the multicenter RTS research conducted by Nwachukwu et al. (2024), which confirms that affective disorders directly inhibit neuromuscular activation during critical phases of RTS. Triana et al. (2021) emphasize that the simultaneous presence of kinesiophobia and depressive states leads to the most unfavorable RTS outcomes. The protective mechanism in which satisfaction with social support during rehabilitation significantly reduces the probability of developing symptoms of depression and anxiety, pointed out by Yang et al. (2014), is also supported by McPherson et al. (2024), emphasizing that a well-organized clinical environment and therapist support prevent the social isolation of the athlete after injury, which directly generates negative affect and leads to a permanent discontinuation of sports participation.

This systematic review has several significant advantages. First of all, it encompassed a wide spectrum of psychological and psychosocial factors associated with RTS after injury. Unlike numerous previous reviews that mainly focused on individual constructs or exclusively on the injury of a single body segment, this review is excluding such limitations, thereby enabling an integrative insight into the psychological factors influencing RTS. An additional advantage is the inclusion of studies with different methodological designs, which allowed for the observation of the process of RTS from both quantitative and qualitative perspectives.

However, the results of this review should be interpreted with certain limitations. The included studies showed significant heterogeneity regarding the type of injury, participant characteristics, time of assessment of psychological factors, and the instruments used. In addition, the most frequently represented studies in the scientific literature with this topic relate to athletes after ACLR, which also determined the structure of our sample. This fact may limit the possibility of generalizing the effects of the action of psychological and psychosocial predictors to other types of sports injuries. Also, certain predictors, such as athletic identity, anxiety, and depression, were represented in a relatively small number of

studies, which limits the reliability of the conclusions relating to these constructs. Despite the stated limitations, the consistency of the findings for fear of reinjury, psychological readiness, confidence, and self-efficacy provides strong support for the crucial role of mental aspects during athletic recovery phases. Additionally, an exact statistical verification of consensus among investigators (such as Cohen's kappa coefficient) was omitted for the title, abstract, and full-text screening stages, which represents a methodological limitation of this review. Furthermore, a formal methodological quality assessment or risk of bias tool (such as the Newcastle-Ottawa Scale or RoB 2) was not applied to the included studies, which should be considered a limitation when interpreting the strength of the evidence.

Conclusion

The success and course of RTS after sports injuries represent a multidimensional process that, in addition to stable functional and anatomical parameters, critically depends on psychological and psychosocial predictors. Negative cognitive and affective factors, primarily fear of injury, kinesiophobia, anxiety, and depression symptoms, provenly prolong recovery time and act as primary causes of permanent sport abandonment. On the other hand, high intrinsic motivation and developed self-efficacy accelerate the course of RTS, while adequate social support and adaptive coping mechanisms provide a crucial protection against the athlete's mental decline during isolation.

However, prematurely high psychological readiness and unrealistic confidence can lead to a false sense of security before the complete restoration of neuromuscular control, with a consequent increase in the risk of sustaining a reinjury. Therefore, the main conclusion of this study is that the RTS clearance process requires the mandatory introduction of standardized psychometric screening protocols and the implementation of a multidisciplinary approach, with the aim of determining the optimal balance between the mental and physical readiness of the injured athlete.

Conflict of interests

The authors declare no conflict of interest.

Author Contributions:

Conceptualization, I.G. and M.B.; methodology, I.G., M.B. and H.S.,; softvere, A.K. and D.D.; validation, M.B., A.K. and H.S.; formal analysis, D,D,; investigation, I.G. and M.B., A.K. H.S. and D.D.; resources, I.G.; data curation, M.B., H.S. and D.D.; writing—original draft preparation, I.G., M.B., A.K. H.S. and D.D.; writing—review and editing, I.G., M.B., H.S., A.K. and D.D.; visualization, I.G., M.B. and H.S.; supervision, I.G., M.B., , A.K., H.S. and D.D.; All authors have read and agreed to the published version of the manuscript.

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Nikolić, D., Stošić, K., Stanković, M., Đorđević, J., Stamenković, S., Mitić, D., & Đorđević, S. (2026). Prevalence of overweight and obesity in preschool children in Bujanovac according to the WHO and CDC recommendations, *Sport media and business*, 12(2), 86-96

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Corresponding author: stefan.robi.djordjevic@gmail.com

PREVALENCE OF OVERWEIGHT AND OBESITY IN PRESCHOOL CHILDREN IN BUJANOVAC ACCORDING TO THE WHO AND CDC RECOMMENDATIONS

Dušan Nikolić[1], Katarina Stošić[1], Magdalena Stanković[1], Jelena Đorđević[1], Stevan Stamenković[2], Dragana Mitić[3], Stefan Đorđević[2]

Abstract: *The rising incidence of childhood obesity among preschoolers presents a substantial global public health challenge, with rates climbing to epidemic levels. This study aims to evaluate the occurrence of overweight and obesity among young children in Bujanovac utilizing benchmarks from the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC). The analyzed cohort comprised attendees of the "Naša radost" kindergarten in Bujanovac. A group of 106 individuals took part, consisting of 50 boys (47%) and 56 girls (53%), aged between 3 and 6 years (44–77 months). Anthropometric metrics including body mass and height were documented for each subject to determine their Body Mass Index (BMI). These BMI calculations were subsequently benchmarked against WHO and CDC reference frameworks. Under the WHO standard, 11.3% of the subjects were identified as overweight and 14.2% as obese. Concurrently, the CDC guidelines identified 13.2% as overweight and 12.3% as obese. Both evaluation metrics yielded an identical aggregated overweight and obesity rate of 25.5%. These outcomes indicate that excess body mass among preschoolers in Bujanovac aligns with trends seen in Western Europe while surpassing figures documented across Middle Eastern and African regions. Furthermore, no statistically meaningful variation appeared between the WHO and CDC interpretive models for defining weight categories within this sample (p=0.716). The notable presence of excess weight documented here highlights an urgent necessity for targeted preventive initiatives and public health frameworks designed to lower these metrics and mitigate the long-term health risks linked to early childhood obesity.*

Keywords: obesity, preschool children, overweight, BMI index, southern Serbia.

[1] Academy of Vocational Studies Southern Serbia, Department of the College of Teachers, Bujanovac, Serbia
[2] Faculty of Sport and Physical Education, University of Niš, Niš, Serbia
[3] Faculty of Sport and Physical Education, University of Priština in Kosovska Mitrovica, Leposavić, Serbia

Introduction

The expansion of early childhood obesity is escalating (Gebremedhin, 2015) and poses a significant challenge to international public health frameworks, as international figures reach crisis levels (Wang et al., 2022). Existing data indicates that the most pronounced concentration of excess weight and obesity in early childhood is situated within North America, though European metrics demonstrate similarly concerning trends. Conversely, specific analyses from Asian and African territories suggest that regional cohorts have not yet reached the high levels of weight escalation observed among their North American and European counterparts (Nikolić, Gadžić & Stamenković, 2022). The volume of childhood weight elevation throughout Europe remains substantial. For children under the age of five, regional overweight and obesity numbers fluctuate broadly between 1% and 28.6% (Mantzorou et al., 2023). Inquiries focused on our specific geographic zone demonstrate that young populations in Serbia closely match European averages regarding weight elevation percentages (Jovanović et al., 2010; Đurašković et al., 2012; Stupar, Popović & Vujović, 2014; Ilić, 2014; Međedović et al., 2014; Cvetković & Cvetković, 2018; Pelemiš et al., 2021). The highest probability of carrying obesity into mature adulthood is tied to having obese parents or exhibiting high weight characteristics between three and ten years of age. It is hypothesized that approximately 30% of obese adults displayed high weight parameters during their youth (Đurašković et al., 2012).

According to the WHO, overweight and obesity are defined as an excessive accumulation of fat that can endanger health (Ilić, 2014, Vuceraković & Mitrović, 2021). Among youth cohorts, obesity is characterized by an inflation of body mass exceeding standard reference distributions calibrated for specific sex, age, and standing height parameters, driven by disproportionate internal adiposity (Peco Antić, 2009). Elevated weight parameters in early childhood create a profound dilemma paired with enduring and dangerous medical sequelae (Mantzorou et al., 2023), which directly impacts the developmental trajectory of the youth (Fäldt et al., 2023). These consequences manifest as psychological and somatic health impairments, diminished quality of life vectors, insulin resistance markers, metabolic disorders, hypertension, lipid abnormalities, and distinct cardiovascular, orthopedic, and oncological issues (Liu et al., 2022; Sekhobo et al., 2010). Early weight issues regularly transition into adulthood as a persistent pathology, sparking numerous downstream crises like emotional difficulties, obstructive sleep apnea, metabolic syndromes, high blood pressure, strokes, and specific tumors (Sekhobo et al., 2010; Wang et al., 2022; Fäldt et al., 2023). Empirical observations suggest that the collective influence of overlapping habits involving dietary routines, physical conditioning, and inactive behaviors—collectively recognized as the behavioral energy balance—is intimately linked to the probability of developing elevated weight status (Miguel-Berges et al., 2023). The initial stages of childhood represent a highly sensitive developmental milestone highlighted by rapid somatic and neurological progression (Liu et al., 2022) and provide an optimal target for obesity mitigation efforts, particularly among children from marginalized social frameworks (including economically disadvantaged contexts, ethnically minoritized groups, or unstable migratory

positions) who exhibit an elevated risk profile for weight gain (Woronko et al., 2023). It is strongly advised that structural interventions target early childhood horizons, as protocols introduced during later youth or adolescence demonstrate lower success metrics. Crucial behavioral models regarding nutritional intake and motor engagement take root during these foundational seasons of growth (Miguel-Berges et al., 2023). Recognizing that childhood weight issues can be successfully mitigated underscores the necessity of achieving a complete structural grasp of this issue to prompt effective remediation.

The objective of this research is to evaluate the distribution of overweight and obesity metrics among preschool cohorts in Bujanovac by applying the diagnostic frameworks structured by the WHO (World Health Organization) and the CDC (Centers for Disease Control and Prevention). In line with this objective, the foundational premise of this inquiry is that no statistically significant variations exist between these two analytical methodologies.

Methods

Participants

The study cohort was drawn from the student body of the "Naša radost" preschool facility located in Bujanovac. The complete experimental group included 106 young children, comprising 50 male subjects (47%) and 56 female subjects (53%). The age spectrum ranged from 3 to 6 years, equating to 44 to 77 months, with a calculated mean chronological age of 4.7 years (61.8 months). To classify weight stratifications, individual body mass and height coordinates were gathered to determine Body Mass Index (BMI). Stature was registered using a GPM anthropometer (manufactured in Switzerland), with participants positioned barefoot on a flat horizontal plane, maintaining an erect posture, fully aligned spine, and touching heels. The transverse arm of the anthropometer was lowered until it contacted the vertex of the cranium. Measurements were recorded to an accuracy of 0.1 cm and subsequently converted into meters. Total body mass was assessed via a Tefal 6010 digital scale (manufactured in France) with participants wearing minimal clothing while standing motionless on the center of the platform. Mass values were collected from the digital display with a precision of 0.1 kg.

BMI was calculated according to the standard formula, i.e. BMI =kg/m^2. Even though the mathematical formula for BMI is uniform across adult and pediatric populations, the classification logic differs significantly because body fat volume undergoes major transitions across developmental ages. Additionally, adiposity configurations vary dynamically between boys and girls. The derived BMI points were contextualized using standard tables provided by the WHO (World Health Organization) and the CDC (Centers for Disease Control and Prevention). These assessment matrices account for biological sex and age, transforming raw BMI positions into percentiles to indicate an individual child's standing relative to a peer demographic of identical age and sex. Consequently, children were allocated among four separate mass groupings: underweight, normal weight, overweight, and obese (Table 1).

Data analysis

Descriptive statistics were generated using the Statistica 10 analytical package. The distribution profile of the metrics was examined via skewness and kurtosis calculations. Skewness was utilized to appraise the symmetry of data parameters relative to the sample mean, where a perfectly balanced distribution yields a value of 0. Furthermore, kurtosis was used to capture the peak or flatness of the distribution curve, centering around a baseline expectation of 2.75. A kurtosis score substantially exceeding 2.75 indicates a leptokurtic distribution characterized by a tight concentration of data points, whereas a score notably below 2.75 represents a platykurtic layout indicating dispersed data configurations (Cain, Zhang, & Yuan, 2017). Pearson's correlation coefficients were deployed to verify the associations between the structural predictors and primary outcomes. The correlation strength was categorized using standard benchmarks (Hopkins, Marshall, Batterham, & Hanin, 2009): negligible ($0<r<0.1$), small ($0.1<r<0.3$), moderate ($0.3<r<0.5$), large ($0.5<r<0.7$), very large ($0.7<r<0.9$), and nearly absolute ($0.9<r<1$). Additionally, linear regression models were calculated to explore the impact of lower extremity structure on performance metrics during race walking.

To determine the position of the BMI value, the calendar age of the children was taken from the records in the preschool institution. Tables and graphs by which children were categorized according to the level of weight are available on the WHO website (WHO, 2024) and the CDC website (CDC, 2024).

Table 1. Categories of weight.

Underweight	Less than 5th percentile	< 5th percentile
Normal weight	from the 5th to less than the 85th percentile	5-85th percentile
Overweight	From the 85th to less than the 95th percentile	85-95 percentile
Obesity	Equal to or greater than the 95th percentile	≥ 95th percentile

Statistical procedures were expanded using the SPSS 20 platform. The following techniques were utilized:

- A Chi-square (X^2) test of independence to analyze the association between individual weight classification outcomes and the choice of diagnostic paradigm (WHO vs. CDC), with statistical significance anchored at $p < 0.05$.
- Descriptive frequency distributions to capture the essential percentage allocations required for this project.

Results

Table 2. Weight level of preschool children in Bujanovac.

Weight level	WHO		CDC	
	N	%	N	%
Underweight	3	2.8%	6	5.7%
Normal weight	76	71.7%	73	68.8%
Overweight	12	11.3%	14	13.2%
Obesity	15	14.2%	13	12.3%
Children who are normally weight	76	71.7%	73	68.8%
Children who are not normally weight	30	28.3%	33	31.2%

Legend: N - number of respondents; % - percentage of respondents; WHO - results according to the recommendations of the World Health Organization; CDC - results according to the recommendations of the Center for Disease Control and Prevention.

The empirical findings produced through the WHO criteria show that out of the entire group, 2.8% present as underweight, 71.7% exhibit normal weight, 11.3% fall into the overweight category, and 14.2% present with obesity. To contextualize the scale of mass variations, we verified that while 71.7% of these preschoolers occupy a normal weight range, 28.3% display a shift away from standard weight parameters. Looking at the CDC framework, 5.7% of the total cohort are classified as underweight, 68.8% sit within the normal weight range, 13.2% are categorized as overweight, and 12.3% display obesity. In total, 68.8% of the children possess normal weight parameters, whereas 31.2% exhibit clear variations from standard weight balances.

Table 3. X^2 test of independence - association of weight level with the choice of the WHO or CDC recommendation.

Org.	Underweight	Normal weight	Over weight	Obesity	X^2	P	Cramer's V
WHO	3 (2.8%)	76 (71.7%)	12 (11.3%)	15 (14.2%)	1.35	0.716	0.080
CDC	6 (5.7%)	73 (68.9%)	14 (13.2%)	13 (12.3%)			

Legend: * Legend: Org. - organization; WHO - results according to the recommendations of the World Health Organization; CDC - results according to the recommendations of the Center for Disease Control and Prevention; X^2 - test result; p - significance level; Cramer's V - effect size.

The X^2 test of independence verified that there is no statistically meaningful relationship between recorded weight statuses and the specific diagnostic guideline chosen to classify those parameters, X^2 (n=212) = 1.357, p=0.716, Cramer's V=0.080. This confirms that the proportions of children occupying the four weight categories under the WHO system do not deviate significantly from the patterns generated by the CDC protocol. Specifically, the

distribution of underweight, normal weight, overweight, and obese configurations remains statistically uniform regardless of whether the WHO or CDC framework is applied. Underweight metrics register at 2.8% via WHO and 5.7% via CDC. Normal weight parameters are 71.7% under WHO and 68.9% under CDC. Overweight percentages are 11.3% (WHO) versus 13.2% (CDC), while obesity figures reach 14.2% (WHO) versus 12.3% (CDC).

Discussion

The data derived from this project indicate that the prevalence of elevated body mass and obesity among preschoolers in Bujanovac is high, irrespective of the analytical framework utilized for evaluation. Based on the WHO analytical track, a significant 25.5% of the sample presents with overweight or obesity. Interestingly, applying the CDC framework produces an identical cumulative value of 25.5%. These parameters highlight a clear need to establish coordinated countermeasures to manage these metrics and shield young cohorts from the physiological risks associated with high weight profiles.

Overweight and obesity according to the WHO recommendation

Our calculations indicate that the overweight rate for preschoolers in Bujanovac is 11.3%, with obesity tracking at 14.2%. While these figures are concerning, evaluating them alongside parallel studies across Serbia reveals that the metrics in Bujanovac are lower than those recorded in Pančevo, Jagodina, Ćuprija, and Niš. Specifically, Jovanović et al. (2010) identified an overweight rate of 13.5% and an obesity rate of 15% among 4- and 5-year-old subjects in Pančevo. That combined high-weight metric reached 28.5%, contrasting with our lower regional finding of 25.5% in Bujanovac. Those researchers also noted that children with high weight parameters frequently had mothers who were also overweight or obese. Even more striking configurations were reported by Ilić (2014) from a preschool sample in Jagodina and Ćuprija, where overweight hit 19.5% and obesity was 14.6%. Their total high-weight metric of 34.1% exceeds both the Pančevo data (28.5%) and our Bujanovac results (25.5%). Furthermore, Đurašković et al. (2012) found an overweight rate of 25.6% and an obesity rate of 16.5% among young children in Niš. Their total combined rate of 42.1% is dramatically higher than our data from Bujanovac (25.5%), while also outstripping the findings from Pančevo (28.5%) and the Jagodina/Ćuprija area (34.1%).

Comparative data from Chile shows that preschoolers in Bujanovac have not reached the high weight elevations recorded among youth in that Latin American country. Kain et al. (2009) documented an overweight prevalence of 25.6% and an obesity rate of 15.6%. Their total elevated weight proportion of 41.2% is considerably higher than the 25.5% registered in Bujanovac. Looking at North American data, Twells & Newhook (2011) discovered that childhood overweight in Canada stood at 26%, more than double our observed rate of 11.3%, while their obesity level (11.3%) was slightly below our Bujanovac figure (14.2%). However, looking at the cumulative high-weight picture, Canada's total metric (37.3%) is notably higher than the 25.5% seen in Bujanovac. Conversely, the patterns reported by Ma et al. (2011) for preschoolers in Northeast China closely mirror our local data, showing an overweight rate of 10.9%, an obesity rate of 13.8%, and a cumulative high-weight metric of 24.7%.

Academic investigations out of Spain, Poland, and the Kingdom of Bahrain show overlapping patterns for overweight relative to Bujanovac, but show obesity metrics that are nearly 50% lower. Ortiz-Marrón et al. (2018) reported a 16.5% overweight rate and a 5.5% obesity rate among preschoolers in Madrid (totaling 22%). Kułaga et al. (2016) noted an 11.1% overweight rate and a 4.1% obesity rate among young cohorts in Poland (totaling 15.2%). Similarly, Al Alawi et al. (2013) found an 12.1% overweight rate and a 2.6% obesity rate in the Kingdom of Bahrain (totaling 14.7%). In comparison, the combined high-weight level in Bujanovac (25.5%) remains elevated relative to the cohorts in Spain (22%), Poland (15.2%), and Bahrain (14.7%).

Overweight and obesity according to the CDC recommendations

Focusing on the CDC methodology, our study reveals an overweight prevalence of 13.2% alongside an obesity prevalence of 12.3% in Bujanovac. Dermanović, Miletić & Pavlović (2015) recorded a slightly higher layout in Republika Srpska, noting an overweight frequency of 16.7% and an obesity level of 13.3%, yielding a combined metric of 30% compared to our local 25.5%. Conversely, Stupar, Popović & Vujović (2014) identified lower weight trends in Novi Sad, with overweight standing at 12% and obesity at 9% (totaling 21%). Pelemiš et al. (2021) documented even lower profiles from a Belgrade preschool sample, noting an overweight prevalence of 9.6% and an obesity frequency of 7.5%, resulting in a combined high-weight metric of 17.1% that sits well below our Bujanovac configurations.

According to historical data from Manios et al. (2007), young cohorts in Greece more than a decade ago presented with higher obesity patterns than those currently observed in Bujanovac. Those authors recorded an overweight rate of 16.3% and an obesity level of 15.7%, culminating in a total elevated body weight prevalence of 32%.

Data tracking from Iran and Iraq shows that childhood weight inflation in the Middle East falls below the benchmarks observed in Bujanovac. Gaeini et al. (2011) identified an overweight rate of 10.1% and an obesity rate of 4.6% in Tehran, establishing a combined metric of 14.7%. Overlapping figures were published by Fatemeh et al. (2012), who found an overweight rate of 10.6% and an obesity rate of 7.6% among preschoolers in Birjand, totaling 18.2%. Hassanzadeh-Rostami, Kavosi & Nasihatkon (2016) reported even lower metrics, with an overweight frequency of 5.7% and an obesity rate of 5.2% (totaling 10.9%). Finally, Ali Musa & Hassan (2010) found an overweight level of 10.5% and an obesity level of 3.3% among young cohorts in Iraq, resulting in a combined elevated weight frequency of 13.8%.

Differences in weight level depending on the use of the CDC and WHO recommendations

The analytical output of our inquiry confirmed the absence of a statistically significant relationship between classified weight profiles and the specific assessment guidelines utilized. This indicates that the percentage allocations for overweight and obese children produced via the WHO criteria do not vary significantly from the allocations generated using the CDC protocols.

The literature surrounding this topic shows that studies using both WHO and CDC frameworks on identical pediatric samples often produce contrasting results. For instance, in the study by Kułaga et al. (2016), weight elevation metrics were higher when applying the CDC criteria compared to the WHO tracks. Specifically, overweight registered at 18.2% via CDC versus

11.1% via WHO, while obesity registered at 8.3% via CDC versus 4.1% via WHO, culminating in an overall high-weight metric of 26.5% (CDC) versus 15.2% (WHO). In contrast, investigations by Twells & Newhook (2011) and Al Alawi et al. (2013) found that overweight frequencies were higher under the WHO system, whereas obesity parameters were more pronounced when using the CDC framework. Twells & Newhook (2011) documented overweight at 26% (WHO) versus 19.1% (CDC), paired with obesity at 11.3% (WHO) versus 16.6% (CDC). Al Alawi et al. (2013) noted an overweight prevalence of 12.1% (WHO) versus 9.8% (CDC), alongside an obesity prevalence of 2.6% (WHO) versus 5.2% (CDC). Different configurations were presented by Ma et al. (2011), who determined that overweight was higher under the CDC protocol (11.3% vs. 10.9%), while obesity was more prevalent under the WHO guidelines (13.8% vs. 11.7%).

Reflecting on these collective outcomes, it is clear that the use of advanced equipment to evaluate nutritional components remains highly valuable, alongside the deployment of precise physical scales to capture granular somatic shifts.

In addition to these structural strengths, a clear limitation should be noted regarding the total sample size, which limits our ability to more exhaustively evaluate the foundational research hypothesis.

Conclusion

The empirical findings of this research show that the prevalence of overweight and obesity among young children in Bujanovac is high, regardless of whether the WHO or CDC interpretive framework is selected. This preschool cohort mirrors the weight inflation trends recorded among peers in Western Europe, while demonstrating higher obesity metrics than those documented in African and Middle Eastern territories. Furthermore, direct comparisons between the WHO and CDC diagnostic frameworks revealed no statistically significant deviations in the proportion of children classified with elevated body weight. These findings highlight that the notable presence of excess weight among preschoolers in Bujanovac underscores an immediate need for structured preventive strategies and timely public health campaigns designed to curb these rates, thereby reducing the long-term medical risks associated with early childhood obesity.

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Corresponding author: katemou@phed-sr.auth.gr

PRE-SERVICE PHYSICAL EDUCATION TEACHERS' PERCEPTIONS, AND INTENTIONS TOWARD INCLUSIVE EDUCATION: A THEORY OF PLANNED BEHAVIOR PERSPECTIVE

Katerina Mouratidou[1], Theocharis Michos[1], Christina Evaggelinou[1]

Abstract: *The present study investigated pre-service physical education (P.E.) teachers' attitudes, intentions, and perceived behavioral control (PBC) regarding the inclusion of children with disabilities in mainstream schools, as well as the relationships among these variables. It further examined the effects of gender and year of study and explored the association between perceived academic preparation and perceived teaching competence within the TPB framework. A total of 176 P.E. students (68 males, 108 females) completed validated questionnaires. Descriptive findings indicated high intention (M = 6.02, SD = 0.82) and positive attitudes (M = 5.74, SD = 0.67), whereas PBC was moderate (M = 5.00, SD = 1.15). Year of study did not significantly affect TPB variables (p > .05), while female students reported significantly higher intention scores than males, t(174) = −2.44, p < .01. Correlation analyses revealed significant positive associations between attitudes and intention (r = .457, p < .01), intention and PBC (r = .451, p < .01), and attitudes and PBC (r = .273, p < .01). Moreover, perceived university preparation was strongly associated with perceived teaching competence (r = .637, p < .01), which was moderately related to attitudes (r = .278, p < .01) and intention (r = .264, p < .01). The findings highlight the central role of university preparation in strengthening inclusive dispositions and perceived competence among future P.E. teachers.*

Keywords: Students with disabilities, teacher preparation, pedagogical readiness, educational mainstreaming, professional predispositions, special educational needs

[1] Department of Physical Education & Sport Science at Serres, Aristotle University of Thessaloniki, Greece

Introduction

Over the last few decades, the integration and mainstreaming of students with diverse functional limitations within standard educational environments has drawn substantial attention from pedagogues and school systems. This cooperative educational environment yields constructive developmental and social outcomes both for the integrated youth and for their typically developing peers (Boyle et al., 2023; Rojo-Ramos et al., 2022; Saloviita, 2018; Zagona, Kurth & MacFarland, 2017). The philosophy of inclusive schooling, which centers on embedding children with distinct educational demands into traditional classrooms, represents a contemporary instructional paradigm and empirical domain dedicated to building learning environments that secure equitable development pathways for every student.

Operating within this conceptual territory, a considerable body of literature has utilized Icek Ajzen's (1991) Theory of Planned Behavior (TPB) to evaluate the prospective behavioral commitments of working educators and university students regarding the classroom integration of youth with special needs. According to this psychological model, the focal drivers shaping actual execution are personal attitudes, subjective social pressures, perceived behavioral control (PBC), and behavioral intentions. More precisely, the TPB posits that actions are directly guided by an individual's explicit intent to act, which is structurally dependent upon: (a) one's evaluative orientation toward the action, (b) subjective norms capturing the perceived social endorsement of the behavior, and (c) the level of perceived control over the action, which reflects the person's internal conviction regarding their capacity to execute it.

Modern empirical studies applying the TPB framework have demonstrated that a major element shaping how teachers view inclusive school settings is their active engagement with dedicated special education and inclusion modules during higher education (Zagona et al., 2017). Furthermore, evidence indicates that standard classroom instructors across various academic fields frequently harbor less encouraging orientations toward embedding students with special needs, and these viewpoints show only minor correlations with their subjective self-efficacy metrics (Saloviita, 2018). This pattern indicates that feeling generally competent as an instructor does not automatically translate into a willingness to adopt inclusive classroom strategies.

Scholars have turned distinct focus toward the professional outlook of physical education (P.E.) instructors, who, despite experiencing institutional preparation paths parallel to special educators, regularly express lower levels of confidence when tasked with directing classes that integrate students with disabilities (Symeonidou & Phtiaka, 2014). Corresponding difficulties were highlighted by Rojo-Ramos et al. (2022), noting that P.E. specialists frequently experience complications when handling student diversity, even when they outwardly advocate for inclusion principles. Discrepancies in professional mindsets have also been documented when comparing pre-service candidates to active, in-service P.E. teachers based on their specific institutional level, with primary school instructors demonstrating more

receptive outlooks than secondary education specialists (Boyle et al., 2023; Rojo-Ramos et al., 2022). In addition, variances often emerge based on the nature of the child's impairment, as educators report diminished self-perceived capability when instructing students experiencing intense behavioral or emotional challenges (Avramidis et al., 2000). Prior exploratory work has also illustrated that unsupportive mindsets toward educational integration are frequently tied to gaps in professional knowledge and field experience (Block & Obrusnikova, 2007; Hersman & Hodge, 2010; Papadopoulou et al., 2004; Sato & Hodge, 2007; Simons & Kalogeropoulos, 2005). Conversely, structured university coursework during the undergraduate phase serves as a cornerstone for building positive professional attitudes and driving instructional competence (Tanure Alves et al., 2022).

Considered collectively, the evidence suggests that teacher preparation during university studies is a critical factor for the successful implementation of inclusion programs. Participation in specialized inclusive education courses significantly affects the attitudes, intentions, and PBC of future P.E. teachers. Although previous research has extensively examined teachers' attitudes toward inclusive education, several important gaps remain. First, limited research has simultaneously examined the interrelationships among the core TPB variables (attitudes, intentions, and PBC) within the context of P.E. Second, while university preparation has been identified as an influential factor, its association with perceived teaching competence and its indirect connection to TPB variables remain underexplored. Third, empirical evidence focusing specifically on pre-service P.E. teachers within the Greek educational context is scarce. Given that teacher preparation systems vary substantially across countries, understanding how academic preparation shapes psychological readiness for inclusion is particularly important in this national context. To address these gaps, a systematic examination of the interrelations among TPB variables and the role of perceived academic preparation in shaping inclusive readiness is warranted.

Purpose

The aim of this study was to examine the personal attitudes, behavioral intentions, and PBC of future P.E. instructors regarding the mainstreaming of children with special needs in standard classrooms, alongside investigating the structural relationships among these specific elements. Additionally, the explicit sub-objectives were: a) to evaluate whether participant gender and current year of study exert a significant impact on the three focal TPB dimensions, and b) to assess the connection between pre-service P.E. teachers' appraisals of their university coursework preparation and their subjective teaching confidence, in relation to the three overarching parameters of the TPB model.

Research Hypotheses

Drawing on the foundational tenets of the TPB and relevant empirical literature, the following research hypotheses were established:

H1: Attitudes toward inclusion will be positively associated with intention.
H2: Perceived behavioral control will be positively associated with intention.
H3: Attitudes and PBC will be positively interrelated.

H4: Perceived university preparation will be positively associated with perceived teaching competence.

H5: Perceived teaching competence will be positively associated with attitudes and intention.
H6: Female pre-service P.E. teachers will report higher intention scores than male students.
H7: Year of study will significantly influence TPB variables.

Methods

Participants

The empirical data collection took place in Greece, capturing a sample of 176 undergraduate and postgraduate students (68 males and 108 females) from university Departments of Physical Education and Sport Science. The participating individuals represented future P.E. specialists qualifying for placement within the national Greek school framework. In terms of sample distribution, 16 individuals were in their 1st academic year, 35 in their 2nd, 25 in their 3rd, 73 in their 4th, 16 were completing remaining requirements, 7 had graduated, and 4 were pursuing advanced postgraduate degrees.

Measures

The data gathering process utilized an evaluation instrument structured into three distinct segments:

a) A standard demographic section, which collected baseline participant characteristics including biological sex, current age, specific year of registration, and current degree level (undergraduate versus postgraduate).

b) An adaptation of the classic TPB assessment model (Ajzen & Madden, 1986), comprising: five items centered on attitudes (initiated by the introductory statement: "In the future, when I work as a P.E. teacher, including a student with a disability in my class will be something I consider to be...", which was paired with bipolar semantic indicators such as "bad-good", "wrong-right", etc.), four items focusing on prospective intention, and three items tracking individual PBC. Throughout these metrics, responses were captured via 7-point Likert scales. For the attitude construct, the values spanned from 1 = most negative to 7 = most positive; for the intention and PBC items, the options extended from 1 = strongly disagree to 7 = strongly agree. This metric was refined and customized for Greek populations following standard methodological protocols (Ajzen, 2006). Internal consistency metrics demonstrated strong reliability coefficients for the attitude scale (\alpha=.88) and the PBC construct (\alpha=.81), while showing excellent internal structure for the intention construct (\alpha=.93). These diagnostic scores verify that all three TPB constructs possessed highly acceptable internal consistency across the entire group (N=176).

c) A customized pedagogical capability and training questionnaire, which featured a single metric exploring subjective teaching confidence (graded via a 7-point Likert scale, ranging from 1 = not at all competent to 7 = completely competent), alongside an item measuring the perceived quality of higher education coursework for instructing youth with physical or

developmental challenges (evaluated on a 5-point Likert scale, where 1 = very poor and 5 = excellent).

Procedure and Ethical Considerations

The research data were gathered via an online digital interface using Google Forms, relying on a snowball distribution approach. The direct questionnaire link was circulated across institutional student email groups and professional social networking channels targeting future P.E. educators. Participation in the study was entirely voluntary and fully anonymous. Before entering the questionnaire portal, all respondents were briefed on the study's scientific goals and provided their electronic informed consent. The collection protocol did not gather any direct personal identifiers.

In alignment with the institutional guidelines of the Aristotle University of Thessaloniki (AUTH), this non-interventional, survey-based study involving legally capable adult participants did not require formal prior clearance from the University Research Ethics and Integrity Committee (EHDE). The data gathering process adhered strictly to the ethical standards detailed in the Declaration of Helsinki as well as the mandate parameters of the General Data Protection Regulation (GDPR).

Study Variables

The primary target variables evaluated in this study were personal attitudes, behavioral intention, and PBC regarding the classroom integration of students with specific impairments. Each individual dimension was quantified by calculating the mean score of its corresponding questionnaire entries (five variables for attitudes, four for intention, and three for PBC), using 7-point Likert measurement paths. The independent predictors included participant gender (male versus female) and current year of study (divided into seven distinct brackets), both analyzed as categorical indicators. Subjective teaching confidence was assessed through a single 7-point scale option, while the perceived quality of higher education preparation was monitored via a 5-point metric. Elevated scores represented highly supportive attitudes, robust behavioral intents, stronger PBC, elevated personal competence, and superior coursework preparation.

Data analysis

Statistical processing was carried out via the SPSS software package (Version 29). Descriptive parameters (means along with standard deviations) were generated for every target metric. Pearson bivariate correlation coefficients were computed to map the associations between core TPB elements, subjective teaching confidence, and perceived academic preparation. Independent-samples t-tests were utilized to evaluate differences between genders relative to the TPB scores. Furthermore, one-way analyses of variance (ANOVAs) were deployed to explore fluctuations across the various years of study. Baseline testing for data normality and equal variances was executed via Shapiro-Wilk and Levene's diagnostics, respectively, with all conditions meeting acceptable standards. The alpha threshold for determining statistical significance was maintained at $p<.05$.

Results

Table 1 outlines the specific means and corresponding standard deviations for the three focal dependent dimensions, organized by participant gender and year of study.

Table 1. Descriptive statistics for TPB variables by gender and year of study.

Year of study	Gender	M±SD for attitudes	M±SD for intention	M±SD for PBC	N
1st year	Male	-	-	-	-
	Female	5.77±.46	6.28±.65	4.79±1.24	16
	Total	5.77±.46	6.28±.65	4.79±1.24	16
2nd year	Male	5.84±.58	5.9±.85	5.24±1.16	11
	Female	5.50±.66	5.82±.66	4.72±1.08	24
	Total	5.60±.64	5.85±.71	4.88±1.12	35
3rd year	Male	5.56±.79	5.72±.76	4.89±1.15	16
	Female	6.04±.48	6.22±.93	5.18±1.19	9
	Total	5.74±.73	5.9±.84	5±1.15	25
4th year	Male	5.72±.66	5.71±.94	5.03±1.17	28
	Female	5.81±.60	6.22±.75	5.19±1.13	45
	Total	5.78±.63	6.02±.85	5.13±1.14	73
Degree-pending students	Male	5.51±1.15	6.06±.93	4.59±1.05	9
	Female	5.43±.77	5.89±1.07	4.33±1.58	7
	Total	5.47±.97	5.98±.96	4.48±1.27	16
Graduate students	Male	5.80±.85	6.00±1.41	5.83±.23	2
	Female	6.32±.27	6.45±.41	5.067±.79	5
	Total	6.17±.48	6.32±.70	5.28±.75	7
Postgraduate students	Male	6.50±.14	7.00±.00	6±.470	2
	Female	6.50±.42	7.±.0	6.5±.70	2
	Total	6.50±.26	7.±.0	6.25±.57	4
TOTAL	Male	5.70±.75	5.84±.88	5.03±1.13	68

	Female	5.77±.61	6.14±.75	4.99±1.17	108
	TOTAL	5.74±.67	6.02±.82	5±1.15	176

The calculated descriptive indices showed that, for the collective sample, relatively high mean scores were present for personal attitudes (M=5.74, SD=0.67), PBC (M=5.00, SD=1.15), and prospective intention (M=6.02, SD=0.82) regarding the embedding of youth with challenges into P.E. environments. In a more detailed view, mean metrics across the different academic years stretched from 5.47 (second-year cohorts) to 6.50 (advanced postgraduate students) for attitudes, from 5.85 (second-year cohorts) to 7.00 (advanced postgraduate students) for behavioral intention, and from 4.48 (degree-pending individuals) to 6.25 (postgraduate students) for PBC.

Moving further into inferential evaluation, the calculation of three standalone one-way ANOVAs (treating academic year as the grouping factor, and personal attitudes, intentions, and PBC as separate criteria) demonstrated that the current year of higher education was not a significant determinant affecting any of the primary TPB indices [specifically: $F(6,169)=2.124$, $p>.05$ for personal attitudes; $F(6,169)=1.773$, $p>.05$ for intentions; and $F(6,169)=1.741$, $p>.05$ for PBC] (refer to Table 2).

Table 2. Results of One-Way ANOVAs examining the effect of Year of Study on TPB variables.

Dependent Variable	df (Between, Within)	F	p-value	η^2
Attitudes	(6, 169)	2.124	> .05	.070
Intentions	(6, 169)	1.773	> .05	.059
Perceived Behavioral Control	(6, 169)	1.741	> .05	.058

In addition, as revealed through three independent-samples t-test computations, the student's gender did not act as a statistically significant factor for personal attitudes ($t=-0.661$, $p>.05$) or PBC scores ($t=0.216$, $p>.05$). Crucially, however, this trend changed regarding the behavioral intention construct, as female respondents demonstrated significantly higher prospective intention metrics (M=6.14, SD=0.75) than their male peers (M=5.83, SD=0.88), [$t(174)=-2.440$, $p<.01$].

Lastly, Pearson product-moment correlation analysis, computed to chart the paths linking the three core TPB markers, the participants' subjective teaching confidence with integrated populations, and their appraisal of higher education preparation quality, surfaced multiple positive and meaningful linkages. Specifically, the following statistical paths were confirmed: (a) personal attitudes displayed a strong and positive relationship with prospective intentions ($r=.457$, $p<.01$) while exhibiting a moderate positive link with PBC ($r=.273$, $p<.01$); (b) behavioral intentions were strongly and positively connected to PBC scores ($r=.451$, $p<.01$); (c) perceived university preparation quality for special needs contexts exhibited a strong,

positive link with subjective teaching confidence (r=.637, p<.01); and (d) subjective teaching confidence demonstrated moderate positive associations with both personal attitudes (r=.278, p<.01) and prospective intentions (r=.264, p<.01) among the student sample. These specific statistical linkages are structurally compiled in Table 3.

Table 3. Pearson Correlations among TPB Variables, Perceived Academic Preparation, and Perceived Teaching Competence.

		1.	2.	3.	4.	5.
1.	Attitudes	1				
2.	Perceived Behavioral Control	.273**	1			
3.	Intention	.457**	.451**	1		
4.	Perceived academic preparation	.277**	.220**	.253**	1	
5.	Perceived teaching competence	.278**	.162*	.264**	.637**	1

Note: * p< .05. ** p< .01.

Discussion

This exploration set out to analyze future P.E. educators' personal attitudes, behavioral intentions, and PBC towards integrating children with specific challenges into mainstream school environments, alongside tracking the structural links between these components. Additional objectives focused on evaluating potential variations driven by student gender and current academic year, while exploring how perceived coursework preparation and self-rated teaching confidence connect to core TPB dimensions. The final data validated our foundational expectations, suggesting a highly positive baseline for implementing successful inclusive practices within physical education classes. The survey participants demonstrated widely positive viewpoints and robust behavioral commitments towards classroom integration, scoring highly across all evaluated TPB constructs. These patterns align with the findings of Sharma and Sokal (2015), which detailed that a heightened professional readiness to include youth with disabilities is strongly associated with intensified personal efforts to implement inclusive strategies during lessons.

This encouraging professional climate presents an optimistic outlook for the future layout of the school system. The pre-service P.E. candidates in this sample seem to evaluate functional impairment not as an absolute constraint, but rather as an expression of individual human diversity that should not isolate a student from the shared classroom environment. Heightened societal exposure to Elite Para-Sports (such as the global Paralympic Games) could likewise support more receptive personal views, increasing the probability that these forthcoming educators will lead their student groups toward broader acceptance and social integration of peers with functional challenges. Subsequent studies could beneficially track the direct influence of hands-on participation in adaptive sports modules on the evolving orientations of P.E. university students.

The generated data also pointed to the absence of meaningful gender-driven variations in relation to personal attitudes or PBC metrics. Conversely, female students exhibited a significantly stronger prospective intention to integrate children with disabilities into general classes compared to male students. This suggests that female P.E. specialists may exhibit a higher behavioral inclination to actualize inclusive strategies within real-world educational environments. This specific trend reflects prior evidence detailed by Saloviita (2018), whereas Rojo-Ramos et al. (2022) demonstrated that male instructors scored slightly higher on specific procedural components of inclusion initiatives. Reflecting on these conflicting paths across the literature, it is apparent that biological sex yields inconsistent findings, with certain projects favoring male candidates and others favoring female candidates regarding inclusive viewpoints and actions. In this specific investigation, female respondents scored significantly higher on behavioral intent, while male respondents scored slightly higher (though without reaching statistical significance) on the PBC index.

Notably, the PBC dimension registered the lowest mean index among the three core TPB components, which is highly likely due to the fact that these student participants have not yet encountered inclusive teaching within actual, real-world school settings. Their survey entries may thus capture academic optimism rather than hands-on professional reality. Viewed through the lenses of the TPB, this outcome is theoretically consistent, given that PBC captures anticipated execution constraints. Consequently, while future instructors express solid behavioral intent, their lower metrics for perceived control may echo underlying apprehensions regarding school resource access, university training sufficiency, or complex classroom management scenarios. This emphasizes the vital necessity of executing longitudinal research tracking TPB components both before and after full entry into active teaching, as genuine field experience can profoundly restructure these perceptions.

Broadly speaking, however, the gathered data validates that future P.E. instructors are highly familiar with and supportive of inclusion models. Regardless of whether they were completing undergraduate modules or pursuing postgraduate tracks, the study participants displayed an equal openness to welcoming students with special needs into their sports sessions. These observations are encouraging and motivating, given that these university cohorts represent the upcoming generation of active teachers. Their current positive positioning promises a bright future for inclusive school models, assuming that state educational frameworks structurally reinforce this mindset by providing dedicated school resources and continuing training.

The most focal structural path identified in this research is the tight relationship linking perceived higher education coursework quality to subjective teaching confidence, which subsequently drives positive adjustments in both personal attitudes and behavioral intentions toward classroom integration. This reinforces the principle that professional teacher education serves as a fundamental lever in constructing inclusive mindsets.

Limitations and Future Research

Despite the value of these observations, the current study possesses specific limitations that require acknowledgement. First, although the overall sample size proved adequate for the

statistical operations performed, it was collected from a single regional university context, which potentially constraints the global generalizability of the findings to pre-service P.E. candidates across divergent socio-cultural or national educational frameworks. Second, the reliance on self-reported survey tools can be vulnerable to social desirability biases, as respondents might provide entries they believe are more professionally expected regarding inclusive values. Forthcoming research should aim to engage wider, multi-center samples to strengthen the generalizability of these outcomes. Furthermore, embedding qualitative tracking tools, such as semi-structured individual interviews or focus group sessions, would offer a deeper, more granular understanding of the underlying factors constructing student mindsets.

Conclusion

In summary, this research verifies that future P.E. educators display supportive personal attitudes, robust behavioral intentions, and a moderate level of PBC regarding classroom integration. While prospective intent scores were elevated, the lower indicators for perceived behavioral control may reflect latent worries regarding practical implementation. The perceived quality of university-level coursework emerges as a vital parameter, given that it directly reinforces personal teaching confidence, attitudes, and prospective intention lines.

Ultimately, optimizing teacher education tracks throughout the undergraduate phase by infusing specialized theoretical knowledge, real-world practical exposures, and targeted inclusive instructional strategies remains the ultimate key to the viable execution of school integration models. Securing top-tier academic training stands as one of the most decisive institutional factors for ensuring the successful integration of youth with special needs in modern classrooms and securing equitable educational pathways for all.

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Corresponding author: snezana.vukovic@mpn.gov.rs

ANALYSIS OF THE NATIONAL EDUCATION PORTAL IN THE CONTEXT OF USING CONTENT FOR DEVELOPING A RESPONSIBLE ATTITUDE TOWARDS HEALTH

Snežana Vuković[1], Ivan Savić[2]

Abstract: ***Introduction:*** *Digital educational platforms have become an essential component of contemporary educational systems, providing teachers with accessible resources for promoting students' health literacy and healthy lifestyles. However, evidence regarding the actual utilization of these resources remains limited, particularly in national educational platforms.* ***Aim:*** *The aim of this study was to evaluate the utilization of digital educational resources available within the Responsible Attitude towards Health section of the Serbian National Education Portal by analysing user engagement indicators, including page views, active users, engagement time, and interaction events during the period from July 2023 to April 2026.* ***Methods:*** *A retrospective descriptive study was conducted using anonymized web analytics collected from the National Education Portal (https://zuov.gov.rs). Indicators included page views, active users, average engagement time, and recorded user events.* ***Results:*** *During the observation period, the page generated 7,246 views from 4,443 active users and recorded 73,491 interaction events. The average engagement time reached 1 minute and 56 seconds. Distinct increases in user activity coincided with the publication of new educational resources, indicating continuous demand for updated materials.* ***Conclusions:*** *The findings demonstrate sustained utilization of digital health education resources among educational professionals and emphasize the importance of continuously updating evidence-based teaching materials. These findings may support future strategies for strengthening digital health education within national educational systems*

Keywords: educational role, responsible attitude towards health, resources

[1] Ministry of Education, Belgrade, Serbia
[2] Institute for Improvement of Education, Belgrade, Serbia

Introduction

Health literacy has become one of the central priorities of contemporary educational systems because healthy behavioural patterns established during childhood and adolescence substantially influence lifelong physical and mental well-being (Lee, 2009; Bröder & Carvalho, 2019). In recent years, digital educational platforms have emerged as an essential component of modern education by providing teachers with immediate access to evidence-based teaching materials, interactive resources, and professional support for implementing health education (Lupton, 2021; Dagenais et al., 2022). Despite substantial investments in developing national digital educational infrastructures, relatively little is known about the actual utilization of these resources and their practical value for educational professionals. In Serbia, the National Education Portal serves as the official repository of educational materials designed to support teachers in developing cross-curricular competences, including Responsible Attitude towards Health. However, no previous study has systematically evaluated user engagement with these digital resources or examined whether continuous content updates influence their utilization. *This knowledge gap provided the primary motivation for conducting the present study, with the intention of generating evidence that could support the further development of digital educational resources and strengthen health promotion within the national education system.*

International legislation is based primarily on the UN Sustainable Development Goals – Goal 4 (United Nations, 2015): ensuring inclusive and quality education by 2030, as well as on the Council of Europe Education Strategy (2024–2030) and UNESCO documents. General cross-curricular competences in the education system represent a set of integrated knowledge, skills, and attitudes necessary for the personal development, social inclusion, and employability of every individual. They are not linked exclusively to a single subject but are developed across all teaching areas.

The educational role of education institutions is presented as a priority in the Strategy for the Development of Education in the Republic of Serbia until 2030. Within General Objective 1, the Strategy defines work on increasing the quality of teaching and learning, as well as the equity and accessibility of pre-university education, which will contribute to the enhanced educational function of education institutions (Azer, 2005). The planned activities include the development of training programmes and working materials for the implementation of preventive and intervention activities in a range of areas: protection against violence and discrimination, preservation of mental health, development of gender and all other forms of equality, improvement of reproductive health, as well as the prevention of risky forms of behaviour among children and young people (Aldana et al., 2005; Bynner, 2005). In addition, the Strategy for the Development of Education in the Republic of Serbia until 2030 identifies school sport as one of its strategic priorities; therefore, with the aim of developing healthy lifestyles and a responsible attitude towards health, special attention is devoted to its improvement.

The study Violence in Schools and Student Well-Being in Serbia (Councile of Europe, 2025), conducted in 2024 and published in 2025, with a sample of 5200 respondents, produced a range of findings as well as recommendations for the education system and schools. Within the framework of education policies, the recommendations refer to the need for schools to improve extracurricular activities by involving teachers and strengthening a positive school culture through the implementation of preventive and intervention measures; to work on strengthening students' well-being; to develop students' competences to recognise violence; to introduce the "Peer Shield" approach, which involves student bystanders in interventions in cases of violence and requires appropriate training and support for students who help their peers; to strengthen the application of positive disciplinary methods by encouraging responsibility, cooperation, and self-control among students; and to develop socio-emotional skills and ensure their inclusion in teaching.

The Law on the Foundations of the Education System, in the General Principles of Education, Article 7 (ZOSOV, n.d.), prescribes "the development and practice of healthy lifestyles, awareness of the importance of one's own health and safety, and the need to nurture and develop physical abilities." Thus, the aim of health education in the teaching and learning process is presented as the acquisition of knowledge that leads to the development of skills, followed by the formation of attitudes, which in turn leads to the formation or change of behaviours that either contribute to better health or undermine it.

In accordance with the standards for general cross-curricular competences prescribed by the Institute for Education Quality and Evaluation and approved by the Ministry of Education, 11 key cross-curricular competences have been defined:

• Competence for lifelong learning: the student's ability to plan, organise, and monitor their own learning process, while recognising their own needs and opportunities for progress.

• Communication: the effective expression and interpretation of thoughts, feelings, and facts in oral and written form, with respect for the rules of communication and the use of digital tools.

• Working with data and information: the skill of finding, selecting, analysing, and critically evaluating information from different sources.

• Problem solving: the ability to identify obstacles, make decisions, and apply different strategies to find solutions in real-life situations.

• Digital competence: the safe and critical use of information and communication technologies (ICT) for work, leisure, and communication.

• Cooperation: readiness for teamwork, respect for different opinions, and contribution to a common goal while observing the rules of social interaction.

• Responsible participation in a democratic society: knowledge of rights and responsibilities, and the development of civic awareness, empathy, and competences for democratic culture.

• Health competence (Responsible Attitude towards Health): developing awareness of the importance of physical and mental health, safety, and healthy lifestyles.

• Aesthetic competence: recognising and valuing cultural values, artistic expression, and creativity.

• Entrepreneurship and entrepreneurial orientation: the ability to turn ideas into action, and to plan and manage projects in order to achieve goals.

• Responsible attitude towards the environment: developing environmental awareness and readiness to act in accordance with the principles of sustainable development.

Education legislation requires these competences to be developed through all forms of teaching and extracurricular activities. Teachers are trained to use an interdisciplinary approach and innovative methods to connect the content of different subjects so that students acquire functional and lasting knowledge.

The Competence Responsible Attitude towards Health

One of the key competences is the competence Responsible Attitude towards Health, which ensures that students develop awareness of their own body, needs, and environment in order to make decisions that protect and improve their physical and mental health (Paakkari & Paakkari, 2012). This competence is essential because it does not focus solely on theoretical knowledge, such as what vitamins are, but on functional behaviour in everyday life (Nutbeam, 2000). The key aspects of the competence are:

1. Physical health and personal hygiene: adopting habits of regular hygiene; understanding the importance of proper nutrition and regular sleep; recognising the importance of physical activity for proper development.
2. Mental and emotional health: recognising and controlling one's own emotions; developing self-esteem and a positive self-image; developing the ability to cope with stress and seek help when necessary.
3. Safety and risk prevention: recognising and avoiding risky behaviours, including psychoactive substances, alcohol, and tobacco; safe behaviour in traffic and in the digital environment.
4. Awareness of the prevention of communicable and non-communicable diseases.
5. Reproductive health: understanding biological changes during growing up; developing a responsible attitude towards sexuality and health protection.

Responsible Attitude towards Health is a cross-curricular competence included in the learning outcomes of subjects such as Biology or Physical and Health Education; however, related content is present in all subjects across all three education cycles. Examples of implementation include:

• Biology/The World Around Us: learning about organs, nutrition, and prevention.

- Physical and Health Education: developing motor skills and exercise habits.
- Civic Education/Class Teacher Period: working on empathy, mental health, and violence prevention.
- Art/Music Education: using art for relaxation and emotional expression.

The aim is for students, by the end of formal education, to actively choose a healthy lifestyle and take responsibility for their actions.

This cross-curricular competence contributes to a more dynamic and engaged combination of subject-specific knowledge, skills, and attitudes, making them relevant to various real-life contexts that require their functional application. Within the education system, health education is explicitly implemented through teaching and learning programmes, namely through the compulsory subject Physical and Health Education in primary education and in grammar schools since 2017, through the compulsory subject Sport and Health in sports grammar schools, through the elective programme Health and Sport in grammar schools since 2018, as well as through other subjects and numerous free and extracurricular activities.

Developing responsibility for health, both one's own and that of society as a whole, is the task of health education, or education for health, as part of general education (Bruun Jensen, 2000). Health education, including the area of reproductive health, is also organised through other extracurricular activities. In addition to Physical and Health Education classes, the subjects that include health-related content in the first cycle of primary education are The World Around Us and Nature and Society. Through learning outcomes, teaching topics, and content, a proper and responsible attitude towards health, prevention, protection against disease, personal hygiene, and basic health protection measures is developed (Ejemot-Nwadiaro et al., 2021).

Support for education staff in their work with students is provided by the Catalogue of Continuous Professional Development Programmes for Teachers, Preschool Teachers, and Professional Associates for the 2025/2026, 2026/2027, and 2027/2028 School Years (Institute for the Improvement of Education, 2024), which contains 31 training programmes in the field of health education, as well as 25 programmes in the field of physical education.

In addition, with the aim of strengthening education staff for the development of the cross-curricular competence Responsible Attitude towards Health among students, the Ministry of Education, in cooperation with the United Nations Population Fund (UNFPA), within the programme for empowering education staff to develop a responsible attitude towards health and to preserve students' health and safety (2021), created materials in the Responsible Attitude towards Health section of the National Education Portal of the Institute for the Improvement of Education. These materials were developed in order to make educational resources available to teachers for the creation or adaptation of content through which this competence can be achieved. Workshop scenarios for working with students were prepared, as well as presentations for working with students and parents. The resources section also

contains a handbook that was part of the online training conducted with all professional associates working in schools in July 2022.

In 2025 and 2026, the content on the page was updated. A *Guide for Achieving a Responsible Attitude towards Health* (Institute for the Improvement of Education, 2026) was developed, covering the following areas:

- healthy lifestyles
- physical activity
- healthy nutrition
- prevention of communicable diseases
- reproductive health
- emotional literacy
- social skills and relationships
- risky behaviour among young people and the use of psychoactive substances
- community mental health and prevention
- coping strategies, etc.

In addition to explaining these areas, the Guide[3] also contains a Practicum with teachers' lesson preparations for the implementation of workshops, as well as workshop content for students. Practical application of skills: contemporary health education focuses on the development of skills, such as decision-making and resisting peer pressure, rather than solely on facts. In its second part, this Guide offers teachers tools for organising workshops and interactive exercises that help children apply these skills in real life.

The website also contains presentations that teachers can use in their work with students across different cycles and levels of education. The programmes can be implemented by teachers and professional associates within individual school subjects, in cooperation with local healthcare institutions, or as part of numerous projects carried out in cooperation with other ministries, civil society, and international organisations.

Therefore, the aim of this study was to evaluate the utilization of digital educational resources available within the "Responsible Attitude towards Health" section of the Serbian National Education Portal by analysing user engagement indicators, including page views, active users, average engagement time, and interaction events recorded between July 2023 and April 2026. It was hypothesised that continuous updating of educational content would be associated with sustained user engagement and increased utilization of the available digital resources,

[3] The authors are experts from the Institute of Mental Health, the Institute of Public Health of Serbia "Dr Milan Jovanović Batut", the Institute for the Improvement of Education, and the Ministry of Education.

thereby demonstrating their practical value in supporting teachers and promoting health education within the Serbian educational system.

Methods

Study design

This study employed a retrospective descriptive observational design based on learning analytics and website usage data collected from the National Education Portal of the Institute for the Improvement of Education of the Republic of Serbia (https://zuov.gov.rs). Rather than involving human participants directly, the study analysed anonymised digital interaction data generated through users' visits to the portal section entitled "Responsible Attitude towards Health". The study was designed to evaluate the utilisation of digital educational resources intended to support teachers in implementing health education within the Serbian educational system.

Data source

Data were extracted from the integrated web analytics platform used by the National Education Portal (Google Analytics 4). The analysed dataset covered the period from July 2023 to April 2026 and included only aggregated, anonymised indicators. No personally identifiable information was collected or processed during the study.

Observed variables

The following web analytics indicators were analysed:

- total page views;
- number of active users;
- average engagement time per active user;
- number of interaction events (e.g., downloads, clicks, scrolling, video interactions);
- temporal trends in user activity.

These indicators were selected because they represent internationally accepted measures of user engagement and digital resource utilisation in learning analytics research.

Data analysis

Descriptive statistics were used to summarise website activity throughout the observation period. Continuous variables are presented as absolute values and averages. Temporal trends were examined graphically in order to identify changes in user engagement over time and to determine whether increases in portal activity coincided with the publication of new educational resources. The interpretation of user engagement followed the principles of learning analytics, whereby higher levels of page activity, repeated visits, longer engagement times, and increased interaction events are considered indicators of greater educational resource utilisation.

Ethical considerations

Because this study analysed only aggregated and fully anonymised website analytics, without collecting personal or sensitive information from users, formal ethical approval and informed consent were not required according to national regulations governing non-interventional observational studies.

Results with Discussion



Figure 1. Analytical Data.

Based on the aggregated website analytics, the "Responsible Attitude towards Health" page demonstrated consistent and sustained user engagement throughout the observation period from July 2023 to April 2026, with several distinct peaks in activity corresponding to specific time intervals. During this period, the page generated 7,246 page views, representing 99.85% of all recorded views within the analysed portal segment. In addition, 4,443 active (unique) users accessed the page, accounting for 99.87% of all active users recorded within the same segment. These findings indicate that the page constituted one of the most frequently accessed educational resources within the analysed section of the National Education Portal.

The average number of page views per active user was 1.63, suggesting that while most users accessed the resource once, a considerable proportion returned for repeated visits, reflecting continued interest in the available educational materials. Furthermore, the average engagement time reached 1 minute and 56 seconds, exceeding the portal average by 11.31%. This level of engagement suggests that users spent sufficient time exploring or downloading the available educational resources rather than leaving the page immediately after accessing

it. Consequently, engagement time may be considered an indirect indicator of the practical relevance and usability of the published materials for educational professionals.

A total of 73,491 interaction events were recorded during the study period. According to Google Analytics terminology, events represent meaningful user interactions with webpage content, including downloading educational materials, clicking interactive elements, scrolling through the page, viewing multimedia resources, and other user-initiated actions. Thus, 4,443 unique users generated 73,491 interaction events across 7,246 page views, representing 99.81% of all recorded events within the analysed portal segment. The exceptionally high number of interaction events relative to page views indicates that users actively interacted with the available content rather than passively browsing the webpage, further supporting the educational value of the portal resources.

The graphical analysis of temporal trends revealed relatively stable user activity throughout most of the observation period, interrupted by several pronounced increases in page visits. These peaks consistently coincided with the publication of newly developed educational materials and resource updates, suggesting that continuous content renewal represents a major driver of user engagement. The relatively high number of active users indicates sustained interest among educational professionals in digital health education resources. More importantly, the repeated peaks in portal activity observed throughout the study period occurred immediately after the publication of new educational materials, indicating that teachers actively seek newly developed evidence-based resources to support classroom practice and the implementation of the cross-curricular competence *Responsible Attitude towards Health*. Similar patterns have been reported in previous studies evaluating educational portals and digital learning environments, where regular content renewal significantly improved user retention, repeated access, and long-term engagement. Consequently, the present findings reinforce the importance of maintaining dynamic, continuously updated digital repositories that respond to teachers' evolving professional needs and support the sustainable implementation of health education within the school system.

Indicator	**Value**
Period	July 2023 – April 2026
Page title	Responsible Attitude towards Health
Page views / number of users	7.246
Active users	4.443
Average number of views per active user	1.63
Average engagement time per active user	1 minute and 56 seconds
Number of events – total number of actions on the page	73,491

Table 1. User Data.

The relatively high number of active users indicates sustained interest among educational professionals in digital health education resources. More importantly, the repeated peaks in portal activity observed throughout the study period occurred immediately after the publication of new educational materials, suggesting that regular content updates represent one of the primary drivers of user engagement. This finding indicates that teachers actively seek newly developed evidence-based resources to support classroom practice and the implementation of the cross-curricular competence Responsible Attitude towards Health. Similar patterns have been reported in previous studies evaluating educational portals and digital learning environments, where continuous content renewal significantly improved user retention, repeated access, and long-term engagement (Couper et al., 2010; Lupton, 2021; Dagenais et al., 2022). Consequently, the present findings reinforce the importance of maintaining dynamic, regularly updated digital repositories that respond to the evolving professional needs of teachers and support sustainable implementation of health education within the school system.

Conclusion

This study achieved its objective by evaluating the utilization of digital educational resources available within the Responsible Attitude towards Health section of the Serbian National Education Portal. The analysis demonstrated sustained user engagement throughout the observation period, with marked increases in activity following the publication of new educational materials. These findings indicate that continuously updated, evidence-based digital resources constitute an important form of professional support for teachers responsible for developing students' health competence. Beyond confirming the practical value of the National Education Portal, the study highlights the strategic importance of investing in digital educational infrastructures that facilitate health promotion within schools. Future research should complement web analytics with qualitative investigations of teachers' experiences and evaluate the impact of these digital resources on students' health knowledge, attitudes, and behaviours.

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Corresponding author: slobodan.penezic@fzs.edu.rs

INFORMATION-CONTROLLED SOCIETY AND ROLE OF THE MEDIA: A STUDY OF THE USA AND THE RUSSIAN FEDERATION

Tomislav Lunić[1], Slobodan Penezić[2]

Abstract: *This paper examines the transformation of contemporary networked societies through the emergence of the information-controlled society (ICS). The aim of the study is to conceptualize the notion of the ICS and to comparatively analyze its manifestations in the United States of America and the Russian Federation, with particular emphasis on legal regulation, traditional media structures, and the online public sphere. The research adopts a comparative narrative review design combined with qualitative case study analysis, integrating content analysis of legal and institutional sources with a systematic comparative method. The findings indicate that the United States operates through a hybrid state–market model of information control characterized by advanced technological infrastructure, corporate data exploitation, and normalized surveillance practices, while the Russian Federation relies on a predominantly centralized state-centered model marked by direct political influence over broadcast media and expanding regulatory oversight of the digital sphere. Despite structural differences, both cases demonstrate convergent tendencies toward the consolidation of informational power, increased surveillance capacities, and the gradual erosion of citizens' autonomy within the public sphere. The study argues that contemporary systems of information control transcend the traditional dichotomy between democratic and authoritarian media models, revealing hybrid mechanisms of governance embedded in global digital infrastructures.*

Keywords: network society, electronic surveillance, digital governance, media concentration, privacy regulation

[1] Faculty of Security Studies, University of Belgrade, Belgrade, Serbia
[2] Institute for Social Sciences, Belgrade, Serbia; Department of Journalism, Faculty of Sport, Union – Nikola Tesla University, Belgrade, Serbia

Introduction

The concept of technofeudalism, advocated by Yanis Varoufakis, as a modern order in which technological platforms – driven by algorithms and data – turn users into subjects and undermine democracy through hidden power management and manipulation, introducing new forms of domination and relations, while generating immense wealth for those who understood this direction of human development early enough (2025), strongly signals the contours of the circumstances in which we all exist today, thus further underscoring the importance of this context.

At the core of contemporary society, therefore, is the importance of information management – their production, availability, and interpretation – essentially, control. Manuel Castells notes that the "control over information lies with corporations that control the networks on which information resides and through which it is transmitted, while governments (globally influential ones) control those corporations, thereby using combined TT and legal capacities to influence the availability and processing of information in the public sphere" (Castells, 2024: 31).

Through this lens we may view the foundational landscape of this paper, which turns toward the domain of the development of digital technologies, communication instruments, computers, the global network – i.e., the internet – and the increasingly significant influence of artificial intelligence (AI).

The accelerated development of digital technologies, global communication networks, and artificial intelligence has fundamentally reshaped contemporary societies. Information has become a central strategic resource, embedded in economic structures, political processes, and cultural production. Within this context, mechanisms of surveillance, data processing, and media influence increasingly determine the dynamics of governance and public life. As digital infrastructures expand, power is no longer exercised solely through traditional state institutions but also through the control of information flows within global networks.

Theoretical reflections on the information society and the network society – such as the works of Manuel Castells, Yanis Varoufakis, and Yuval Noah Harari – highlight the growing importance of data, algorithms, and communication infrastructures in shaping contemporary power relations. These transformations raise critical questions regarding the balance between security and privacy, efficiency and autonomy, and technological progress and democratic accountability.

In this broader framework, the notion of the information-controlled society (ICS) emerges as a conceptual tool for understanding how surveillance technologies, media systems, and regulatory mechanisms interact to shape citizen behavior and public discourse. The ICS does not refer merely to technological advancement, but to a structural configuration in which information becomes the primary medium of governance and control.

The aim of this study is to conceptualize the notion of the ICS and to comparatively analyze its manifestations in the United States of America and the Russian Federation, with particular

emphasis on legal regulation, traditional media systems, and the online public sphere. By focusing on these dimensions, the paper seeks to identify similarities and differences in the organization of information control within distinct socio-political contexts and to assess their implications for citizens' autonomy and the structure of the public sphere.

Methodologically, the study is structured as a comparative narrative review combined with qualitative case study analysis, whose detailed framework is presented in separated chapter.

The central research question guiding this study is whether contemporary systems of information control differ fundamentally between democratic and authoritarian environments, or whether they represent structurally different yet functionally convergent models embedded in the global network society.

By addressing this question, the study contributes to a more nuanced understanding of informational power in the digital age, moving beyond simplified binary classifications and examining hybrid configurations of state and market influence over communication infrastructures.

Theoretical Background

Information as a Key Resource of Contemporary Power

The concept of information was originally linked to problems of telecommunications technology and the study of algorithms for encoding, measuring, and assessing the quality of message transmission (particularly in the work of Claude Shannon and the so-called electro-engineering approach[3]). Information was thus reduced to the technical aspects of transferring content from sender to receiver, without touching other dimensions. Perhaps the most comprehensive definition is, therefore, given by Luciano Floridi, who defines information as "an objective, declarative, and syntactic content of varying size, type, format, and carrier, which can be produced, processed, stored, transmitted, and accessed in various ways", emphasizing that "truthfulness is the key parameter in determining the difference between information and disinformation" (2005: 352).

Yuval Noah Harari notes that many scientific actors across different fields view information as "the basic building block of reality, more elementary than matter and energy" (2024: 39). Cybernetics, as the science grounded in information theory, studies feedback loops in communication and control, and its well – known first law – that those who possess information rule – can serve as a significant lens for our analysis. In this context, the reflections of Manuel Castells are especially significant. He argues that we live in a networked society in which key social functions are organized through digital communication networks, and information thereby becomes the primary resource of power (2018a).

Processed data produce information, while processed information yields knowledge. Information thus shapes one's understanding of reality – but also reality itself. "Information

[3] More details at: Shannon, C E. (1948). A Mathematical Theory of Communication. *The Bell System Technical Journal*, 27(3), 379–423. https://doi.org/10.1002/j.1538-7305.1948.tb01338.x.

has a dual nature and is primarily tied to the phenomenon of the information society" (Subotić, 2011: 16). The notion of the information society is, therefore, inevitably linked to information-communication technologies and their widespread use. Beniger (1986) points to numerous synonyms for the information society, such as "knowledge economy", "technological society", "computerized society", "information age", "industrial-technological society", "telematic society", and "post-industrial society". Therefore, Gilles Deleuze developed the concept of the society of control, whose foundation is "continuous monitoring and information management" (Mlađenović, 2025: 119).

The information society is thus an organic successor to the industrial society, transformed in structure while retaining essential characteristics. Such society may be defined in three principal ways. *The first* is based on the concept of information processing; *the second* is qualitative and concerns the adequate use of information-communication technologies; *the third* is quantitative and relies on measurable parameters that determine the degree of ICT application in various social processes.

The information society remains in continuous development. "Ultimately, we must place it within the modern framework of sustainability, where it is harmonized in ecological, social, economic, and cultural terms" (Shauer, 2003: 6). At this point, the previously mentioned first law of cybernetics ("Whoever has information – rules") receives new confirmation within the contemporary societal framework. Concretely, Castells believes that today, instead of the former geographical and hierarchical logic based on a monopoly of force in its traditional sense, there is a dominant logic of a global network through which capital, information, people, and symbols move. This is in line with Varoufakis' described concept of technofeudalism. In such a society, identities and power are in fact shaped through communication networks, which can serve both social control and resistance.

The key question, therefore, is no longer who owns the means of production, but who controls the infrastructure that generates meaning and attention. Harari thus quite rightly asks: "Can we trust computer algorithms to make good decisions and create a better world?" (2024: 24), and warns us about the growing influence of AI. He also notes that the main protagonist of our time is in fact not the human being (*homo sapiens*), but information itself, because of which the new information technologies might ultimately "take power away from us and destroy our physical and mental health" (Harari, 2024: 24).

The flip side of current global technologization thus becomes confirmation that once unconditional faith in the liberating potential of the internet – as it was predominantly perceived at the outset – was unfounded. It is, however, still alive, because "it has to some extent awakened the hope that citizenry would be reactivated and the superior aspects of digital communication are therefore still taken as a perfected guarantee of civil liberties in the present age" (Penezić, 2022: 6).

At this point, we can also focus on our primary domain of analysis. The phrase *information-controlled society (ICS)* points to a complex paradigm manifested through the controlled dissemination of mass-media messages on the one hand, and electronic surveillance on the other, for the sake of establishing a high degree of control and steering of population

behavior. Roger Clarke defines the conditions for establishing an ICS as follows: the creation of databases that record information about citizens and their various activities, an appropriate structure of computer networks (...) a reliable technological scheme that enables the formation of a virtual registry for every inhabitant through the combination of heterogeneous databases, and a population willing to accept all this (1997). The ICS thus also points us toward a "surveillance society" and a "society of total surveillance", which we see as a result of the fact that "information-communication technologies of electronic surveillance and mass – media dissemination of messages are used in parallel in order to achieve the highest possible degree of control over the population and to shape a desirable model of citizens' behavior on a mass scale" (Subotić, 2011: 32).

Taking into account these broader social dimensions and processes – and thereby underscoring their significance – we can turn more directly to the phenomenon of the ICS itself. In this sense, the first question that arises is whether it represents coercion and/or necessity, a question we may examine through the lens of the preconditions for the emergence of an ICS, the specificities of surveillance, and the role of media in the overall state of the public sphere.

Preconditions for the Emergence of an ICS

The preconditions for the emergence of an ICS primarily relate, as we see, to the influence of the technological factor as such, that is, to understanding the potential of technological solutions applied to the surveillance of the population for the purposes of planned governance and social shaping.

This specific attitude toward the technological factor became particularly important after the mass destruction of the 20th century, when questions of democratic control of the military and control of nuclear weapons came to the fore, while the issue of safeguarding freedom, relegated to the background in such circumstances, was simultaneously endangered and neglected.

This raises a rhetorical question: *Was a vast field for abuse and manipulation already opened at that time?* Perhaps the most significant classification of theoretical approaches to technology was given by Andrew Feenberg:

- "Determinism: technology is value – neutral and autonomous in its development;
- Instrumentalism: technology is neutral and controlled by humans;
- Substantivism: technology is value – laden and autonomous (Heidegger and Ellul are the most notable representatives);
- Critical theory: technology is value – laden, but with the possibility of human agency, with Marcuse as the key representative" (Feenberg, 1999: 9).

The preconditions for its emergence certainly include the legal framework that unites the phenomena of privacy and security culture. The classical legal definition of privacy is associated with U.S. judges Louis Brandeis and Samuel Warren at the end of the 19th century,

who characterized the right to privacy as "The right to be let alone"[4] (1984: 76). From that period, privacy protection is linked to legal guarantees. Today, it belongs to the corpus of personal rights and is protected both by national and universal legal mechanisms. "Notable examples include:

- The International Covenant on Civil and Political Rights, whose Article 17 protects citizen privacy by stipulating that "no one shall be subjected to arbitrary or unlawful interference with his privacy, family, home or correspondence, nor to unlawful attacks on his honor and reputation";
- The Universal Declaration of Human Rights, whose Article 12 requires that "no one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honor and reputation," and that everyone has the right to legal protection against such interference;
- The European Convention on Human Rights, which permits state interference in citizens' privacy only to the extent that it is genuinely necessary" (Subotić, 2011: 51).

William L. Prosser defines practical violations of privacy in the legal sense through several parameters, the most important being: "intrusion into someone's solitude or private affairs; public disclosure of private facts about a person; casting someone in a false light before the public; and appropriating someone's name or likeness for personal benefit" (1984: 107). Beyond this, Edward J. Bloustein points to an integral approach, relating privacy violations to infringements of human dignity (1984).

In the context of contemporary circumstances, it is important to distinguish between the private and the public. In its basic sense, the private refers to family and personal matters, while the public refers to the state, civil society, and the market. The problem of privacy within an ICS involves institutional and corporate violations of privacy through the collection of large amounts of data on citizens. Thus, protecting the right to privacy is a demanding task – especially today.

It is therefore necessary to mention the affirmation of a security culture, which includes socially acceptable security behaviors and the acceptance of patterns of controlling such behavior. Here we encounter the necessity of establishing an ICS and affirming it for the sake of societal survival; otherwise, insecurity would be inevitable. In such a paradigm, the ICS "appears as a solution that prevents system disintegration and enables effective risk control, while also embodying the utopian dream of total control over harmful and uncontrolled tendencies (e.g., real dangers of terrorist attacks or threats against the state and the people)" (Subotić, 2011: 61).

There is, however, a danger of "suspending" privacy in the name of general goals of preserving public order. It is therefore necessary to balance and carefully calibrate the interplay between security culture and appropriate mechanisms of population control or surveillance within the concrete informational environment.

Another precondition for establishing an ICS is its acceptance among the wider population and the potential of various socio-political systems for forming such a society, including an uncritical attitude toward technology, relativization of the right to privacy, and the establishment of a corresponding security culture.

In totalitarian societies, the imposition of an information-controlled environment in its full scope is natural. In such systems, *de facto* (and often *de jure*) "free and spontaneous citizen action is prevented, and unquestioned, total loyalty is demanded from them" (Arendt, 1998: 332), primarily due to the need to control the opposition. "Authoritarian regimes are characterized by a paradigm that requires submission to authority, aggression toward nonconformists, cognitive rigidity, and intolerance of authoritarian personalities" (Peterson & Pang, 2006: 443–444). On the other hand, democratic capitalist societies and the application of ICS within them also include some totalitarian connotations, because surveillance measures are carried out over everyone. The goal is the rationalization of public administration, increasing productivity, improving sales of products and services, etc.

Our study focuses on contemporary conditions marked by the development of networked social structures – i.e., deterritorialization – where nation–states retain a monopoly on force within their borders. In this sense, determining the potential for implementing an ICS depends on defining statehood within a globalized world. At the same time, with the spread of modern democratic principles, the needs for political engagement of the driving forces of surveillance have increased, as well as the need to establish an appropriate bureaucratic apparatus (introduction of bureaucratic documentation and structures) and "support" through industrialization. What we see, therefore, is a thin line of "maneuvering" between coercion and objective necessity in a globally networked society, where local circumstances only further stimulate – or hinder – the application of one or the other logic.

The phenomenon of surveillance initially appeared with clearly defined objectives. At first, it was reduced to "locating malfeasance such as tax evasion or money laundering, and later to counterintelligence surveillance amid inter – bloc tensions" (Lyon, 1994: 89–90). With globalization, the classical paradigm of surveillance has been transformed. David Lyon also notes that the level of surveillance depends on five parameters: "economic factors, technological development, the legal system and specific regulations, colonial history, and relations with the USA" (2008: 45).

Oliver Subotić offers a basic classification of the phenomenon of surveillance in contemporary society according to "two criteria:

- according to the subjects of surveillance (those who conduct surveillance), their goals, and the objects of surveillance (those who are surveilled)[5];

[5] The focus shifts from the local to the global level, and the subject of surveillance from the state to corporations and the private sector (thus, surveillance is no longer carried out exclusively by the state). It should be noted that the object of surveillance in contemporary society may be an individual as such, but also an individual as a member of a particular social group. The "most extreme" objects of

- according to the surveillance technology used, the characteristics of the data collected, and the actions carried out in the process" (Subotić 2011: 72).

Perhaps the best definition of contemporary surveillance is again given by David Lyon, who states that modern surveillance is "a complex and combined activity of state administration, police – security structures, and corporations" (1994: 81).

The key event that changed the modern paradigm in the direction of creating a so-called security state is undoubtedly the terrorist attack on New York on 11 September 2001. The "Big Brother" paradigm, in which one center exercises complete surveillance, was reorganized into a polycentric form that includes various structures. In academic circles, this new structure is called the "Little Sisters" structure. "It is a networked structure of surveillance and information control in which each small center – a node in the network – reveals one segment of human identity and the sphere of privacy, while full exposure is possible through the coordination of all nodes' activities together" (The Royal Academy, 2007: 19).

Long ago, Martin Heidegger announced such a change in the very essence of modern man, who changes in the direction of a "mere technologized animal" from the moment he becomes a primary resource of technological control (1977: 19–30). He warned of a "monstrous reversal that could lead us to a catastrophic outcome", not only pointed to the practical threats brought by various new technologies, but also to a particular ontological threat to human reality and being, noting that "as we fear a catastrophe – it may already be taking place in our reality" (Пенезић, 2022: 5). The current challenges posed by AI considerably revitalize that warning.

Namely, Joseph Stiglitz from the contemporary perspective points to similar consequences, speaking of the shifting of foundational logic and the failure of desired outcomes within today's dominant techno-globalization tendencies, which – rather than producing positive results – lead instead to the emergence of new divisions, misunderstandings, and negativities across the world (2018). This is a conclusion we can often draw when observing technological progress, manifested in new communication tools and possibilities[6], because of which, as Marcuse once conluded "every individual is thus forced to adapt to and conform with an imposed modality of living of a technological character" (1968: 153).

This overview of relevant reflections, therefore, gives us a possibility of recognizing objectively that today – given the technological context – also exists a real danger (perhaps greater than ever before) that the ICS is acquiring features of coercion, implicitly evident when anticipating the phenomenon of social control.

surveillance include, for example, prisoners or workers in highly secured facilities, as well as members of specific professions who wear electronic bracelets (Clarke, 2001).

[6] It is a question of technology transfer (TT) as a process of conveying scientific discoveries from one organization to another for the purpose of further development and commercialization.

The Role of Media Organizations

The role of the media (media organizations) in ICS is probably crucial for shaping the attitudes of a population (and thus its behavior). Given their influence and specificities, we may say that they constitute a problem *sui generis*.

At the same time, their social role certainly also should be viewed through the lens of the media propaganda, especially in totalitarian and authoritarian regimes, vbecause of wich Subotić rightly notes that we also should consider the possibility of political and corporate influence on the media in democratic societies through the prism of media monopoly/oligopoly (2011).

Marshall McLuhan's well-known metaphor "The medium is the message" (2005: 262), originally structured in 1964, becomes a paradigm of contemporary society. Paul Levinson applied this idea to the television, placing it in the context of a factor that influences people's lives even "more comprehensively and on a broader scale" (2004: 35), while Graeme Burton emphasized that television affects "changes in human attitudes, the increase of anxiety, the acceptance of certain patterns of behavior, the support of particular ideologies, etc" (2005: 101).

It is clear that television (and to a great extent other so-called traditional media) still represents a powerful weapon, despite the strong influence of the internet. Therefore, it is important to point out the possibilities of the internet in this domain, since it "has the capacity to integrate all previous media and unique forms of communication – everyone with everyone (...) and to become the *par excellence* medium of the information-controlled society" (Subotić, 2011: 97).

Given the current communication context, we must also address certain formal innovations that have occurred in recent times, driven by TT challenges and directly relevant to our analytical framework. This is, first of all, the General Data Protection Regulation (GDPR)[7], which concerns the protection of privacy of information in the European Union and the European Economic Area. It is a key component of EU privacy law and human rights law (in particular Article 8 of the Charter of Fundamental Rights of the EU), and also regulates the transfer of personal data outside the EU and EEA, which is necessary. This is important because it has prompted numerous operational changes in the world of communication, as well as in the media sphere (and global communication as a whole). All this was intended to protect individuals' privacy and personal data, which in reality, however, has not been fully achieved, since abuses still occur in the online sphere, with the new regulatory framework being skillfully circumvented.

We must then mention the latest changes in this area: the Digital Markets Act (DMA) and the Digital Services Act (DSA)[8]. The DMA, namely, concerns the platform that allows traders to

[7] More details at: GDPR, n.d. *What is GDPR, the EU's new data protection law?*. https://gdpr.eu/what-is-gdpr/. Accessed 2 April 2025.

[8] More detail at: European Commission, n.d. *The Digital Services Act package*. https://digital-strategy.ec.europa.eu/en/policies/digital-services-act-package. Accessed 3 April 2025.

communicate directly with marketers and exchanges, enabling faster and more precise trading, while the DSA, linked to the DMA, allows automated trading strategies to enter the so-called execution channel of operations. Both are also attempts to regulate the contemporary social context while simultaneously protecting basic human rights – but, as in the case of the previously described changes, it will be important to observe whether they will bring substantive changes that keep pace with the times *and* the protection of human rights and freedoms, or whether they will simply further complicate the functioning of all actors, while still allowing those who profit in the fog of the newly created confusion to further appropriate these aspects for the sake of profit.

The described innovations and their consequences can again be analyzed through the lens of Castells' network society. In it, power shifts from centralized institutions to networks that control information flows, which is also visible in contemporary phenomena such as manipulation via social networks, algorithmic management of attention, and the so-called platform economy (e.g. Uber, Amazon). In such an ICS, digital surveillance and datafication become new forms of control, replacing traditional institutional mechanisms. At the same time, new forms of resistance appear through hacker movements, online activism, and alternative networked communities that attempt to reclaim narratives and redefine identity. Castells thus emphasizes that networks in themselves are neither democratic nor authoritarian; their social effect depends on who controls them and how they are used (2018a, 2018b) – a crucial remark toward which our analysis also tends.

We believe that such an interpretation can be perfectly applied to current considerations of the development and consequences of the changes brought by new media tools and AI. On the other hand, this new type of power – arising from influence over the formation of meaning and identity through so-called networked communication – also brings us to the described Castells' concept of "communication power". This theory illuminates the tension between emancipation and control in the contemporary digital age, which we also highlight here through the dynamics of choosing between the logic of necessity and that of coercion.

We shall therefore next turn to case studies of the USA and the Russian Federation, which we will analyze through the prism of legal regulations, the role of the media, and the influence of new technologies in determining the degree of social surveillance. Both the USA and the Russian Federation are unquestionably global driving forces of 21st – century civilization and are among the key actors in the global socio-political spectrum. Hence, analyzing these elements is essential for understanding their potential and capacities (and, more broadly, their power).

The Case of USA

Legal Framework

The Constitution of the USA does not directly regulate the issue of surveillance (info-control), but it does so indirectly through several amendments (the First covers freedom of speech, religion, and association; the Fourth protects individuals from unlawful surveillance by

government agencies; the Fifth concerns private property; the Fourteenth further protects the private life of citizens from the government).[9]

Other relevant regulations pertain "primarily to the Report of the Special Committee on the Code of Fair Information Practices from 1973, which mainly concerns the use of personal data, as well as the Freedom of Information Act from 1966, which relates to the protection of the right to privacy" (Holtzman, 2006: 109). Alongside these is the Privacy Act of 1974, which regulates the right of citizens to be informed when information about them is collected, arising from the concerns expressed in the Special Committee's Report a year earlier, and which provides "the possibility of access and correction where necessary, except in cases where data are collected for national security purposes" (Holtzman, 2006: 110).

The Electronic Communications Privacy Act of 1986 protects citizens from the "interception of electronic information, providing protection from the federal government" (Committee on Privacy, 2007: 136)[10].

In the USA there is no institution comparable to the Commissioner for Information of Public Importance and Personal Data Protection (as in Serbia), so citizens are particularly endangered in the field of human rights concerning surveillance conducted by the private sector.

Traditional Media Sphere

We take the USA as the setting in which the influence of the so-called mass media reached its culmination over the previous century. Ben Bagdikian reminded at the beginning of this century that global media ownership is in the hands of "around fifty corporations, and that the USA had more than 1,700 daily newspapers, 11,000 magazines, about 9,000 radio stations, 1,000 television stations, 2,500 publishers, and seven film studios" (2000: 4–22).

Perhaps the greatest problem for the media in the USA in 21th century is the dual influence of so-called big capital, which exerts pressure on advertisers on the one hand, and influences editorial policy on the other. As a consequence, media markets become increasingly concentrated, meaning ownership concentration and the creation of media monopolies. The consequences for the quality of reporting in such an environment are easy to imagine. Jeremy Tunstall and Michael Palmer, therefore, pointed out to the problem of capital being grouped into media cartels, i.e. the establishment of classic media monopolies (2001). For example, in 1989 there was a merger between Time and Warner, after which "this corporation became a leader in the music industry and Hollywood films, and the second largest national operator of local cable systems in the USA" (Tunstall & Palmer, 2001: 39), while Bagdikian also warns of

[9] It should be noted that the first ten amendments constitute the Bill of Rights. More details at: U.S. Senate (n.d.). *The Constitution of the United States of America*. https://www.senate.gov/civics/resources/pdf/US_Constitution-Senate_Publication_103-21.pdf. Accessed 8 January 2025. Amendment 1, 4, 5 (all 1971), and 14 (1868).

[10] More details at: Committee on Privacy. (2007). *Engaging Privacy and Information Technology in a Digital Age*, ed. J. Waldo et al. Washington, D.C.: The National Academies Press.

the emergence of one of the largest communication conglomerates, tied to the merger of Time Warner and America Online (2000: 11).

It is also considered that the largest media lobby in the world is likewise based in the USA – the Motion Picture Association (MPA), which includes: Amazon MGM Studios and Amazon Prime Video, Netflix, Paramount Pictures, Sony Pictures, Universal Pictures, Walt Disney Studios, and Warner Bros. From 1922 to 1945 it was called the Motion Picture Producers and Distributors of America, and from 1945 to 2019 the Motion Picture Association of America. It is worth noting that the MPA plays a major role in combating copyright infringement.

We should also not omit Rupert Murdoch, a media mogul of global proportions. In addition to practically controlling 175 newspapers worldwide through his NewsCorp, via DirecTV he also controls cable and satellite television in the USA. He owns Fox, which represents a paradigm of his media power. According to *Forbes* magazine, Murdoch is "the 38st richest person in the USA and the 87st richest in the world" (Forbes, n.d.)[11].

Almost all types of media content in the USA – from music videos and TV programming to films, magazines, and books – have for some time been controlled by a handful of media magnates: General Electric, Viacom, Disney, Bertelsmann, AOL Time Warner, NewsCorp. The print media and news service in the USA are largely under the control of the Associated Press (AP).

The influence of some of these actors extends into the domain of the internet and online media, so in the field of internet regulation the greatest potential likewise lies with American companies such as AOL Time Warner, along with AT&T and Microsoft. Of course, control of the internet is not possible to the same extent as with other media, but it is important to emphasize that the USA still remains the most developed in terms of internet capacity and infrastructure.

The list of examples that could further confirm these trends is certainly much longer than what is presented here. It is expanded by the roster of contemporary technological and communication giants that today exert enormous influence in the media industry[12], and more recently also by those working in the field of AI development, whose impact is increasingly felt in this domain as well.

In examining the media landscape in the USA, we should also highlight the influence of the American government on the media. Ever since the emergence of the print press, the US establishment has relied on it through various methods of lobbying and pressure, often entering into conflicts of interest. The goal has always been the same: to establish and maintain power and keep public opinion at a level favorable to the authorities. On the other hand, opposition forces and critical voices of influential individuals have most often been reduced or minimized as far as possible. Citizens have consistently been given a narrowed

[11] For more detail: Forbes. (n.d.). *Rupert Murdoch*. http://www.forbes.com/profile/rupert-murdoch/. Accessed 12 January 2025.

[12] Foremost among these are the companies of the so-called "Big Five": Alphabet, Amazon, Apple, Meta, and Microsoft, which also rank among the economically wealthiest in the world.

range of information, tailored to the so-called mainstream media aligned with the government.

Good examples include the bombing of the FRY in 1999 or the Iraq War in 2003, when the propaganda machinery did much of the work through anti-war propaganda materials but also through censorship of opposition voices. It can also be observed that some media tend to cover up incidents when the USA or its allies are behind them.

Russian Federation Case

Legal Framework

The protection of personal data, the right to privacy, and the prohibition of collecting, processing, and forwarding data without the knowledge of the person concerned, except in cases provided by law, are regulated by the Constitution of the Russian Federation.

Therefore, when it comes to the broadest and most general legal-formal framework influencing dynamics in this context, it primarily rests on the content of the Constitution. Article 29(1) of the Russian Constitution guarantees freedom of thought and speech; Article 29(4) guarantees the right to freely seek, receive, transmit, produce, and disseminate information; and Article 29(5) guarantees freedom of the mass media and prohibits censorship.[13]

This area is further regulated by a package of laws from 2006, which includes: the Law on Personal Data, the Law on Information, and the Law on Information Technologies and the Protection of Information.

"We should also mention SORM – 1 (1995) and SORM – 2 (1998). SORM – 1 represents a combination of CALEA and the Patriot Act legislation and is, in a way, their counterpart, while SORM – 2 presupposes the existence of a court order for the surveillance of the communications of a particular person, which often is not the case in practice" (Deibert, 2008: 181).

"The government controls communication resources and channels through the 2000 Information Security Doctrine, but due to the low level of development of information – communication infrastructure this has been reduced to two main areas: the monitoring of internet communications and government control of the media" (Subotić 2011: 159).

Traditional Media Sphere

In Russia, the influence of the government on media organizations is generally strong, especially on those operating within the traditional media framework. Zassoursky notes that the state focuses on controlling the media sphere because of its clear perception that the media are an important instrument for maintaining the stability of the entire state system,

[13] More details at: The Ministry of Foreign Affairs of the Russian Federation (3 July 2000). *The Constitution of the Russian Federation*. https://mid.ru/en/foreign_policy/fundamental_documents/1750525/. Accesed 8 January 2025.

and that an additional argument is found in the "consequences from the period immediately after the Cold War" (2009: 29).

As for media monopolies, perhaps the most influential figure at one time was Boris Berezovsky, who became rich during the privatization of state assets in Russia in the 1990s. He owned Channel 1, TV – 6, and numerous publishing houses. With the arrival of Vladimir Putin to power, a crackdown on the oligarchs began, and the media sphere came under the tight control of the state apparatus.

The emphasis of state control is primarily on television and less on the print media. Zassoursky believes that the state "directly or indirectly controls all major television stations: Channel One and Channel Two, TV Center, Rossiya, Kultura, Sport, NTV, and TNT" (2009: 31–32). Radio and print media in Russia are under noticeably less direct state control. The largest magazine publisher in Russia is Independent Media, whose content mostly encourages opposition forces.

Ellen Mickiewicz warns that there is a serious problem of self – censorship and press freedom in Russia, and that investigative journalism is also "at a low level, primarily due to frequent and unresolved murders of journalists" (2008: 31).

The media role of the internet and online media in this segment of the media market is still at a lower level, primarily because the Russian population has only recently gained broader, mass access. In this sense, it should be noted that this field is developing, digital channels are being improved, and therefore the possibilities for criticizing the government are growing in both scope and importance.

Methodological Framework

This research adopts a comparative case study approach, focusing on the United States and the Russian Federation as distinct socio-political environments in which information control and electronic surveillance are exercised. The primary aim is to identify similarities and differences in the ways information is utilized as a tool of social regulation and governance, also as the general use of information as a tool of social regulation and governance within contemporary society.

Three complementary methods were employed to ensure a comprehensive analysis. First, case studies allowed for an in-depth examination of electronic surveillance practices within the selected countries. Second, content analysis was applied to relevant legal documents, policy reports, scholarly literature, and media sources to uncover patterns of control and regulation. Third, a comparative analytical framework facilitated the systematic juxtaposition of findings from both cases to highlight key distinctions and commonalities.

Within each case study, the research predominantly focused on three aspects: the legal framework governing information and surveillance, the traditional media sphere, and the Internet and the online public sphere. By examining these dimensions, the study assessed both formal regulations and practical implementations of information control, as well as their impact on public discourse and civil liberties.

The narrative review component enables the synthesis of interdisciplinary theoretical perspectives, including political theory, media studies, surveillance studies, and information ethics. The qualitative case study approach allows for contextualized analysis of specific regulatory frameworks, media structures, and digital governance mechanisms in the selected countries. The narrative review is based on a systematic search of relevant academic and policy literature. Additional sources include official government documents, constitutional texts, legislative acts, policy reports, and publications of international organizations.

Data collection relied on publicly available sources, including government reports, legal texts, and media system and coverage characteristics, which were classified according to thematic relevance. While this approach enabled detailed insights into observable patterns and trends, it is acknowledged that certain covert aspects of surveillance remain inaccessible. Furthermore, the comparative scope is limited to the two selected countries, and conclusions may not be universally applicable.

Overall, this methodology allows for a nuanced understanding of how information functions as a primary resource in contemporary networked societies – and its impact on citizens – and how it can simultaneously serve as a framework for improvement of contemporary living, but also as a mechanism of social control.

Results with Discussion

USA Case: *ICS within the Contemporary Public Sphere*

The USA allocates substantial funds for the protection of information-communication networks, with emphasis on safeguarding telecommunications infrastructure, which closely follows the development of the internet. In the context of online communication, the surveillance system in the USA is therefore “on an impressively high level” (Deibert, 2008: 232).

It is important to draw attention to the fact that ICANN is tied to the USA through several substantive elements (mechanisms, membership, territory), so the USA has the greatest capacity for controlling communication via the internet14.

An additional important element that supports US dominance in this field is the requirement that internet service providers comply with CALEA legislation, which “enables law enforcement authorities easy access to their surveillance infrastructure” (Bloss, 2007: 219)15.

The government filters prohibited content (illegal pornography, various offensive materials, etc.) with the aim of protecting children and morality, national security, intellectual property, and computer security. “Within libraries and schools, this field is regulated in an institutional domain” (Deibert, 2008: 226). The “Patriot Act” legislation obliges third parties that maintain

[14] *The Internet Corporation for Assigned Names and Numbers* (ICANN) is the leading organization in Internet governance infrastructure (IP addresses, domains, servers).

[15] *The Commission on Accreditation for Law Enforcement Agencies* (CALEA) is an agency that issues accreditations with the aim of ensuring public safety through law enforcement.ri

databases on particular individuals to provide such data when needed, without a court order. This includes the identity of the person using a specific IP address, internet messages, etc. The data must be provided to state authorities in a timely manner, without any obligation to inform the person being monitored.

In the commercial sector, we can single out companies that produce specialized software for tracking and recording an individual's activities, including all websites visited and emails received. It is clear that these frameworks allow certain companies to occupy an almost monopolistic position in monitoring internet content – for example, the RIAA, which primarily deals with identifying potential piracy involving audio material. "In the event that pirated content is discovered, the provider is contacted and the internet user's service is terminated due to illegal activities" (Katyal 2003: 341)[16].

An additional problem in controlling internet content is that it is burdened with a multitude of irrelevant topics that further relativize the correctness of data usage. It is therefore necessary to conduct a thorough analysis of the available information.

[16] *The Recording Industry Association of America* (RIAA) is a trade organization that supports and promotes the creative and commercial vitality of music publishers in the United States. Its membership includes several hundred companies, ranging from small and medium-sized firms to global enterprises. It creates, produces, and/or distributes sound recordings. The RIAA works to protect intellectual property and the rights of artists and publishers.

Table 1. Key Characteristics of the ICS: The Case of the United States of America.

Analytical Dimension	Key Actors / Frameworks	Information Control Mechanisms	Implications for Citizens and the Public Sphere
Constitutional and legal framework	U.S. Constitution (1st, 4th, 5th, 14th Amendments); FOIA; Privacy Act; ECPA; USA PATRIOT Act	Limited constitutional privacy protections; expansion of surveillance under national security exceptions	Formal rights coexisting with extensive surveillance powers; reduced transparency
Institutional privacy safeguards	Federal agencies; judiciary	Lack of an independent data protection authority	Weak institutional oversight; limited legal remedies for citizens
Traditional media system	Major media conglomerates	Concentrated ownership; commercial and advertising pressures on editorial autonomy	Reduced media pluralism; weakening of investigative journalism
Media lobbies and entertainment industry	Motion Picture Association	Strong lobbying in copyright enforcement and digital regulation	Restrictive circulation of content; punitive approaches to digital practices
Political influence on media	Government; military and security institutions	Agenda-setting, framing, and marginalization of dissent	Alignment of dominant discourse with state interests
Online public sphere and internet governance	ICANN; ISPs; U.S.-based technology corporations	Structural dominance in internet governance and infrastructure control	Asymmetrical global communication power; limited user sovereignty
Digital surveillance and security	CALEA; intelligence and law-enforcement agencies	Large-scale data access and monitoring with limited judicial oversight	Normalization of surveillance; erosion of privacy and autonomy
Commercial surveillance and data economy	Technology firms; RIAA	Behavioral tracking; monetization and enforcement practices	Convergence of state and market surveillance; data commodification
Cognitive dimension of information control	Algorithmic platforms; mass media	Algorithmic filtering; information overload	Weakened capacity for informed and critical public judgment

Source: Authors' processing, 2025.

4.2 Russian Federation Case: *ICS within the Contemporary Public Sphere*

In Russia, the number of internet users is growing rapidly nowadays, although most usage is still concentrated in the Moscow and St Petersburg regions. All providers are obliged, in accordance with SORM – 2 regulations, to supply the Federal Security Service[17] with precise data on internet traffic. Otherwise, they lose their license.

The Russian online sphere is not typically subject to classical censorship of political content, but government produced material in Russian is heavily promoted. Content filtering primarily concerns pornography, spam, and piracy, which are censored.

Government agencies do monitor internet content, but this surveillance is significantly less advanced technologically than that in the United States, mainly due to insufficient infrastructure and capacity. In this regard, the Russian Federation is allocating increasing funds to improve this sector.

It should be mentioned that the internet space is to a great extent still free, although "there is a tendency to place it under greater state control" (Deibert, 2008: 180).

By following the analysed social context and two dominant and fairly divergent interpretations of the meaning of information, this study has demonstrated that one perspective sees information as an attempt to represent reality, which, when accurate, becomes truth, while the other suggests that information itself can produce reality, shaping the perception of truth.

More concretely, those who control information control the production of reality. At the same time, both perspectives confirm the central role of information as a resource in contemporary society, but also remain incomplete, as "increased connectivity has not necessarily led to greater truthfulness or rationality" (Harari, 2024: 55).

The functioning matrix of the ICS shapes global patterns of human behavior through the combined effects of modern surveillance technologies and targeted media activities. Namely, information and communication technologies (ICTs) play a dual role: they facilitate positive outcomes, such as crime prevention and rapid public administration, but their ubiquity and invisibility also pose risks to fundamental human rights and freedoms.

[17] *The Federal Security Service* (Russian: *Федеральная служба безопасности Российской Федерации*, ФСБ РФ) is the federal executive authority of Russia, an intelligence service that performs tasks related to maintaining the security of the Russian Federation.

Table 2. Key characteristics of the ICS: The case of the Russian Federation.

Analytical Dimension	Key Actors / Frameworks	Information Control Mechanisms	Implications for Citizens and the Public Sphere
Constitutional and legal framework	Constitution of the Russian Federation; data and information laws	Formal privacy guarantees combined with broad statutory exceptions	Legal protection of privacy accompanied by extensive state discretion
Surveillance legislation and enforcement	SORM system; Federal Security Service (FSB)	Mandatory interception infrastructure; provider access obligations with limited judicial oversight	Systematic monitoring of communications; low transparency
State doctrine and information security	Information Security Doctrine	Centralized monitoring and regulation of information flows	State stability prioritized over individual informational autonomy
Traditional broadcast media	State authorities; national television networks	Direct and indirect state ownership and control	Dominance of pro-government narratives; restricted pluralism
Media ownership and consolidation	State-controlled media structures	Elimination of independent ownership; consolidation under state supervision	Reduced editorial autonomy; political alignment of media content
Journalistic practice and press freedom	Journalists; print and radio outlets	Self-censorship; weak institutional protection	Chilling effects on investigative and watchdog journalism
Online media development	Internet portals; digital platforms	Expansion of digital communication under delayed and uneven access	Conditional space for alternative and critical discourse
Online public sphere and infrastructure	ISPs; FSB	Mandatory traffic data retention and disclosure	Institutionalized monitoring of online communication
Content regulation and agenda-setting	State regulatory bodies	Selective filtering and prioritization of state-aligned content	Managed visibility of narratives; limited political pluralism
Technological capacity of surveillance	State security services	Less advanced but expanding surveillance capabilities	Partial effectiveness of control with increasing reach
Trajectory of information control	Russian state institutions	Gradual expansion of internet regulation and centralization	Increasing state dominance over the digital public sphere

Source: Authors' processing, 2025.

Furthermore, this matrix demonstrates a shift from local to global focus, with power increasingly residing not only in state institutions but also in multinational corporations and digital platforms.

Table 3. Level of development of the ICS: USA and Russian Federation.

Analytical Dimension	United States	Russian Federation
Constitutional basis	Indirect constitutional protection of privacy and expression	Explicit constitutional regulation of privacy and data protection
Surveillance legislation	ECPA; CALEA; USA PATRIOT Act	SORM system; data and information laws
Judicial oversight	Broad surveillance powers with limited transparency	Formal court authorization, frequently bypassed
Institutional privacy safeguards	No independent national data protection authority	Centralized security-based oversight; no independent authority
Dominant model of information control	Hybrid state-market model	State-centered model
Primary locus of control	Market power, advertising, and political influence	Political authority and security apparatus
Media ownership structure	Concentrated private media conglomerates	Direct and indirect state control of broadcast media
Television sector	Commercial dominance with political influence	Centralized and state-controlled
Print and radio media	Formally free, economically constrained	Limited pluralism under self-censorship
Media elites and lobbying	Strong corporate lobbies and media magnates	Marginalized oligarchic influence; state dominance
Online public sphere	Globally dominant, technologically advanced	Expanding under increasing state oversight
Internet governance	Structural dominance via platforms and ICANN	National regulation and provider obligations
Content regulation	Surveillance-based control with selective filtering	Agenda-setting with limited political censorship
Surveillance capacity	Highly developed and comprehensive	Less advanced but rapidly expanding
Impact on citizens	Normalized surveillance and data commodification	Restricted pluralism with conditional online freedom
Overall trajectory	Expansion of algorithmic and market-based control	Intensification of centralized state control

Source: Authors' processing, 2025.

Comparative analysis of the USA and Russia highlights both similarities and differences.

In the USA, ICT infrastructure is highly developed, and surveillance is exercised both by the state, under legal regulation for national security, and by private actors seeking profit. The media landscape is dominated by corporate capital, while internet communication is subject to regulation, especially after the events of September 11, 2001.

In Russia, ICT infrastructure is less advanced, yet electronic surveillance occurs and produces significant social control effects. Particularly television remains largely state-controlled, while print media are somewhat freer but constrained by self-censorship. Internet development is still nascent, though investment in digital spaces is increasing.

Both cases demonstrate that technological capacity alone does not determine the extent of social control, because political, institutional, and societal factors act synergistically to shape outcomes.

Conclusion

This study has examined the emergence of an ICS, comparing the United States of America and the Russian Federation, with a focus on the legal framework, traditional media, and the online public sphere. By analyzing these dimensions, the paper aimed to understand how information flows shape social control, influence citizen behavior, and redefine the power dynamics among states, corporations, and the global network society.

Its ambition it to conceptualize the notion of the information-controlled society (ICS) and to comparatively analyze its manifestations in the United States of America and the Russian Federation, with particular emphasis on legal regulation, traditional media systems, and the online public sphere.

The analysis demonstrates that both cases exhibit structured systems of information control, though organized through different institutional logics. In the United States, information control operates predominantly through a hybrid state–market model characterized by advanced technological infrastructure, corporate concentration in the media sector, and extensive data-driven surveillance practices. In the Russian Federation, information control is primarily centralized within state institutions, with direct political influence over broadcast media and expanding regulatory oversight of digital communication.

Despite these structural differences, the comparative findings reveal functional convergence. In both contexts, information increasingly serves as a mechanism of governance, surveillance capacities are expanding, and asymmetries in access to communication infrastructures shape public discourse. The study therefore confirms that contemporary systems of information control cannot be adequately understood through a simple democratic–authoritarian dichotomy. Instead, they represent distinct yet comparable configurations of informational power embedded within networked societies.

By demonstrating these convergences and divergences, this paper contributes to a more precise understanding of how information functions as a central resource of power in contemporary digital environments and how its control reshapes the relationship between

institutions, media systems, and citizens. Aligning TT development with privacy protection, promoting civic engagement, and fostering critical understanding of information's role in shaping reality are, therefore, essential for securing a safer, more equitable, and sustainable future for citizens worldwide.

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Corresponding author: natasastanisic@singidunum.ac.rs

COACHES' PERCEIVED KNOWLEDGE AND COMPETENCES: IMPLICATIONS FOR SPORT MANAGEMENT AND HUMAN RESOURCE DEVELOPMENT

Nataša Stanišić[1], Igor Radošević[1], Dušan Mandić[1]

Abstract: *The aim of this study was to investigate coaches' perceived knowledge and competences and to examine their implications for sport management and human resource development (HRD). Using a quantitative, cross-sectional approach, data were collected from 216 basketball coaches through the Coaches' Knowledge and Competence Questionnaire (CKCQ). Descriptive statistics, dependent correlation comparisons, and correlation analyses were employed to assess the relationships between professional, interpersonal, and intrapersonal domains of knowledge and overall coaching competences. The results indicate that coaches report high levels of knowledge across all domains, with strong positive interrelationships between them and overall competence. However, lower scores were identified in areas related to external communication and sports legislation, suggesting potential gaps in domains associated with broader organizational responsibilities. These findings suggest that coaching competence represents an integrated system of knowledge and skills, where intrapersonal reflection serves as the strongest statistical driver of perceived competence. Importantly, the study contributes to literature by positioning coaches not only as performance specialists but also as key agents of human resource development, influencing learning processes, organizational culture, and long-term sustainability within sport organizations.*

Key words: coaching effectiveness, human capital in sport, competence assessment, coach education, organizational performance, talent development

[1] Singidunum University, Belgrade, Serbia

Introduction

Integrating coaching knowledge and competencies using sports management through the lens of human resource development represents a relatively novel perspective in sport research (Garavan, 2007; Swanson & Holton, 2009; Nelson, Cushion, & Potrac, 2013). Today, the role of the sports coach as a human capital manager has become increasingly important within competitive sport contexts (Côté & Gilbert, 2009; Lyle & Cushion, 2017). While human resource management primarily focuses on people, and sport management on organizational functioning and strategy, these domains intersect in coaching practice (Garavan, Carbery, & Rock, 2012). In the business world, human resource manager is to motivate, educate and train employees, while the coach's role in sports is very similar and focused on motivating, training and educating athletes (Garavan, 2007; Swanson & Holton, 2009).

The connection between the coach and the human resource manager refers to the selection and recruitment of talent because the coach needs to recognize the talented athletes that he has to fit into his team, while performance management refers to the feedback information that the coach receives through the analyzed performance of each subunit player using analytics that coincides with the function of the sports manager who analyzes and evaluates his employees (Garavan et al., 2012; International Council for Coaching Excellence [ICCE], 2012). Learning and development processes in sport involve the systematic improvement of athletes' knowledge and skills through tailored individual development plans (Côté & Gilbert, 2009; ICCE, 2012). From this perspective, contemporary coaches are expected to possess competencies related to strategic planning, leadership, communication, decision-making and interpersonal relations, which closely correspond to core human resource management competencies (ICCE, 2012; Quinaud et al., 2018). In this sense, sport management provides the organizational framework and resources, while the coach applies human resource principles in managing athletes in order to achieve competitive success (Garavan et al., 2012).

Beyond their technical responsibilities, coaches increasingly function as key agents of human resource development within sport organizations (Garavan, 2007; Swanson & Holton, 2009). Through mentoring, feedback, role-modeling and everyday interaction, they influence the acquisition of knowledge, motivation, career progression and the long-term retention of athletes and support staff (Côté & Gilbert, 2009; Lyle & Cushion, 2017). In this sense, coaching practice extends beyond performance outcomes and becomes a strategic human resource development (HRD) function that contributes to the sustainable development of sport organizations (Nelson, Cushion, & Potrac, 2013).

Coaching knowledge can be divided into three interconnected domains, according to Côté and Gilbert (Côté & Gilbert, 2009): the intrapersonal domain, which includes self-reflection, personal awareness, and ongoing practice improvement; the professional domain, which includes sport-specific knowledge and knowledge related to sports science (Abraham, Collins, & Martindale, 2006); and the interpersonal domain, which refers to the abilities of effective

communication and relationships with athletes and other stakeholders. This framework has been widely adopted and forms the basis of modern coach education systems.

Competences in coaching work refer to the ability to effectively apply knowledge, skills and attitudes in order to achieve the desired results. This implies not only knowing what to do, but also the ability to do it appropriately, consistently and adaptively. ICCE defines coach competencies as the integration of knowledge in functional domains such as strategic planning, practice management, communication, decision-making and reflective learning (International Council for Coaching Excellence (ICCE), Association of Summer Olympic International Federations (ASOIF), & Leeds Beckett University, 2012).

Recent studies confirm the importance of the integration of knowledge and competences in the practice of sports coaches. Quinaud and associates (Quinaud et al., 2020) developed and validated the Coaches' Knowledge and Competence Questionnaire (CKCQ), which is based on the model of Côté and Gilbert (Côté & Gilbert, 2009). This instrument enables the quantitative assessment of professional, interpersonal and intrapersonal knowledge, as well as the functional competences arising from that knowledge base. Research findings indicate that successful coaches not only possess expert knowledge of sports, but have also developed communication and reflective skills, which are key to effective team management and adapting to the demands of the modern sports environment. From this perspective, coaches' knowledge and competences should be understood not only as performance-related attributes, but also as organizational resources that shape human resource development processes in sport organizations — including learning, talent development, leadership formation and organizational culture (Garavan, Carbery, & Rock, 2012; ICCE, 2012).

Despite the recognized importance of coaches, previous research has predominantly focused on coaching effectiveness, performance outcomes, and athlete development. While these perspectives have contributed significantly to understanding the technical and pedagogical aspects of coaching, limited attention has been given to how coaches perceive their own knowledge and competences from a sport management and human resource development (HRD) perspective. In particular, the role of coaches as organizational actors and contributors to broader development processes remains insufficiently explored.

In this context, the present study examines how basketball coaches assess their own knowledge and competences and considers the implications of these perceptions for the management and development of sport organizations. The study contributes to the existing literature by positioning coaches not only as performance specialists, but also as key agents of human resource development who influence learning processes, organizational culture, and long-term organizational sustainability. The aim of this study is to examine coaches' perceived knowledge and competences and to explore their implications for sport management and human resource development (HRD), systematically validating the structural hierarchy of their knowledge domains in predicting overall coaching competence.

Based on the theoretical framework and previous research, the following hypotheses are proposed:

H1: There are positive relationships between professional, interpersonal, and intrapersonal knowledge domains.

H2: Coaches' perceived knowledge is positively associated with their perceived competences.

H3: Intrapersonal knowledge shows a statistically significant, stronger association with overall coaching competence compared to both the professional and interpersonal knowledge domains.

Methods

Participants and Sampling Design

This study applied a quantitative, cross-sectional research design with a descriptive–correlational approach. The sample consisted of 216 basketball coaches (188 male and 28 female) from European FIBA member countries, working with different age categories, from youth to senior levels, and with varying levels of formal and informal education and coaching experienceParticipants were recruited from European FIBA member countries through national basketball federations and professional coaching networks using a convenience sampling procedure, and their participation was voluntary. Given the exploratory nature of the study and the difficulty of accessing a diverse population of basketball coaches across multiple countries, a convenience sampling approach was considered appropriate. However, this sampling method may limit the generalizability of the findings.

Measures

For the purposes of this research, a two-part questionnaire was used. The first part collected socio-demographic data from respondents, including gender, age, formal/informal education, and years of coaching experience. The second part employed the validated Coaches' Knowledge and Competence Questionnaire (CKCQ). The instrument enables the assessment of key knowledge and competences that are necessary for the successful performance of the coaching role. Its purpose is to enable the collection of data on how important certain domains of knowledge and competence are in everyday coaching practice, as well as to enable coaches to assess their level of expertise in each of them (Quinaud et al., 2020; International Council for Coaching Excellence (ICCE), Association of Summer Olympic International Federations (ASOIF), & Leeds Beckett University, 2012; Côté & Gilbert, 2009). The CKCQ has been previously validated and has demonstrated satisfactory psychometric properties, including reliability and construct validity (Quinaud et al., 2020). The CKCQ contains 38 questions divided into two categories: "knowledge" (20 questions) and "competences" (18 questions). The part related to "knowledge" includes three groups of knowledge: professional (n = 10), interpersonal (n = 5) and intrapersonal (n = 5) knowledge, while the part related to "competences" contains questions related to defining vision and strategy (n = 3), shaping the environment (n = 3), building relationships (n = 3), performing practices (n = 3), recognizing and responding to situations in the field (n = 3) and learning and reflecting (n = 3). Participants answered the CKCQ questions using a Likert scale, rating the importance assigned (from 1 = "not important" to 5 = "very important") and perceived

proficiency (from 1 = "I know nothing" to 5 = "I know a lot") for a specific topic. Attributed importance refers to the level of importance that the participant attaches to a certain topic (in this research, a certain knowledge or competence) in the context of the trainer's work. Perceived domain refers to the participant's perception of how much knowledge or competence they possess as coaches (Del Corto Motta, Barreira, Corrêa Cortela, & Galatti, 2021). The data collected rely on self-reported psychological measures, which are systematically treated as subjective perceptual evaluations.

Procedure

We gathered the empirical data between May 2024 and March 2025 through an online survey sent out via email. Involvement in this research was entirely optional and contingent upon obtaining informed consent from each participant. We clearly explained the research objectives to all respondents, guaranteeing complete confidentiality and anonymity throughout the process. The survey did not collect any personal identifiers, and we utilized the generated database strictly for academic purposes. The study process aligned with international ethical guidelines for human subject research. Additionally, the Institutional Ethics Committee of Singidunum University formally reviewed and authorized our study protocol (Protocol Reference Number: 131 – 1, date: 04.02.2026).

Data Analysis

We executed all statistical computations using SPSS version 23. Our analytical approach incorporated several methods: descriptive statistics (arithmetic mean, standard deviation), Cronbach's Alpha-coefficient to determine the reliability of the used scales on the examined sample and Pearson's coefficient to check the connection between the scales. The level of statistical significance was set at $p<0.05$. Skewness and kurtosis were used to check the deviation of the scores from the normal distribution. In addition, the normality of the data distribution was tested using the Shapiro–Wilk test. The statistical outputs showed no significant deviations from normality, confirming that the data was suitable for parametric testing. Skewness indices fall within the range of -2 to +2, and kurtosis values remain between -7 and +7, which meets the standard criteria for parametric analysis (Hair, Black, Babin, & Anderson, 2020; Finney & DiStefano, 2006).

Results

The results indicate high levels of perceived knowledge and competences among coaches, with strong positive relationships between knowledge domains and overall coaching competence. A total of 216 basketball coaches participated in the study, of whom 188 were male (87.0%) and 28 female (13.0%). The majority of respondents were under the age of 45 (71.3%), while 28.7% were over 45. Regarding educational background, 10.2% of the coaches had completed secondary education, 19.4% had graduated from a college of applied studies, 19.0% held a bachelor's degree, 16.7% had a bachelor's degree specifically in physical education and sport, and 34.7% had completed a master's or PhD program. When it comes

to non-formal education, most coaches (41.7%) were educated as youth basketball coaches, 31.5% as senior basketball coaches, 16.2% as top national level basketball coaches, 7.4% as top international level basketball coaches, and 3.2% as mini basketball coaches. In terms of coaching experience, the largest share (44.0%) had more than 15 years of experience, one in four (25.0%) reported having between 10 and 15 years of experience, 17.1% had between 5 and 10 years, while 13.9% of respondents had less than 5 years of coaching experience *(Table 1).*

Table 1. Respondents' socio-demographic characteristics and coaching experience.

Respondent gender	**N**	**%**
Male	188	87.0%
Female	28	13.0%
Age		
Under 45	154	71.3%
Age		
Over 45	62	28.7%
Formal education		
High school	22	10.2%
Higher school (3-year studies)	42	19.4%
Bachelor studies (4-year studies)	41	19.0%
Bachelor studies in Physical education and sport (4-year studies)	36	16.7%
Master studies and PhD	75	34.7%
Informal education		
Mini basketball coach – instructor	7	3.2%
Youth basketball coach	90	41.7%
Senior basketball coach	68	31.5%
Top national level basketball coach	35	16.2%
Top international level basketball coach	16	7.4%
Experience		
Up to 5 years	30	13.9%
5-10 years	37	17.1%
10-15 years	54	25.0%
Over 15 years	95	44.0%

Source: Authors' analysis

The distributions of all scales and subscales were close to normal, and the reliability of the measures was satisfactory *(Table 2).*

Table 2. Descriptive indicators of the scales and subscales used in the research (the number of variables included in each scale is shown in parentheses).

Variables	**Min.**	**Max.**	**AS**	**SD**	**α**	**Skewness**	**Kurtosis**
Knowledge (18)	2.50	5.00	4.24	0.46	.899	-.430	.207
Knowledge - Professional (9)	2.89	5.00	4.20	0.50	.825	-.204	-.546
Knowledge - Interpersonal (5)	2.20	5.00	4.19	0.57	.786	-.574	.109
Knowledge – Intrapersonal (4)	2.00	5.00	4.38	0.52	.710	-.901	1.389

Competence (12)	2.67	5.00	4.37	0.49	.902	-.685	.149

Source: Authors' analysis.

Table 3 shows the descriptive indicators for the variables that make up the professional, interpersonal and intrapersonal domains of knowledge and competence of basketball coaches. In the professional domain, the highest rated item was training planning (AS = 4.58), followed by pedagogical approach (AS = 4.55) and training management (AS = 4.36). The lowest values were recorded for knowledge of sports legislation (AS = 3.65) and competition organization (AS = 3.98). In the interpersonal domain, the highest mean score was obtained for communication with players and coaching staff (AS = 4.59), while the lowest score was observed for communication with parents, media and referees (AS = 3.66). In the intrapersonal domain, high scores were recorded for reflection on coaching practice (AS = 4.41), emotional control (AS = 4.32), and providing feedback (AS = 4.45). Overall, the results indicate a high self-assessment of the trainers' competences, with identified weak points that represent potential domains for additional education and professional development.

Table 3. Descriptive indicators of individual variables within the examined subscales.

	Variables	**AS**	**SD**
Professional	Practice planning (goals, content, structuring, and drills progressions).	4.58	0.61
	Practice management (time, space, equipment, and players).	4.36	0.69
	Pedagogical approach (equal opportunities, respect, methodology).	4.55	0.62
	Evaluation of basketball skills, physical, and psychological abilities in the context of sports training.	4.33	0.68
	Short, Medium and Long-term goals in development of players.	4.41	0.69
	Programs and practice load monitoring and correction that involve the integration of specialists in Sports Sciences.	3.98	0.81
	First aid.	3.94	0.88
	Legislation that regulates the sports system.	3.65	0.99
	Organization of basketball competitions.	3.98	0.86
Interpersonal	Leadership and management of athletes and coaching staff	4.33	0.73
	Effective communication with players and coaching staff during practice.	4.59	0.62
	Mentoring other coaches.	4.13	0.81
	Communication with other actors in the sports scene (parents, media, referees).	3.66	0.91
	Development of acceptable attitudes, values, and social behaviors.	4.23	0.81
Intrapersonal	Reflection for your own coaching performance.	4.41	0.72
	Control of your own emotion and the emotion of others (athletes, parents, media, referees)	4.32	0.76
	Coaching philosophy.	4.36	0.68
	Providing feedback to players (after practice and games).	4.45	0.67

Source: Authors' analysis.

The results of the Pearson correlation analysis indicate a strong positive correlation between the subscales of the knowledge scale. A strong positive correlation was found between the

interpersonal and intrapersonal subscales (r(216) = +0.72, $p < .01$), indicating a strong positive association between interpersonal and intrapersonal knowledge domains. A moderately strong positive correlation was identified between the professional and interpersonal subscales (r(216) = +0.64, p < .01), indicating a meaningful association between these domains. Likewise, a moderately strong positive correlation was observed between the professional and intrapersonal subscales (r(216) = +0.61, p < .01), further supporting the interconnectedness of different knowledge domains (*Table 4*).

Table 4. Pearson correlation coefficients between subscales.

	Professional	Interpersonal	Intrapersonal
Professional	1	.640**	.612**
Interpersonal		1	.725**
Intrapersonal			1

Source: Authors' analysis.

Note: **. Correlation significant at the level of 0.01 (2-tailded).

The results of the Pearson correlation analysis indicate a strong positive relationship between the knowledge and competence scales (r(216) = +0.77, p < .01), suggesting a close association between these constructs (*Table 5*).

Table 5. Pearson correlation coefficient between the knowledge and competence scales.

	Knowledge	Competence
Knowledge	1	.772**
Competence		1

Source: Authors' analysis.

Note: **. Correlation significant at the level of 0.01 (2-tailded).

The results of the Pearson correlation analysis indicate positive relationships between the competence scale and all knowledge subscales. A strong positive correlation was found between the intrapersonal subscale and the competence scale (r(216) = +0.77, p < .01), indicating a particularly close association between these variables. Moderate positive correlations were observed between the professional and competence scales (r(216) = +0.65, p < .01), as well as between the interpersonal and competence scales (r(216) = +0.65, p < .01), further supporting the relationship between knowledge domains and overall coaching competence (Table 6).

Table 6. Pearson correlation between knowledge subscales and the competence scale.

	Professional	Interpersonal	Intrapersonal	Competence
Professional	1	.640**	.612**	.655**
Interpersonal		1	.725**	.654**
Intrapersonal			1	.773**
Competence				1

Source: Authors' analysis.

Note: **. Correlation significant at the level of 0.01 (2-tailded).

Overall, the findings indicate that coaches perceive all domains of knowledge as highly important and closely interconnected. Strong positive relationships were observed both among knowledge domains and between knowledge and competences. In particular, intrapersonal knowledge showed the strongest association with overall coaching competence, while relatively lower scores were identified in areas related to external communication and sports legislation, highlighting potential areas for further development. These findings provide support for the proposed hypotheses, confirming positive relationships between knowledge domains (H1), a strong association between knowledge and competences (H2), and the particularly strong role of intrapersonal knowledge in relation to overall coaching competence (H3).

Discussion

The findings of this study provide insight into how coaches perceive their knowledge and competences and highlight their broader role within sport management and human resource development. . The surveyed coaches rate highly all three key areas of knowledge – professional, interpersonal and intrapersonal – which is in line with the models developed by Côté and Gilbert (Côté & Gilbert, 2009), as well as the ICCE guidelines (International Council for Coaching Excellence (ICCE), Association of Summer Olympic International Federations (ASOIF), & Leeds Beckett University, 2012). Professional components, such as training planning, pedagogical approach and resource management, represent the basis of the coach's professional work, while lower scores in domains such as sports legislation and competition organization indicate the need for additional formal education in those segments.

This pattern indicates that coaches tend to understand competence as a combination of different aspects of their work, rather than as a set of separate skills. Technical knowledge, interaction with others and personal self-control appear to be closely connected in everyday coaching practice. This way of understanding coaching reflects the practical demands of the profession, where effective work depends on the ability to combine different forms of knowledge and experience within a specific organizational setting.

The interpersonal domain shows that coaches highly value communication and managing people within the team, but rate relations with external stakeholders, such as parents and the media, less highly, which suggests that this aspect of the coaching role is less developed and may require further professional support and training. In this respect, the present findings are consistent with those of Gould et al. (2007), who emphasize the important role of coaches in the psychological and personal development of athletes, as well as with the study by Jowett and Cockerill (2003), who highlight the crucial contribution of high-quality communication with external stakeholders to athletic success. As pointed out by Cushion, Armour, and Jones (2003), a large part of a coach's professional development takes place through everyday experience, mentoring and reflection on practice. This supports the importance of interpersonal and pedagogical competences identified in the present study, as these forms of learning are closely linked to direct work with athletes and colleagues.

The findings further suggest that not all domains contribute equally to overall coaching competence. The particularly strong association between intrapersonal knowledge and overall coaching competence can be explained by the central role of self-reflection, emotional regulation, and adaptive thinking in coaching practice. These competencies enable coaches to respond effectively to complex and dynamic situations, which are characteristic of modern sport environments. In line with HRD perspectives, intrapersonal capabilities can be seen as foundational for continuous learning and personal development, which in turn influence broader organizational outcomes.

At the same time, the results reveal certain areas that are less developed and may require additional attention**.** The relatively lower scores observed in areas such as sports legislation and external communication may reflect the traditional focus of coach education programs, which tend to prioritize technical and performance-related competencies over broader organizational and regulatory knowledge. Additionally, communication with external stakeholders, such as media and parents, often falls outside the core coaching role, which may help explain lower perceived importance and competence in these areas.

These findings further highlight the importance of reflection, emotional regulation, and adaptive capacity in coaching practice. The close relationships observed between different areas of knowledge and overall coaching competences indicate that these aspects do not develop independently but rather function as an interconnected system. In practice, professional, interpersonal, and intrapersonal elements are mutually reinforcing, with progress in one domain often accompanied by changes in others. These results also support the validity of the CKCQ as an instrument for evaluating coaches' professional competence and further illustrate the complex and multidimensional nature of coaching work.

From a human resource development perspective, these findings indicate that coaches should be understood not only as trainers of athletes, but also as facilitators of learning and development within sport organizations. Through everyday interactions, feedback processes, and role modeling, coaches contribute to the development of individual and team capabilities, thus influencing organizational culture and long-term performance. In this sense, coaching can be understood as a micro-level HRD function embedded within the broader organizational system. The interrelations among professional, interpersonal, and intrapersonal domains are consistent with strategic HRD models that emphasize continuous learning, talent development, and leadership formation as key drivers of organizational sustainability (Garavan, 2007; Swanson & Holton, 2009; Garavan, Carbery, & Rock, 2012). The results should be interpreted with certain limitations in mind. The analysis is based on coaches' own assessments and does not include evaluations from other perspectives, which may have influenced the responses. The study focuses only on basketball coaches, so the findings cannot be directly applied to other sports. In addition, the data were collected at one point in time and do not reflect possible changes in coaching competences during different phases of a coaching career. Future studies could reduce these limitations by including coaches from various sports, relying on additional sources of evaluation and following the development of coaching competences over a longer period.

Conclusion

This study highlights the importance of understanding coaching competence as a multidimensional construct, encompassing professional, interpersonal, and intrapersonal domains. The findings emphasize the particularly strong role of intrapersonal competences, such as reflection and emotional regulation, while also identifying areas for further development, especially in communication with external stakeholders and knowledge of sports legislation.

From a practical perspective, these findings suggest that coach education and development programs should move beyond a narrow focus on technical skills and incorporate elements related to communication, leadership, and organizational understanding. In this way, coaches can be positioned as key contributors to human resource development and organizational sustainability within sport organizations.

The study is limited by the use of self-reported data, its cross-sectional design, and its focus on basketball coaches, which may limit the generalizability of the findings. Future research could include coaches from other sports and organizational settings and rely on multiple sources of evaluation in order to provide a more comprehensive understanding of how coaching competences develop over time.

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Corresponding author: joksimovicmarijana80@gmail.com

DIRTY MONEY IN SPORTS: AN ANALYSIS OF MONEY LAUNDERING MECHANISMS IN THE GLOBAL SPORTS INDUSTRY

Marijana Joksimović[1], Biljana Grujić Vučkovski[2], Vladimir Ristanović[3]

Abstract: *Money laundering in the global sports industry represents a growing threat, driven by high financial volumes, transnational transactions, and limited transparency in sports finance. This study examines how criminal networks exploit professional sports—particularly football—to integrate illicit funds into legitimate financial flows. The research is designed as a narrative literature review combined with qualitative case study analysis. A method approach is employed, including content analysis of regulatory frameworks and academic literature, semi-structured expert interviews, and in-depth examination of two prominent cases: the FIFA corruption scandal (2015) and the Belgian football fraud case (2017–2019). Data from international organizations such as FATF, UNODC, ICSS, and SIGA are systematically analyzed. The findings identify recurring money laundering mechanisms in professional sports, most notably inflated player transfer fees, fictitious sponsorship agreements, betting manipulation, and the use of offshore ownership structures. The analysis further reveals significant institutional and regulatory vulnerabilities, including weak financial oversight, inconsistent enforcement of anti–money laundering (AML) regulations, limited transparency in ownership and sponsorship arrangements, and insufficient internal compliance capacities within sports organizations. Football emerges as the most exposed sport due to its global reach, transfer market structure, and high commercial revenues. The study concludes that existing AML frameworks in sport remain largely reactive and fragmented, particularly in a transnational context. Strengthening financial oversight, enhancing transparency, establishing dedicated compliance units, and improving international regulatory coordination are essential to safeguarding the integrity of professional sports. These findings contribute to sport governance and sport business literature by offering policy-relevant insights into risk management and integrity protection in the global sports industry.*

Keywords: football, cryptocurrency, corruption, organizational integrity, risk management and financial oversight.

[1] Alfa BK University, Faculty of Finance, Banking and Audit, Belgrade, Serbia
[2] Research and Development Institute TAMIS, Pančevo, Serbia
[3] Institute of European Studies, Belgrade, Serbia

Introduction

Money laundering in professional sports is most commonly conducted through sponsorship agreements, player transfers, ticket sales, betting activities, and investments in sports organizations, where high financial volumes and complex transactional structures provide opportunities to disguise illicit funds (FATF, 2009; Unger & Ferwerda, 2011). Among all sports, professional football represents the most exposed sector due to its global transfer market, extensive commercial revenues, and transnational financial flows (UNODC, 2021; ICSS, 2019). This phenomenon has attracted increasing academic and policy attention due to its implications for financial integrity and governance in global sport.Although sport is traditionally associated with fairness, competition, and global unity, the rapid commercialization and internationalization of the sports industry have significantly increased its vulnerability to financial crime (Kuwelker, Diaconu, & Kuhn, 2022; Shchokin et al., 2023). Opaque ownership structures, weak financial oversight, and inconsistent regulatory enforcement create favorable conditions for criminal networks to exploit legitimate sports-related transactions for the purpose of money laundering (Li, 2023; Mravec, 2025).

Previous research highlights that criminal organizations frequently exploit the legitimacy and public trust associated with sport to integrate illicit proceeds into formal financial systems. High-risk areas include inflated player transfer fees, fictitious sponsorship agreements, manipulation of betting markets, and investments in sports-related businesses used as laundering vehicles (FATF, 2009; OECD, 2009; Žličar, Barbaros, & Hublin, 2025). These practices undermine fair competition, distort market values, and seriously damage the credibility and integrity of sporting institutions at both professional and amateur levels (Cindori & Manola, 2020).

Over the past two decades, numerous high-profile international scandals—such as match-fixing schemes, fraudulent contracts, tax evasion, and corruption within governing bodies—have demonstrated how sport can serve as an efficient channel for laundering substantial amounts of illicit capital (UNODC, 2021). Despite the introduction of regulatory instruments such as UEFA's Financial Fair Play and national anti–money laundering (AML) frameworks, empirical evidence suggests that existing prevention and control mechanisms remain fragmented, inconsistently enforced, and often ineffective in a transnational context (European Parliament, 2020; Unger & Ferwerda, 2011).

Within this context, education and awareness among athletes, club officials, and sports administrators have been identified as important but insufficient preventive measures if not supported by robust governance structures and institutional compliance systems (Cindori & Manola, 2020). Criminal schemes typically operate through seemingly legitimate mechanisms: front companies sponsoring clubs or events, manipulated player transfers used to move funds across borders, large-scale ticket purchases and resale, illegal betting and match-fixing activities, and investments in clubs, academies, or merchandising businesses to legitimize illicit income (Joksimović, Peković, & Stamenović, 2024).

Despite the growing body of literature, a clear research gap remains. Existing studies predominantly focus on descriptive accounts of individual cases or isolated mechanisms, with limited efforts to develop a systematic and conceptually structured typology of money laundering practices in sport. Furthermore, there is a lack of integrative approaches that combine case study evidence, institutional reports, and expert insights into a unified analytical framework.

Against this background, this study aims to provide a systematic and analytically grounded examination of money laundering in professional sports, with a particular focus on football.

The primary objective of the study is to identify and develop a typology of recurring laundering mechanisms based on qualitative evidence derived from international case studies and expert insights.

By focusing analytically on the identification and typology of laundering mechanisms, this study contributes to the sport business and sport governance literature through an empirically grounded and conceptually structured analysis of money laundering risks in professional sports.

Several high-profile cases illustrate how money laundering operates in sport. The Belgian "Operation Clean Hands" scandal revealed a network of corruption involving clubs, agents, and referees, leading to multiple charges related to money laundering and fraud.

Similarly, investigations into South American football have exposed systematic abuses involving criminal networks and sports federations (UNODC, 2021).

FIFA and UEFA have also implemented financial fair play regulations, though critics argue enforcement is inconsistent and often lacks transparency (European Parliament, 2020).

The global nature of sport complicates enforcement. Differences in national laws, limited data sharing, and loopholes in ownership disclosure laws hinder effective action (Unger & Ferwerda, 2011; OECD, 2009). Club ownership structures, particularly involving offshore entities, further obscure the financial trail.

Additionally, there is limited training among sports organizations in identifying suspicious transactions, and most rely heavily on external audits rather than in-house compliance mechanisms (ICSS, 2018).

Technology such as AI and blockchain is being considered to improve transparency and traceability in sports finance (SIGA, 2022). There is also growing advocacy for harmonized international regulatory standards and the creation of independent anti-money laundering units within sports bodies.

To achieve this aim, the research is guided by a set of interrelated questions that address the structural, operational, and regulatory dimensions of money laundering in sport. Specifically, the study examines: (RQ1) how structural characteristics of the sports sector, particularly football, create opportunities for money laundering; (RQ2) what the most common laundering mechanisms are and how they facilitate the integration of illicit funds into legitimate financial flows; (RQ3) how effective existing regulatory and enforcement

frameworks are in mitigating these risks; and (RQ4) how governance structures, transparency, and internal compliance systems influence the vulnerability of sports organizations. By addressing these questions through a qualitative, multi-source analytical approach, the study provides a comprehensive understanding of financial crime risks in sport and offers practical implications for strengthening institutional resilience and regulatory effectiveness.

Method and Subject of Research and Data Collection

This study is designed as a qualitative, exploratory research combining a narrative literature review with case study analysis and expert interviews, in order to examine money laundering mechanisms within the global sports industry, with a particular focus on professional football. The narrative review approach enables the synthesis of academic literature, regulatory reports, and policy documents, while the case study component provides an in-depth analysis of concrete manifestations of illicit financial activities in sport (Anderson, 2018; Cindori & Manola, 2020).

The research design is analytically oriented toward the identification and typology of money laundering mechanisms, rather than the formal evaluation of regulatory effectiveness.

The methodological framework integrates both inductive and deductive reasoning, allowing patterns to emerge from empirical evidence while simultaneously assessing them within established theoretical and regulatory frameworks. Data collection was conducted through a systematic, multi-source approach between 2023 and 2025. The primary sources included official and publicly available documents issued by leading international organizations involved in combating financial crime in sport, such as the Financial Action Task Force (FATF), the United Nations Office on Drugs and Crime (UNODC), the International Centre for Sport Security (ICSS), and the Sport Integrity Global Alliance (SIGA).

Document inclusion criteria were as follows: (1) verified or official source, (2) direct relevance to financial crime and sport integrity, and (3) sufficient analytical depth to support qualitative assessment.

The research was conducted between 2023–2025 using a systematic multi-source approach integrating document analysis, case studies, and expert interviews.

To complement the documentary analysis, purposively selected case studies were included to provide empirically grounded insights. Two high-profile international cases were analyzed in detail: the FIFA Corruption Scandal (2015), focusing on bribery schemes, illicit payments, and money laundering involving senior officials and sports marketing executives, and the Belgian Football Fraud Scandal (2017–2019), examining organized crime involvement, inflated player transfers, fictitious consultancy fees, and laundering through football transactions.Case selection followed a purposive sampling strategy, prioritizing analytical relevance, availability of verified documentation, and significance for sport governance and financial regulation.

Case materials included court documents, investigative reports, audit findings, and official statements. The analysis focused on identifying laundering typologies and structural vulnerabilities exploited within each case. Additionally, semi-structured qualitative

interviews were conducted with fifteen experts, including specialists in sports law, compliance officers, and representatives of sports governing bodies. Participants were selected based on their professional experience and direct involvement in sports governance or financial regulation.

Interviews explored operational characteristics of laundering mechanisms, enforcement challenges, and perceived institutional weaknesses. All interviews were transcribed and subjected to thematic coding to identify recurring patterns and expert consensus. Data analysis was performed using qualitative content analysis supported by systematic coding and thematic categorization. A comparative analytical approach was applied to examine similarities and differences across data sources and cases, enabling the refinement of typological classifications. The triangulation of documentary evidence, case studies, and expert interviews enhanced the validity and reliability of the findings.The coding process was conducted in two stages: open coding (identification of recurring financial practices and transaction patterns) and axial coding (grouping these into higher-order laundering typologies). To ensure analytical consistency and transparency, NVivo software (QSR International, Australia) was used for data organization, coding, and cross-case comparison (Allsop et al., 2022).The combined methodological approach provides analytically grounded insights into recurring money laundering mechanisms and the structural conditions that enable them. While the study does not aim for statistical generalization, it ensures methodological rigor, internal coherence, and transparency. The methodological design ensures internal coherence between research design, data collection, and qualitative analysis procedures, while acknowledging that further empirical research using quantitative financial data could complement the findings.

Results

This study applied a qualitative methodological framework combining content analysis, comparative case study analysis, and expert interviews. This method approach enabled a systematic examination of money laundering mechanisms in global sports and ensured triangulation of data sources, thereby increasing the reliability of the empirical findings.

The content analysis covered official reports and policy documents issued by international regulatory and enforcement bodies, including the Financial Action Task Force (FATF), the United Nations Office on Drugs and Crime (UNODC), and the International Centre for Sport Security (ICSS), as well as relevant academic literature and legal frameworks related to anti-money laundering (AML) in sport (Verschuuren, 2018).

The analysis focused on three main thematic categories: financial vulnerabilities in sports institutions, dominant laundering mechanisms (e.g., inflated player transfers, betting manipulation, sponsorship abuse), and regulatory and jurisdictional gaps.

The empirical data reveal significant regional disparities in reported sports-related crime. As shown in Table 1, Europe accounts for the largest share of reported cases worldwide (38%), followed by the Middle East and North Africa (27%), Asia (18%), and the Americas (12%).

Africa represents the smallest share (5%), which may reflect both lower detection rates and underreporting due to weaker monitoring mechanisms.

Table 1. Geographic Distribution of Sports Crime Reports.

Region	Share (%)
Europe	38
Middle East & North Africa	27
Asia	18
Americas	12
Africa	5

Source: Author's own elaboration, based on data.

The analysis identifies distinct, continent-specific typologies of money laundering in the sports sector, reflecting regional institutional, regulatory, and market characteristics. Table 2 presents a comparative overview of the dominant laundering methods and structural vulnerabilities observed across continents, based on synthesized evidence from international reports and case studies.

Table 2. Typology of money laundering in sports by continent.

Continent	Typology and Methods of Money Laundering in Sports
Europe	Inflated player transfers and overvalued sponsorship agreements in professional football; match-fixing and illegal betting facilitated by organized crime networks; use of offshore tax havens and shell companies to obscure ownership; exploitation of loopholes in Financial Fair Play (FFP) regulations; use of cryptocurrencies in unregulated betting markets.
Asia	Match-fixing in cricket and football, particularly in South and Southeast Asia; cross-border laundering through online betting platforms; bribery and corruption within sports federations and governing bodies; laundering through club investments and fictitious sponsorship arrangements; weak or uneven AML enforcement mechanisms.
Americas	Links between organized crime (including drug cartels) and professional football clubs; underground betting operations and ticket fraud; governance corruption and embezzlement within sports organizations; tax evasion and opaque ownership structures; limited cross-border regulatory coordination.
Australia	Illegal online betting via offshore platforms; match-fixing in minor leagues and niche sports; existing AML legislation (AML/CTF Act 2006) with uneven enforcement; laundering through broadcasting rights and merchandise revenues; relatively lower exposure to transnational criminal networks.

Continent	Typology and Methods of Money Laundering in Sports
Africa	High levels of corruption and weak institutional capacity; fake tournaments and sham sponsorships used to introduce illicit funds; misuse of donor and development funds within sports federations; minimal AML compliance structures at club level; illicit betting and use of "smurfing" techniques to avoid detection.

Source: Based on FATF (2022), UNODC (2022), ICSS (2019), and academic literature.

Across all regions, the findings indicate recurring vulnerabilities linked to player transfers, betting activities, sponsorship arrangements, and ownership opacity. However, the specific manifestation of laundering techniques varies significantly by continent, reflecting differences in regulatory capacity, governance standards, and market structures. This comparative typology provides an empirical foundation for understanding regional risk profiles and informs targeted policy and regulatory responses discussed in the following section.

Table 3 presents a comparative assessment of money laundering risk factors across continents based on transfers, sponsorships, betting, and offshore structures. Europe records the highest overall risk score (18), followed by Asia and the Americas (15 each). Africa shows a moderate risk level (12), while Australia has the lowest cumulative risk score (9).

Table 3. Money laundering risk factors in sports by continent.

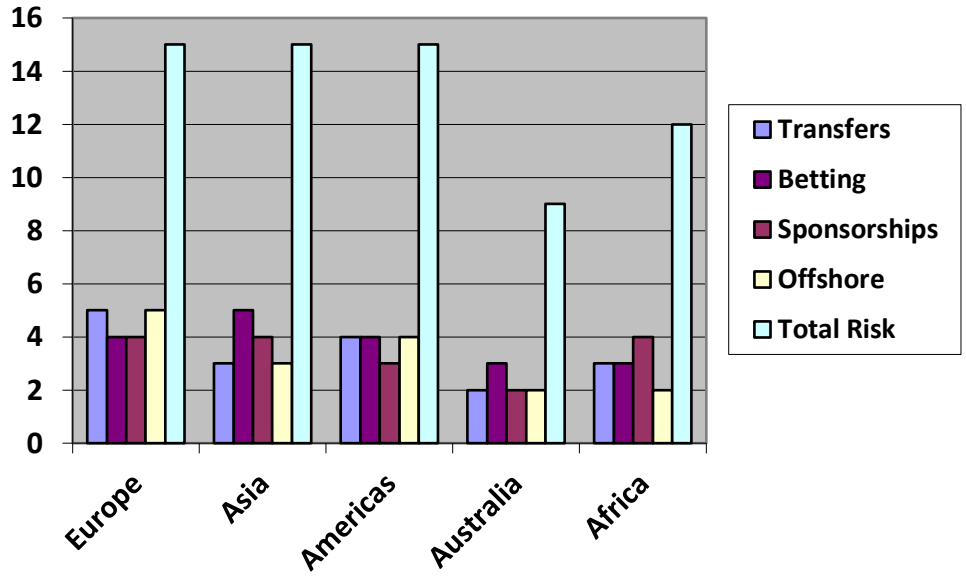
Continent	Transfers	Sponsorships	Betting	Offshore	Total Risk
Europe	5	4	4	5	18
Asia	3	4	5	3	15
Americas	4	3	4	4	15
Australia	2	2	3	2	9
Africa	3	4	3	2	12

Legend: Risk levels (1–5) indicate the assessed severity of each money laundering factor in sports organizations: 1 – Very low risk; 2 – Low risk; 3 – Moderate risk; 4 – High risk; 5 – Very high risk; **Transfers** – Risk associated with inflated or suspicious player transfers; **Sponsorships** – Risk linked to fictitious, overvalued, or opaque sponsorship deals; **Betting** – Risk related to match-fixing, illegal betting markets, or manipulation of odds; **Offshore** – Risk from opaque ownership structures, shell companies, or cross-border fund movements; **Total Risk** – Sum of the individual risk scores across the four categories for each continent. A higher total indicates a greater overall exposure to money laundering in sports within that region.

Source: Author's own elaboration, based on data.

Chart 1 illustrates both the magnitude and composition of these risks, allowing for the identification of dominant laundering channels in each region.

Chart 1. Money laundering risk factors in sports by continent.



Source: Author's own elaboration, based on data.

The findings also reveal substantial internal weaknesses in sports organizations' AML frameworks. As shown in Table 5, the most severe vulnerabilities include the absence of internal compliance units, offshore ownership structures, and limited financial transparency, all assessed as severity level 5 (very high risk). Weak Know Your Customer (KYC) procedures and poor international cooperation are rated as severity level 4 (high risk), while insufficient AML training represents a moderate risk, severity level 3. Risk scores (1–5) were assigned based on thematic coding of case data and expert judgment during analysis rounds. The data presented in Table 5 were compiled from multiple sources, including international case studies (e.g., FIFA 2015 Corruption Scandal, Belgian Football Fraud 2017–2019), regulatory reports from the Financial Action Task Force (FATF, 2022), the United Nations Office on Drugs and Crime (UNODC, 2022), and the International Centre for Sport Security (ICSS, 2019). Key vulnerabilities were identified through thematic coding of qualitative data using NVivo (QSR International, Australia), including expert interviews with sports compliance officers and analysis of organizational reports.

Table 5. Key AML vulnerabilities in sports organizations**.**

AML Weakness	Severity (1–5)
No internal compliance unit	5
Offshore ownership	5
Weak KYC procedures	4
Poor international cooperation	4
Limited financial transparency	5
Low AML training	3

Legend: Severity levels indicate the assessed risk of each vulnerability for facilitating money laundering - 1 - Very low risk; 2 - Low risk; 3 - Moderate risk; 4 - High risk; 5 -Very high risk.

Source: Author's own elaboration, based on data.

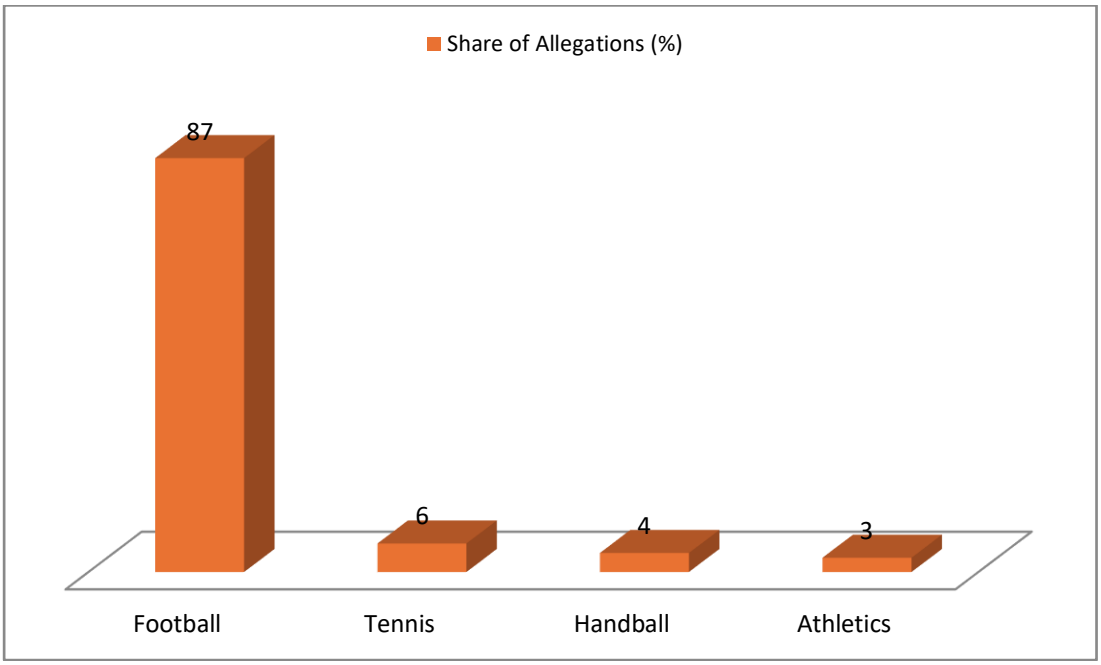
Data from processed cases further illustrate the scale of financial crime in sport. According to UNODC estimates, illegal betting, match manipulation, and organized crime connections in sport generate up to USD 1.7 trillion annually (UNODC, 2022). High-profile cases, such as the embezzlement and illegal betting activities involving a former NFL employee, demonstrate how sports institutions can be exploited for large-scale financial misconduct. Table 6 presents the sports most affected by financial crime, while Chart 2 provides a graphical representation of the sports most affected by financial crime.

Table 6. Sports most affected by financial crime.

Sport	Share of Allegations (%)
Football	87
Tennis	6
Handball	4
Athletics	3

Source: Author's own elaboration, based on data.

Chart 2. Sports most affected by financial crime.



Source: Author's own elaboration, based on data.

Additional empirical evidence from the Sport Integrity (SI) Hotline indicates more than 240 reported allegations of corruption in sport (ICSS, 2019). Football accounts for 87% of all reported cases (Table 6), confirming its dominant exposure compared to other sports such as tennis (6%), handball (4%), and athletics (3%). The chart (Chart 2) visually represents the relative share of reported cases per sport, with vertical bars labeled according to percentage values for clarity.

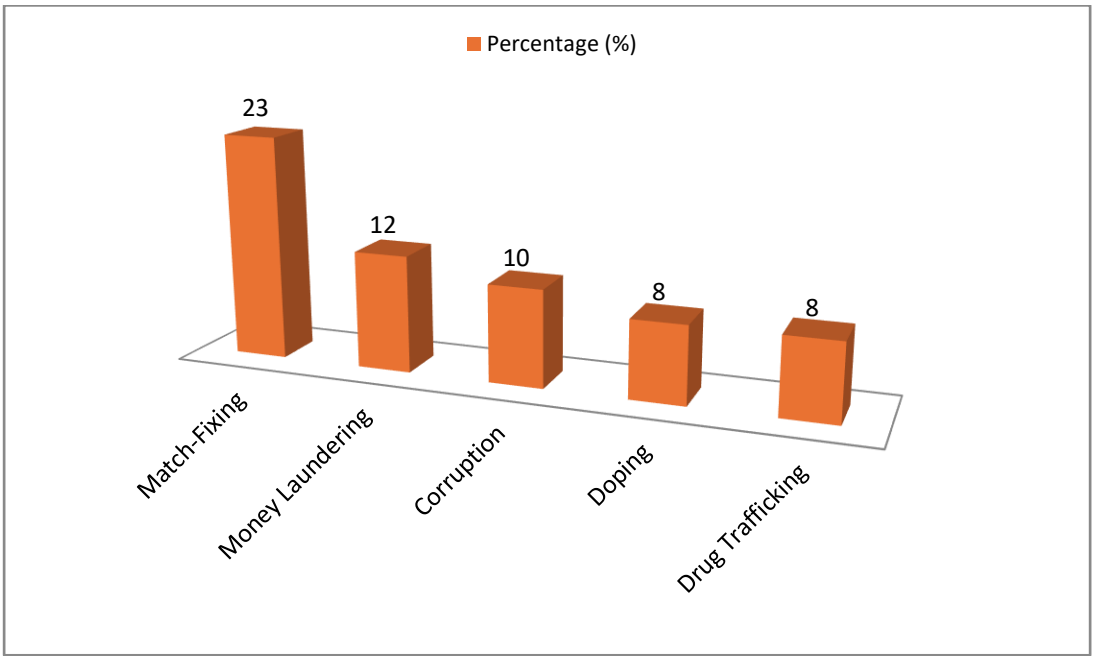
Table 7 presents the types of crime reported in sport, while Chart 3 provides a graphical representation of the types of crime reported in sport.

Table 7. Types of crime reported in sport.

Crime Type	Percentage (%)
Match-Fixing	23
Money Laundering	12
Corruption	10
Doping	8
Drug Trafficking	8
Other Crimes	39

Source: Author's own elaboration, based on data ICSS Hotline.

Chart 3. Types of Crime Reported in Sport.



Source: Author's own elaboration, based on data ICSS hotline.

Reported crime types (Table 7 and Chart 3) show that match-fixing represents 23% of cases, followed by money laundering (12%) and corruption (10%). Doping and drug trafficking each account for 8%, while other crimes comprise 39% of reports.

Overall, the research results demonstrate clear and consistent empirical patterns of money laundering and related financial crime within the global sports sector. The findings reveal pronounced regional disparities in reported cases, well-defined continent-specific laundering typologies, and recurrent risk factors linked to player transfers, betting markets, sponsorship arrangements, and offshore ownership structures. Across all analyzed data sources, professional football emerges as the most exposed sport, accounting for the vast majority of reported allegations. In addition, the results highlight significant internal AML vulnerabilities within sports organizations, particularly the absence of compliance units, limited financial transparency, and weak KYC procedures. Taken together, these findings provide a comprehensive empirical foundation for further interpretation and policy-oriented discussion in the subsequent section.

Discussion

The findings of this study provide a systematic insight into the structural, operational, and regulatory dimensions of money laundering in professional sports, particularly football. The discussion below explicitly addresses the research questions (RQ1–RQ4) and critically links

the results presented in Tables 1–7 and Charts 1–3 to existing literature and practical mechanisms of illicit financial flows.

The study confirms that the professional sports sector is highly susceptible to money laundering due to weak financial oversight and opaque ownership structures. As illustrated in Table 5, the absence of internal compliance units, limited transparency in ownership, and weak KYC procedures represent the most severe internal vulnerabilities (severity level 5). These organizational weaknesses facilitate the infiltration of illicit funds by providing minimal scrutiny of incoming financial flows, allowing criminals to integrate illegal revenues into legitimate sports operations (Kuwelker et al., 2022; Shchokin et al., 2023). For example, offshore ownership structures enable the layering of illicit funds, while inadequate KYC protocols hinder the identification of high-risk entities, corroborating findings from FATF (2022) and UNODC (2022). These findings directly address RQ1 by highlighting how structural vulnerabilities create opportunities for money laundering in professional sports

Empirical data reveal that laundering mechanisms in sports are multifaceted and context-dependent. Predominant methods include: Inflated Player Transfers: Criminal actors manipulate transfer fees, often through shell companies, to move large sums across borders while masking the illicit origin of funds. Case evidence from European football demonstrates how transfers can be intentionally overvalued to legitimize illegal money (Joksimović, Peković, & Stamenovic, 2024). Fictitious Sponsorship Agreements: Sponsorship deals with non-existent or affiliated entities allow the injection of illicit capital into club accounts under the guise of legitimate marketing expenditures (Cindori & Manola, 2020). Manipulation of Betting Markets: Criminals exploit weakly regulated betting markets, placing illicit funds on predetermined outcomes and cashing out through ostensibly legal channels (Žličar, Barbaros, & Hublin, 2025). Use of Offshore Structures: Offshore accounts and corporate vehicles obscure ownership, complicating regulatory oversight and permitting layering of illegal revenues (Verschuuren, 2018).

These mechanisms demonstrate that money laundering in sports is not incidental but structurally embedded within high-risk activities, aligning with the comparative analysis in Table 4 and the typology in Table 3. These mechanisms directly answer RQ2 by detailing the operational strategies through which illicit funds are integrated into legitimate sports finance.

The results indicate that existing anti-money laundering (AML) measures remain largely reactive. While some jurisdictions, particularly in Europe, have implemented Financial Fair Play (FFP) regulations and comprehensive AML frameworks, uneven enforcement allows transnational criminal networks to exploit loopholes (FATF, 2022). For instance, Table 4 shows Europe has the highest total risk score (18), highlighting that even well-regulated regions remain vulnerable due to the complexity and mobility of illicit financial flows. This observation supports previous critiques regarding the fragmented implementation of AML measures in sport (Kuwelker et al., 2022; Shchokin et al., 2023). Regulatory gaps are particularly evident in Asia and Africa, where limited cross-border cooperation and uneven monitoring exacerbate the risk of laundering through betting markets and sponsorship abuse. This analysis addresses RQ3 by evaluating the effectiveness and limitations of current regulatory and enforcement mechanisms in mitigating money laundering risks.

At the organizational level, deficiencies such as the lack of internal compliance units, insufficient AML training, and limited transparency significantly constrain the detection and prevention of illicit financial flows. Chart 3 and Table 7 demonstrate the relative severity of these vulnerabilities, which amplify the sector's exposure to criminal exploitation. Consistent with prior studies, such as those by ICSS (2019) and UNODC (2022), these weaknesses create an environment in which laundering can occur with minimal oversight. Notably, high implementation costs, resistance to digitalization, and insufficient expertise further impede proactive risk management. These organizational insights respond to RQ4 by showing how internal governance and institutional factors influence susceptibility to money laundering.

Overall, the discussion demonstrates that the mechanisms and vulnerabilities identified in this study correspond closely with existing literature. Empirical patterns from international case studies (e.g., FIFA 2015, Belgian football 2017–2019) and quantitative risk assessments (Tables 1–6) illustrate how organizational, regional, and regulatory factors intersect to facilitate money laundering. By linking Tables 1–7 and Charts 2–3 to RQ1–RQ4, this study provides a coherent narrative that contextualizes both the prevalence and the structural embedding of illicit financial flows in sport.

Beyond mere description, the study elucidates the practical functioning of money laundering in sports. For example, layering through inflated transfers is often combined with sponsorship schemes and offshore transactions to create complex financial pathways that are difficult to trace. Betting-related laundering typically exploits weakly regulated or online platforms, where winnings are reintegrated into the legitimate economy. These mechanisms are not only theoretically supported by the literature (Cindori & Manola, 2020; Joksimović et al., 2024) but also empirically evident in the case studies analyzed.

The synthesis of empirical evidence and literature indicates that money laundering in sports is systemic, regionally differentiated, and closely tied to organizational deficiencies. Strengthening internal compliance, improving transparency, harmonizing international regulations, and promoting proactive risk management are essential steps to mitigate these vulnerabilities. The study underscores the need for both preventive measures and enhanced cross-border cooperation to effectively counteract money laundering in professional sports.

Future studies could significantly enhance the understanding, relevance, and practical impact of research on sports-related money laundering: Expansion to other sports and regions – Broader comparative studies involving underrepresented sports (e.g., basketball, athletics, esports) and regions with limited reporting could uncover novel laundering typologies and institutional vulnerabilities. Longitudinal analysis – Tracking cases and regulatory interventions over time would allow for the assessment of trends, effectiveness of AML measures, and the evolution of laundering mechanisms in response to policy changes. Quantitative modeling – Integrating quantitative methods, such as network analysis or financial modeling, could complement qualitative insights and enable the prediction of high-risk transactions or organizational behaviors. Technological and digital dimensions – Future research should investigate the impact of emerging technologies, including cryptocurrencies, blockchain-based sponsorships, and digital betting platforms, on laundering patterns. Policy evaluation and enforcement studies – Empirical assessment of the effectiveness of existing

regulations, cross-border cooperation, and internal compliance practices could provide actionable recommendations for sports governing bodies and financial authorities.

By addressing these areas, future research could not only deepen the empirical understanding of money laundering in sports but also offer evidence-based guidance for more effective prevention, detection, and policy interventions, thereby enhancing the practical and scholarly contribution of the field.

Conclusion

Money laundering in sports represents a complex and growing challenge, characterized by recurring operational patterns, structural vulnerabilities, and opaque financial arrangements. Professional football is particularly susceptible, with empirical evidence highlighting the use of inflated player transfers, fictitious sponsorship agreements, and betting manipulation as key mechanisms through which illicit funds are systematically integrated into legitimate financial flows. Empirical evidence from this study—including case analyses, charts, and tables—confirms that these mechanisms are widely employed and systematically exploit weaknesses in regulatory oversight and organizational transparency.

The study demonstrates that structural, operational, and regulatory vulnerabilities in professional sports create ideal conditions for money laundering. High financial volumes, complex transactions, and opaque ownership structures facilitate illicit activities, while inconsistencies in anti-money laundering (AML) enforcement leave gaps for exploitation. Regulatory mechanisms such as UEFA's Financial Fair Play offer some mitigation, but enforcement gaps, cross-border loopholes, and emerging technologies, including cryptocurrencies, continue to challenge effective oversight.

Regional analysis reveals pronounced disparities. Europe and the Middle East/North Africa report the highest incidences of sports-related financial crime, while Africa and parts of Asia remain under-monitored, reflecting both reporting limitations and weaker institutional frameworks. Football dominates the affected sports landscape, followed by tennis, handball, and athletics. Common crime types—match-fixing, money laundering, and corruption—underscore the structural vulnerabilities within the sector.

Addressing these risks requires coordinated, proactive efforts. Sports governing bodies, regulatory authorities, financial institutions, and governments must enhance transparency, implement rigorous internal controls, enforce thorough due diligence, and foster international collaboration. Only a unified, well-regulated, and transparent approach can mitigate the risk of illicit financial activity and safeguard the integrity of sports.

Ultimately, protecting the sports sector from money laundering is essential not only for fairness and ethical competition but also for maintaining public trust and preserving its economic value. Targeted preventive measures, consistent enforcement, and proactive global cooperation are critical to ensuring that professional sports remain resilient against exploitation.

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Corresponding author: milijanka.ratkovic@fzs.edu.rs

IMPLICATIONS OF MARKETING MIX ELEMENTS FOR CONSUMER PURCHASING DECISIONS REGARDING SPORTS EQUIPMENT

Marko Pavlović[1], Milijanka Ratković[2], Zoran Ćirović[3]

Abstract: *This paper investigates consumer behavior and the primary factors affecting the selection and purchase of sports equipment in the Republic of Serbia, with particular emphasis on the role of sports marketing activities. The study employed a quantitative research design using a structured questionnaire administered to a sample of 112 respondents. The objective was to examine the relative importance of product quality, price, brand image, sponsorship, and promotional activities in shaping consumer purchasing decisions, as well as to assess the influence of demographic characteristics on sports marketing perceptions. The results revealed that 71.4% of respondents identified product quality as the most important factor influencing sports equipment purchasing decisions, while price ranked second (21.4%). Marketing-related activities, including sponsorship, athlete endorsement, influencer marketing, and social media promotion, demonstrated a limited direct influence on consumer purchasing behavior. Television remained the dominant source of sports content, whereas digital platforms and sports influencers exhibited a comparatively weaker impact. Consumer participation in loyalty programs, promotional campaigns, and prize contests was generally low. Significant differences were identified according to gender and region for selected aspects of purchasing behavior, whereas age and monthly income were not significant predictors. These findings provide direct empirical support for the main research hypothesis that product quality represents the dominant purchasing criterion in the Serbian sports equipment market. The study contributes to a better understanding of consumer behavior in sports marketing and highlights the importance of aligning marketing strategies with consumer priorities. The findings suggest that sports organizations and sports equipment manufacturers should prioritize product quality while using sponsorship, digital communication, and promotional activities as complementary tools for strengthening brand visibility and consumer engagement.*

Keywords: sports marketing, consumer behavior, sports equipment, purchasing decision, brand perception, sponsorship, product quality and promotional activities.

[1] Polytechnic Academy of Vocational Studies Belgrade, Belgrade, Serbia
[2] Faculty of Sport, Union – Nikola Tesla University, Belgrade, Serbia
[3] Financial and Investment Consultant, Belgrade, Serbia

Introduction

Sports marketing is closely linked to broader social changes that result from changing consumer behavior and technological development. It has become one of the most effective forms of indirect marketing communication. Unlike traditional marketing approaches, sports marketing relies on emotional connections, symbolic meanings, and consumer experiences to attract customers, fans, and potential buyers. Its position between entertainment, business, and communication has generated discussion about ethical issues, legal limitations, and the boundaries of marketing activities. Digital technologies and new marketing approaches have increased the focus on sales-oriented strategies and consumer-centered decision-making. Consumers increasingly expect transparency, authenticity, and consistency in brand communication. As a result, organizations have adjusted their communication approaches. In a competitive business environment, companies often use integrated strategies such as cross-marketing (Ratković et al., 2012) This approach combines traditional and digital marketing methods to create distinctive consumer experiences and strengthen brand differentiation. Sports marketing increasingly relies on the integration of traditional media, particularly television, with social media platforms in order to maximize audience reach and consumer engagement. Rather than replacing traditional media, digital communication complements television by enabling interactive communication, real-time consumer participation, and stronger brand relationships across multiple communication channels (Mastromartino & Naraine, 2022). Previous studies suggest that purchasing decisions may be influenced by product characteristics, brand image, price, and marketing communication (Pavlović et al., 2026). However, empirical evidence regarding the Serbian market remains limited. Sports marketing has undergone continuous development and is now recognized as an important segment of marketing practice. Consequently, there is a need for empirical research that simultaneously examines the influence of product quality, price, brand image, sponsorship, promotional activities, and demographic characteristics on consumer purchasing behavior. Addressing this issue is particularly important for understanding the specific characteristics of the Serbian sports equipment market and for providing evidence-based recommendations for sports organizations and marketers. Accordingly, this study seeks to determine which factors exert the greatest influence on sports equipment purchasing decisions in the Serbian market and to evaluate the extent to which sports marketing activities contribute to consumer purchasing behavior. The emotional nature of sports consumption provides opportunities for brands to associate themselves with passion, excitement, and loyalty, which are common characteristics of sports audiences.

During the 21st century, sports marketing expanded beyond its original promotional purpose and became an integral part of the sports industry. Sports consumption is associated with enjoyment, satisfaction, and personal identification, which increases the attractiveness of sports as a platform for promoting products and services. Advertising integration within sports broadcasts and sponsorship-related marketing have become common elements of sports communication strategies (Chadwick & Thwaites, 2004; Ratković, 2023). Sports events often create strong emotional connections with audiences and attract substantial public

attention. Professional sports organizations, particularly football clubs, generate substantial revenue through broadcasting rights and sponsorship agreements because of their ability to attract large audiences worldwide. Demand for live sports broadcasts and competitive sporting events encourages marketers to connect brands with positive consumer experiences associated with sports (Desarbo & Madrigal, 2011). Sponsorship objectives commonly include increased brand visibility, stronger brand image, improved brand equity, goodwill development, and influence on consumer behavior. Sports marketing provides organizations with opportunities to promote products and services within a sports context and benefit from the social and emotional connections associated with sports consumption (Shekhar & Shah, 2023). Businesses have long recognized sports as an attractive market for investment and commercial growth (Sanchez et al., 2024). Early studies highlighted the importance of understanding the passion, engagement, and consumption habits of sports fans. These findings provided a foundation for later research on behavioral intentions in sports marketing. Behavioral intention refers to the perceived likelihood that an individual will perform a specific action. It may relate to event attendance, media consumption, or purchasing behavior. Strong behavioral intentions are associated with positive consumer attitudes and future purchasing decisions (Xiao et al., 2020). A better understanding of consumer behavior allows sports marketers to develop products, services, and marketing activities that correspond more closely to consumer needs and expectations (Kural & Özbek, 2023). Purchasing decisions are influenced by attitudes, values, and individual preferences, which makes consumer behavior an important area of marketing research (Jotanović et al., 2017). Recent studies have highlighted the growing importance of digital environments in shaping behavioral intentions (Uhm et al., 2023). Social media platforms, interactive content, and visual communication are frequently associated with consumer engagement and decision-making in sports marketing (Kumar & George, 2024; Wang et al., 2022). Research on behavioral intentions contributes to the development of sports branding and sponsorship strategies and supports a better understanding of consumer responses within sports marketing.

The present study builds upon our previous research on sports marketing and consumer behavior by extending the analysis toward consumers' perceptions of marketing activities associated with sports equipment purchasing in Serbia. While the earlier study primarily examined the general effects of sponsorship, brand image, and digital campaigns on consumer behavior, the present research provides a more detailed assessment of how specific marketing activities, including sponsorship, advertising, social media communication, athlete and influencer endorsements, and sources of sports information, are perceived by consumers in relation to sports equipment purchasing decisions. In addition, the study employs a newly collected empirical dataset and further examines demographic differences in consumer perceptions. Therefore, the contribution of the present study lies not in replicating previous findings but in broadening the conceptual framework by integrating traditional purchasing determinants with contemporary sports marketing instruments within a single analytical framework, thereby providing a more comprehensive understanding of consumer behavior in the Serbian sports equipment market (Pavlović et al., 2025).

Literature Review

Sports marketing has been understood through various theoretical frameworks over the years, illustrating its evolving and multidisciplinary character. In a similar vein, Ratten and Ratten (2011) highlight its significance as a strategic avenue for organizations to market their products and services within a sports-centric context. From a theoretical perspective, sports marketing can be examined through two main dimensions: the marketing of sports and marketing through sports (Shannon, 1999). The former pertains to the promotion of sports-related products, events, and activities directly to consumers, whereas the latter entails leveraging sports as a medium for advertising goods and services that are not related to sports (Goldman & Johns, 2009). In this framework, sports teams and athletes frequently act as pivotal promotional agents, enhancing brand visibility and consumer engagement. The economic importance of sport is reflected in its contribution to gross value added, employment, and the development of related industries, confirming its role as a driver of economic growth and market expansion (Kostadinović & Kostadinović, 2025). Initial contributions to the discipline underscored the commercial viability of sports marketing. Parkhouse and Ulrich (1979) recognized it as a highly appealing and profit-driven sector, stressing the necessity for systematic inquiry, theoretical development, and professional acumen. Building on these early perspectives, Shannon (1999) further integrated sports marketing into the broader marketing communication framework, emphasizing sponsorship, advertising, and publicity as key promotional tools. This contribution provided an important foundation for subsequent research on fan behavior, emotional attachment, and consumption patterns in sports environments. This research established a basis for future studies concentrating on fan behavior, emotional connections, and consumption trends within sports environments. Event-based marketing and sports-related activities are increasingly recognized as effective tools for brand building and destination promotion. Large-scale events can significantly enhance brand image, attract audiences, and stimulate economic and social benefits (Dašić, 2023). Building on these early theoretical frameworks, extended the application of marketing concepts by examining brand equity within sports organizations, including prominent leagues such as Major League Baseball. Since then, the field has experienced significant expansion, encompassing diverse research approaches and contexts. Conceptual studies (Witkemper et al., 2012), empirical investigations (Duan et al., 2020), and experimental research (Yuan et al., 2019) have contributed to a more comprehensive understanding of sports marketing phenomena. Marketing communication plays a crucial role in shaping consumer perceptions and strengthening competitive positioning, allowing organizations to differentiate their offerings in increasingly competitive markets. Customer relationship management is an essential component of modern marketing, as maintaining strong relationships with consumers enhances loyalty and significantly improves a company's competitive position in the market (Ratković et al., 2011; Jotanović et. al., 2017). In parallel, specialized research streams have emerged, reflecting the complexity of the domain. These include studies on sports consumer behavior, emotional attachment and identification (Welzmueller & Schmidt, 2024), sports analytics (Muniz & Flamand, 2023), strategic management in sports (Mastromartino & Naraine, 2022), and cause-related marketing initiatives (Han & Lee, 2022). Such diversification highlights the

interdisciplinary character of sports marketing and its relevance across multiple academic and practical domains. In this changing environment, sports marketing has solidified its role as one of the most vibrant sectors of contemporary marketing. These ties allow entities to market brands, sponsorships, and products through cohesive communication channels, which encompass both traditional media and digital platforms. In today's landscape, sports marketing has transitioned from a mere auxiliary promotional role to a crucial element of the sports industry. The experiential aspect of sports—marked by enjoyment, satisfaction, and identification—further amplifies its efficacy as a medium for advertising products and services in a market environment driven by experiences. Customer satisfaction is a key determinant of consumer behavior, as it directly influences purchasing decisions, loyalty, and long-term relationships with brands (Ratković et al., 2017). In light of these developments, it is crucial to investigate the fundamental characteristics of marketing in the sports sector. Thus, the main aim of this research is to pinpoint and scrutinize the essential features that set sports marketing apart from other marketing fields. This encompasses not only the advertising of sports-related goods and services but also wider elements such as brand management, sponsorship tactics, event planning, fan interaction, and community development. Moreover, sports marketing is intrinsically fluid, necessitating ongoing adjustments to changing market dynamics and consumer demands, while also capitalizing on the emotional and psychological allure of sports. A significant focus within sports marketing research pertains to the assessment of sponsorship effectiveness. Prior research has highlighted various factors that affect sponsorship results, including both attitudinal and behavioral indicators such as brand recognition, purchase intent, and consumer perception (Jensen & White, 2018). In this area of study, special emphasis has been placed on visual attention as a critical factor influencing sponsorship effectiveness. Research on visual attention underscores the significance of both sponsor-related and viewer-related factors. Sponsor-related variables encompass aspects such as logo size, duration of exposure, color, animation, and alignment with the sporting context. For example, Breuer and Rumpf (2012) illustrate that larger logos and extended exposure times markedly improve viewer attention. Likewise, visual attributes like color (Toh et al., 2023) and animation (Breuer & Rumpf, 2012) have been shown to be crucial in capturing audience focus. Conversely, viewer-related factors also play a vital role in determining the effectiveness of sponsorship. These factors include the extent of identification with a sports team, the level of involvement in sports activities, and familiarity with the sponsor brand (Boronczyk et al., 2018). Furthermore, attitudinal and behavioral engagement, such as the strength of support for a team or brand, has been recognized as a significant predictor of sponsorship outcomes (Nazari et al., 2021). In summary, the current literature indicates that sports marketing is a complex and ever-evolving domain, marked by profound emotional engagement, a variety of research avenues, and growing strategic significance in both academic and commercial spheres. Despite the growing body of international research on sports marketing, several important gaps remain. Most previous studies have examined sponsorship effectiveness, brand image, consumer loyalty, or digital marketing separately, whereas relatively few studies have simultaneously analyzed the relative importance of product quality, price, sponsorship, promotional activities, and demographic characteristics within a single empirical framework. Furthermore, empirical evidence regarding consumer behavior in the Serbian sports equipment market remains limited. Therefore, this study seeks

to address this research gap by providing an integrated analysis of the key determinants of sports equipment purchasing decisions in Serbia.

Methods

The research methodology applied in this study was based on a quantitative research approach. The methodological framework was aligned with the research objectives and hypotheses and supported systematic data collection, processing, and interpretation. The study was designed as descriptive and analytical research. Particular attention was given to the relationship between respondents' demographic characteristics and purchasing behavior. The study also examined the importance of product quality, price, brand, sponsorship activities, and promotional efforts. Primary data were collected through a structured questionnaire developed specifically for this study. The questionnaire was constructed based on concepts and variables identified in previous empirical research on sports marketing and consumer behavior, particularly the studies by Duan et al. (2020), Shekhar and Shah (2023), Kural and Özbek (2023), and Kumar and George (2024). The questionnaire was subsequently adapted to the objectives and context of the present research. Its content was developed in accordance with the relevant scientific literature and the research objectives, thereby supporting the content validity of the instrument. It consisted of three sections. The first section collected demographic information (gender, age, place of residence, and monthly income). The second section examined sports participation and purchasing behavior. The third section assessed perceptions of sports marketing activities, sponsorship, brand image, promotional campaigns, and purchasing criteria. The questionnaire included multiple-choice questions, dichotomous (Yes/No) questions, and five-point Likert-scale items ranging from 1 (very low/never) to 5 (very high/very often). It was distributed electronically through Google Forms. Respondents participated anonymously, and the confidentiality of the collected data was maintained. Participation was voluntary, which reduced the possibility of response bias. Before distribution, the questionnaire was reviewed by two university researchers with experience in marketing research to evaluate the clarity and relevance of the questions. Minor linguistic revisions were made before the final version was distributed.

The study was approved based on the Decision of the Ethics Committee of the Faculty of Sport, Union University – Nikola Tesla, Belgrade, No. 443-1/25, dated December 23, 2025, which confirmed that the proposed experimental research procedure complies with the ethical principles of the Declaration of Helsinki and approved the implementation of the study in accordance with the submitted research protocol. All participants were fully informed about the specific scientific purposes of the survey, data aggregation procedures, and strict anonymity metrics, and their explicit, written informed consent was obtained prior to accessing the questionnaire.

The research was conducted on a sample of 112 respondents from the Republic of Serbia between January 15, 2026, and February 15, 2026. A non-probability convenience sampling method was applied. Respondents were recruited through online distribution of the questionnaire using social media platforms and personal and professional networks. Participation was voluntary and limited to adult consumers residing in the Republic of Serbia who had previous experience purchasing sports equipment or sportswear. Because a

convenience sample was used, the findings should not be considered statistically representative of the entire Serbian population but rather indicative of consumer perceptions within the surveyed sample. The sample included respondents with different demographic characteristics, which enabled the analysis of consumer behavior across several population groups. The methodology is consistent with similar empirical studies in the fields of tourism and consumer behavior, where survey methods and structured questionnaires are frequently used to examine attitudes and satisfaction (Pavlović & Marković, 2025). Data processing and statistical analyses were conducted using IBM SPSS (Statistical Package for the Social Sciences), version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondent characteristics and purchasing behavior. The main research hypothesis was evaluated using frequency distributions of respondents' answers regarding the most important purchasing criterion. Independent-samples t-tests were applied to examine differences according to gender and age, whereas one-way analysis of variance (ANOVA) was used to compare respondents according to place of residence and monthly income. These statistical procedures were selected because they are appropriate for comparing mean values across independent groups and correspond directly to the research objectives and hypotheses. Statistical significance was established at $p < 0.05$.

Results

Table 1. Sociodemographic characteristics of the respondents.

		f	%
Gender	Male	48	42.9
	Female	64	57.1
Age	Under 18 years	2	1.8
	26-35 years	2	1.8
	36-45 years	9	8.0
	46-60 years	85	75.9
	Over 60 years	14	12.5
Place of Residence	Belgrade Region	44	39.3
	Vojvodina Region	20	17.9
	Šumadija and Western Serbia	11	9.8
	Southern and Eastern Serbia	37	33.0
Monthly Income	No income	12	10.7
	Up to RSD 65,000	30	26.8
	RSD 65,001 to RSD 120,000	33	29.5

	Above RSD 120,001	19	17
	Prefer not to disclose	18	16.1

Legend: *f* - frequency (number of participants); % - percentage; RSD - Serbian dinar (official currency of the Republic of Serbia).

Table 1 summarizes the demographic characteristics of the respondents. The sample consisted of 112 participants with different gender, age, regional, and income characteristics. Most respondents were between 46 and 60 years of age, while the largest proportions resided in the Belgrade region and Southern and Eastern Serbia. Figure 1 and Table 2 show that basketball and tennis were the most frequently followed sports, whereas most respondents did not actively participate in sports activities. Respondents generally purchased sports equipment or sportswear several times per year (M = 2.71, SD = 0.70).

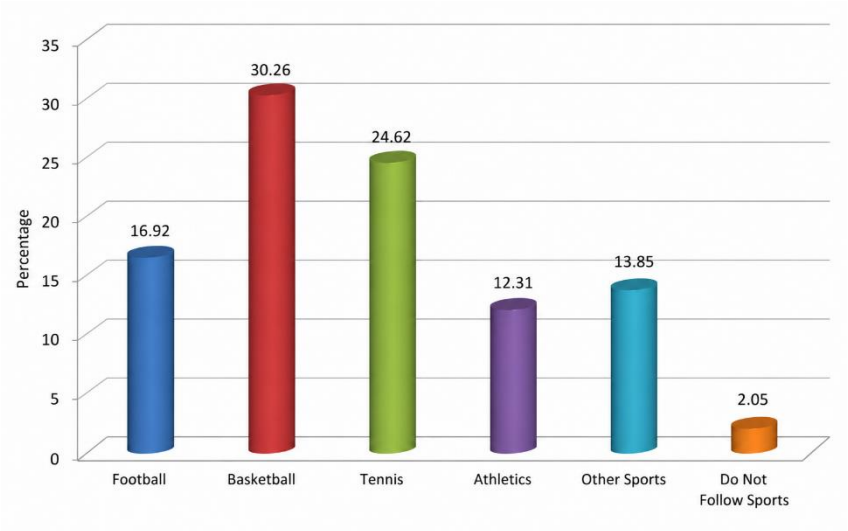


Figure 1. Respondents' preferred sports to follow.

Source: Authors.

Table 2. Do you actively participate in a sport.

	F	%
Yes	36	32.1
No	76	67.9
Total	112	100

Source: Authors.

Respondents were neutral regarding the importance of brand presence in sports (M = 2.53, SD = 0.94). Respondents reported that event sponsorship by brands rarely encouraged the use of their products (M = 1.91, SD = 0.85). The descriptive findings presented in Figures 2–4 and Table 3 indicate that respondents were generally exposed to sports marketing activities but reported only limited influence of sponsorship, athlete endorsements, and brand

promotion on their purchasing decisions. Respondents were neutral regarding the importance of brand image when making decisions about purchasing sports equipment or sports-related products (M = 2.85, SD = 1.08). Taken together, these findings indicate that sports marketing activities contribute primarily to brand visibility rather than directly influencing purchasing decisions. Consumers appeared to rely more on product-related characteristics than on promotional activities when selecting sports equipment.

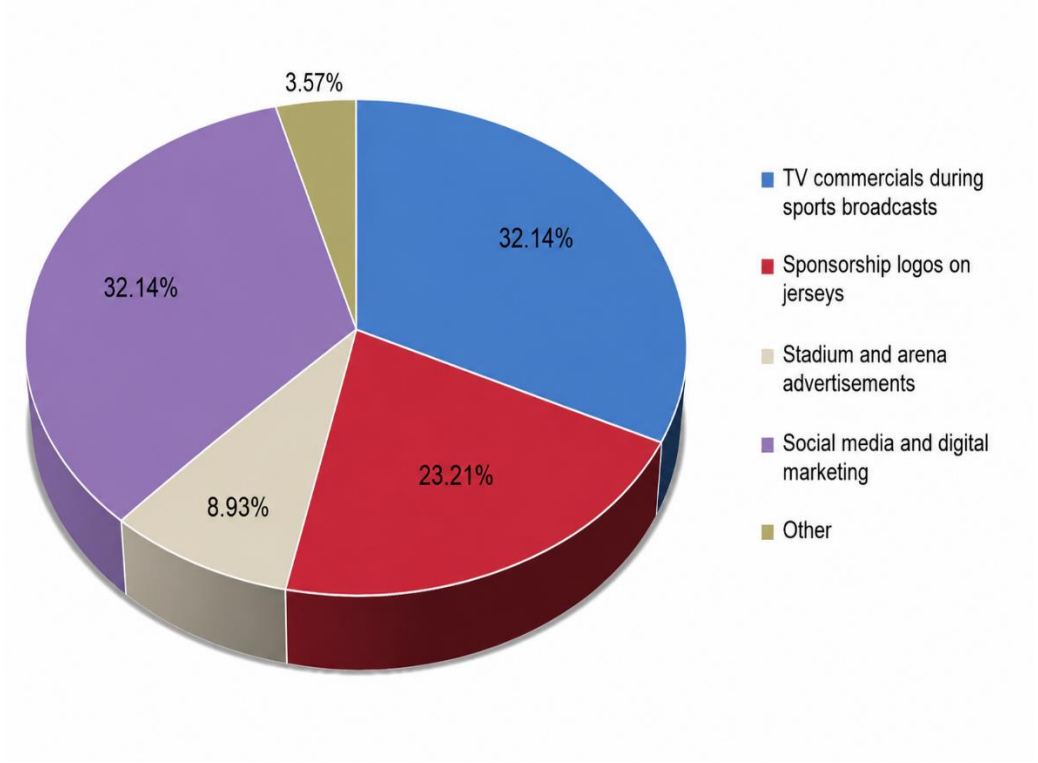


Figure 2. How do you most frequently notice advertisements in sports.

Source: Authors.

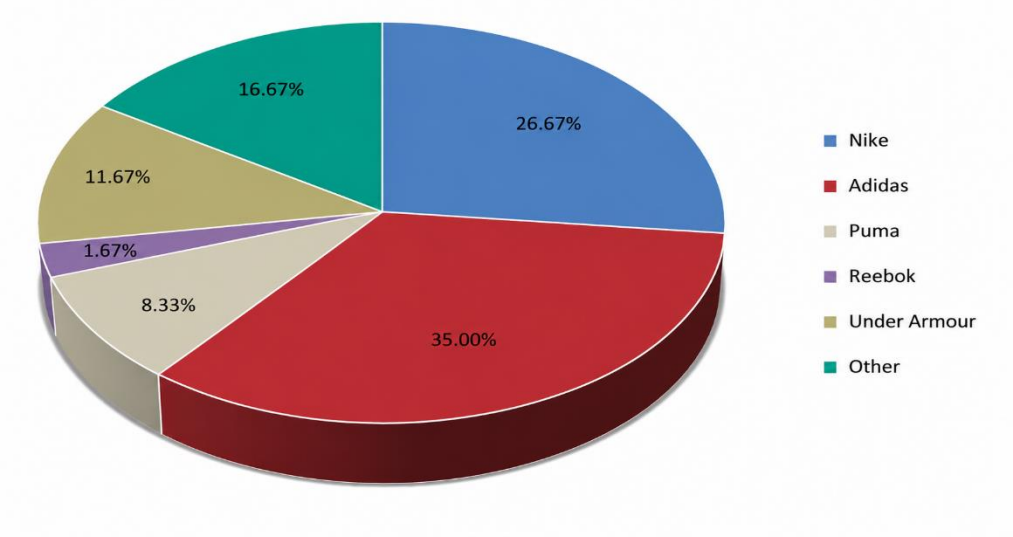


Figure 3. Which sports equipment brand do you purchase most frequently.
Source: Authors.

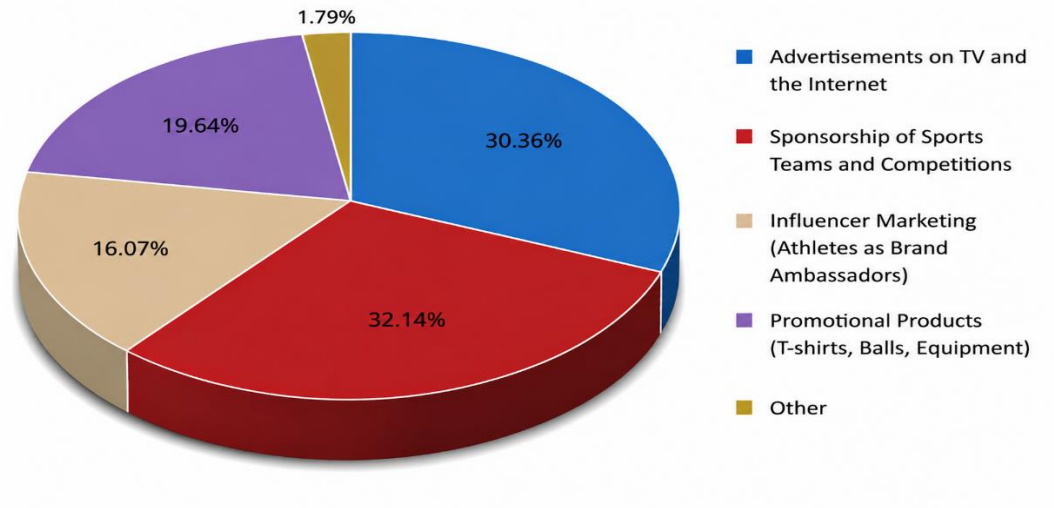


Figure 4. Which form of promotion do you consider most effective in sports marketing.
Source: Authors.

Table 3. Have you ever purchased a product because it was endorsed by an athlete.

	F	%
Yes	26	23.2
No	86	76.8
Total	112	100

Source: Authors.

According to the results presented in Figure 5, respondents most frequently followed sports content on television (78.57%). Most respondents reported that sports influencers did not motivate them to follow a particular brand (79.5%) (Table 4). Respondents rarely followed sports brand campaigns on social media (M = 1.98, SD = 0.81) and rarely participated in prize contests organized by sports brands (M = 1.55, SD = 0.80). Most respondents had not purchased a product due to promotion on social media (60.7%) (Table 5). Overall, the findings suggest that television remains the dominant communication channel for sports-related information, whereas digital marketing activities and influencer promotion currently exert only a limited influence on consumer purchasing behavior in the Serbian sports equipment market.

Table 4. Do sports influencers motivate you to follow specific brands.

	F	%
Yes	23	20.5
No	89	79.5
Total	112	100

Source: Authors.

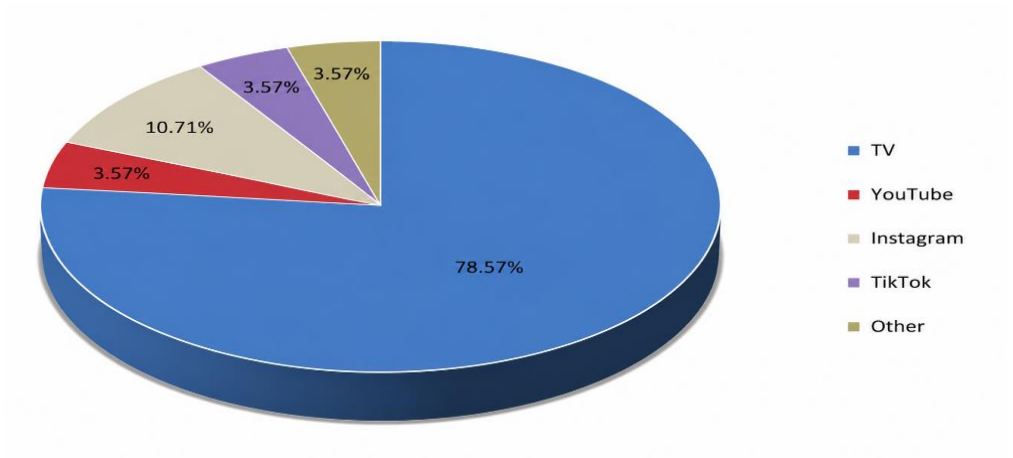


Figure 5. Which platform do you most frequently use to follow sports content.

Source: Authors.

Table 5. Have you ever purchased a product due to promotion on social media.

	F	%
Yes	44	39.3
No	68	60.7
Total	112	100

Note: F – the number of respondents; % – percentage.

The following analysis presents the principal empirical finding of this study, namely the respondents' primary purchasing criterion, followed by statistical analyses examining whether demographic characteristics influenced consumer purchasing behavior and perceptions of sports marketing activities. The study examined whether there were significant differences in respondents' attitudes toward sports marketing based on gender. An independent samples t-test was used to assess gender differences. According to the results presented in Table 6, significant differences were found for following sports events and purchasing sports equipment or sportswear. Male respondents reported higher levels of sports event following and sports equipment or sportswear purchasing compared to female respondents.

Table 6. Respondents' most important criterion when purchasing sports equipment.

Factor	F	%
Quality	80	71.4%
Price	24	21.4%
Comfort	4	3.6%
Athlete/Personal recommendation	2	1.8%
Brand	2	1.8%

Note: F – the number of respondents; % – percentage.

Table 6 presents the principal empirical finding of this study. Product quality clearly dominated all other purchasing criteria and provides direct empirical support for the main research hypothesis (H3). Price represented the second most important purchasing factor, whereas all remaining factors were selected only occasionally. Price ranked second (21.4%), whereas comfort (3.6%), brand (1.8%), and athlete or influencer recommendation (1.8%) were selected considerably less frequently. These findings provide direct empirical support for the main research hypothesis (H3), indicating that product quality is the dominant factor in sports equipment purchasing decisions in the Republic of Serbia. Following the evaluation of the main research hypothesis, additional analyses were conducted to examine whether demographic characteristics influenced respondents' purchasing behavior and perceptions of sports marketing activities.

Table 7. Differences in attitudes toward sports marketing by respondent gender.

	Male (N=48)	**Female (N=64)**	**t**	**p**
	Mean Value			
How Often Do You Follow Sports Events?	3.83 ± 1.22	2.45 ± 0.71	6.969	<0.0005*
How Often Do You Purchase Sports Equipment or Sportswear?	2.87 ± 0.84	2.59 ± 0.55	2.128	0.036*
How Important Is Brand Presence in Sports to You?	2.62 ± 1.00	2.46 ± 0.90	0.862	0.391
Does Sponsorship of Sports Events by Brands Encourage You to Use Their Products or Services?	2.00 ± 0.92	1.84 ± 0.80	0.957	0.341
How Important Is Brand Image When Making a Decision to Purchase Sports Equipment or Sports-Related Products?	2.95 ± 1.11	2.78 ± 1.06	0.857	0.393
How Often Do You Follow Sports Brand Promotional Campaigns on Social Media?	2.12 ± 0.78	1.87 ± 0.82	1.616	0.109
Do You Participate in Prize Contests Organized by Sports Brands?	1.70 ± 0.89	1.43 ± 0.70	1.782	0.077

Note: t - the magnitude of the difference between the mean values; p - Statistical significance of the observed difference is set at the 0.05 level.

The study examined whether there were significant differences in respondents' attitudes toward sports marketing based on age. An independent samples t-test was used to assess differences between age groups. According to the results presented in Table 7, no significant differences were found with respect to respondents' age. These findings indicate that age was not a significant determinant of perceptions of sports marketing activities or purchasing behavior within the surveyed sample.

Table 8. Differences in attitudes toward sports marketing by respondent age.

	Up to 46 Years of Age (N=13)	Over 46 Years of Age (N=99)	t	p
	Mean Value			
How Often Do You Follow Sports Events?	2.61 ± 1.38	3.10 ± 1.14	-1.400	0.164
How Often Do You Purchase Sports Equipment or Sportswear?	2.69 ± 0.85	2.71 ± 0.68	-0.119	0.905
How Important Is Brand Presence in Sports to You?	2.84 ± 1.21	2.49 ± 0.90	1.258	0.211
Does Sponsorship of Sports Events by Brands Encourage You to Use Their Products or Services?	1.69 ± 1.03	1.93 ± 0.83	-0.980	0.329
How Important Is Brand Image When Making a Decision to Purchase Sports Equipment or Sports-Related Products?	2.53 ± 1.19	2.89 ± 1.06	-1.132	0.260
How Often Do You Follow Sports Brand Promotional Campaigns on Social Media?	1.92 ± 0.86	1.98 ± 0.81	-0.276	0.783
Do You Participate in Prize Contests Organized by Sports Brands?	2.00 ± 1.08	1.49 ± 0.74	1.635	0.125

Note: t - the magnitude of the difference between the mean values; p - statistical significance of the observed difference is set at the 0.05 level.

The study examined whether there were significant differences in respondents' attitudes toward sports marketing based on place of residence. Analysis of variance (ANOVA) was used to assess differences among regions. According to the results presented in Table 8, significant differences were found for the frequency of purchasing sports equipment or sportswear, purchase encouragement due to sponsored sports events, following promotional campaigns of sports brands, and participation in prize contests organized by sports brands. The post hoc test results showed a significant difference in the frequency of purchasing sports equipment or sportswear between respondents from the Vojvodina region and those from the Belgrade region ($p = 0.012$), as well as respondents from Southern and Eastern Serbia ($p = 0.002$). Respondents from the Vojvodina region reported more frequent purchases of sports equipment or sportswear. The post hoc test results also indicated a significant difference in purchase encouragement due to sponsored sports events between respondents from the Vojvodina region and those from the Belgrade region ($p = 0.005$), as well as respondents from Southern and Eastern Serbia ($p = 0.046$). Respondents from the Vojvodina region reported a higher level of purchase encouragement from sponsored sports events. A significant difference in following promotional campaigns of sports brands was found between respondents from the Vojvodina region and those from Šumadija and Western Serbia ($p = 0.040$) and Southern and Eastern Serbia ($p = 0.026$). Significant differences were also found between respondents from the Belgrade region and those from Šumadija and Western Serbia ($p = 0.028$) and Southern and Eastern Serbia ($p = 0.008$). Respondents from the Belgrade and Vojvodina regions reported lower levels of following promotional campaigns of sports brands.

The post hoc test results showed a significant difference in participation in prize contests organized by sports brands between respondents from Southern and Eastern Serbia and those from the Belgrade region (p = 0.005) and the Vojvodina region (p = 0.034). Respondents from Southern and Eastern Serbia reported higher participation in prize contests organized by sports brands.

Table 9. Differences in attitudes toward sports marketing by respondents' place of residence.

	Belgrade Region (N=44)	**Vojvodina Region (N=20)**	**Šumadija and Western Serbia (N=11)**	**Southern and Eastern Serbia (N=37)**	**t**	**p**
	Mean Value					
How Often Do You Follow Sports Events?	2.81±1.16	3.45±1.05	3.09±0.94	3.08±1.29	1.355	0.260
How Often Do You Purchase Sports Equipment or Sportswear?	2.63±0.71	3.10±0.85	3.00±0.63	2.51±0.50	4.119	0.008*
How Important Is Brand Presence in Sports to You?	2.54±0.99	2.60±0.99	2.63±0.80	2.45±0.93	0.150	0.930
Does Sponsorship of Sports Events by Brands Encourage You to Use Their Products or Services?	2.09±0.91	1.45±0.51	2.00±0.63	1.91±0.92	2.754	0.046*
How Important Is Brand Image When Making a Decision to Purchase Sports Equipment or Sports-Related Products?	2.72±1.10	3.00±1.12	3.27±0.78	2.81±1.10	0.890	0.449
How Often Do You Follow Promotional Campaigns of Sports Brands on Social Media?	1.77±0.80	1.75±0.63	2.36±0.50	2.24±0.89	3.841	0.012*
Do You Participate in Prize Contests Organized by Sports Brands?	1.36±0.65	1.40±0.59	1.54±0.82	1.86±0.97	3.078	0.031*

Note: t - the magnitude of the difference between the mean values; p - statistical significance of the observed difference is set at the 0.05 level.

The study examined whether there were significant differences in respondents' attitudes toward sports marketing based on monthly income. Analysis of variance (ANOVA) was used to assess differences among income groups. According to the results presented in Table 9, no significant differences were found in attitudes toward sports marketing with respect to respondents' monthly income. Therefore, monthly income was not identified as a significant predictor of consumer attitudes toward sports marketing or purchasing behavior in this study.

Table 10. Differences in attitudes toward sports marketing by respondents' monthly income.

	No Income (N=12)	Up to RSD 65,000 (N=30)	SD 65,001 to RSD 120,000 (N=33)	Above RSD 120,001 (N=19)	Prefer Not to Disclose (N=37)	t	p
	Mean Value						
How Often Do You Follow Sports Events?	3.00±1.12	3.23±1.16	2.84±1.30	3.26±1.28	2.88±0.90	0.656	0.624
How Often Do You Purchase Sports Equipment or Sportswear?	2.91±0.66	2.86±0.77	2.60±0.70	2.57±0.50	2.66±0.76	0.993	0.415
How Important Is Brand Presence in Sports to You?	2.50±0.79	2.86±0.93	2.39±0.93	2.26±0.93	2.55±1.04	1.524	0.200
Does Sponsorship of Sports Events by Brands Encourage You to Use Their Products or Services?	1.75±0.62	2.06±0.90	1.84±0.83	1.84±0.89	1.94±0.93	0.428	0.788
How Important Is Brand Image When Making a Decision to Purchase Sports Equipment or Sports-Related Products?	2.83±0.57	3.00±1.17	2.72±1.20	2.94±1.02	2.77±1.06	0.301	0.877
How Often Do You Follow Promotional Campaigns of Sports Brands on Social Media?	2.00±0.60	2.00±0.78	1.96±0.88	1.94±0.77	2.00±0.97	0.017	0.999
Do You Participate in Prize Contests Organized by Sports Brands?	1.91±0.90	1.63±0.88	1.51±0.79	1.42±0.69	1.38±0.69	1.024	0.398

Note: RSD - Serbian dinar (official currency of the Republic of Serbia); t - the magnitude of the difference between the mean values; p - statistical significance of the observed difference is set at the 0.05 level.

Overall, the empirical findings demonstrate that product quality represents the dominant determinant of sports equipment purchasing decisions, whereas sports marketing activities such as sponsorship, influencer marketing, and promotional campaigns have only a limited direct influence on consumer purchasing behavior. Demographic characteristics showed only partial effects, with statistically significant differences identified primarily according to gender and place of residence. These findings provide empirical support for the stated research hypotheses and establish the basis for the discussion presented in the following section.

Discussion

As presented in Table 6, product quality was identified by 71.4% of respondents as the most important criterion when purchasing sports equipment. This finding provides direct empirical support for the main research hypothesis (H3) and is consistent with previous studies emphasizing the importance of product quality in consumer purchasing decisions. It also supports previous findings by Pavlović et al. (2025), who reported that product quality is the dominant factor influencing sports equipment purchasing decisions in Serbia. Although respondents frequently followed sports events, relatively few actively participated in sports activities. This finding suggests that sports consumption in Serbia is predominantly media-oriented rather than participation-oriented. Consequently, exposure to sports content does not necessarily translate into higher purchasing activity, indicating that consumer purchasing decisions depend primarily on product-related characteristics rather than on sports involvement itself. Regarding sports marketing, respondents assigned moderate importance to brand presence in sports and brand image. At the same time, sponsorship of sports events rarely encouraged respondents to use products or services associated with sponsoring brands. These findings indicate that consumers primarily base their purchasing decisions on product-related characteristics rather than on sports marketing activities. Consumers appear to base their decisions primarily on product characteristics, while promotional activities serve a more informational function. These findings are consistent with the studies of Shekhar and Shah (2023) and Kumar and George (2024), who concluded that sports marketing activities primarily enhance brand visibility and consumer engagement, whereas purchasing decisions continue to depend mainly on consumers' evaluation of product characteristics. An interesting finding is that most respondents had never purchased a product because it was endorsed by an athlete. Sports influencers also had a limited effect on respondents' willingness to follow specific brands. These results suggest that influencer marketing in the sports sector currently has limited effectiveness in the Serbian market. Although previous studies have reported an increasing importance of influencers in digital environments, the findings of this study indicate that their ability to influence consumer behavior remains relatively weak. One possible explanation is the demographic structure of the sample, in which respondents aged 46–60 years represented the largest group. Older consumers generally rely more on traditional information sources than on influencer-based communication, which may explain the relatively weak impact of athlete endorsements and social media promotion observed in this study. The study also found that television remains

the dominant platform for following sports content. More than three quarters of respondents identified television as their primary source of sports information, while social media and digital channels were used less frequently. This finding suggests that traditional media continue to have an important position in sports marketing, particularly among older consumers, who represented the largest group within the sample. The analysis of gender differences revealed that male respondents followed sports events more frequently and purchased sports equipment more often than female respondents. However, no significant gender differences were found regarding attitudes toward brands, sponsorship activities, and promotional campaigns. These results suggest that gender influences the level of sports engagement and purchasing behavior but does not significantly affect perceptions of sports marketing activities. These findings indicate that demographic characteristics only partially explain consumer purchasing behavior. Gender influenced sports participation and purchasing frequency, whereas perceptions of sports marketing activities remained relatively consistent across demographic groups. No statistically significant differences were identified in attitudes toward sports marketing based on age or monthly income. The main research hypothesis (H3) was fully supported, as the frequency analysis demonstrated that product quality was identified by 71.4% of respondents as the dominant purchasing criterion. In contrast, the hypotheses related to demographic differences received only partial empirical support because statistically significant differences were identified only according to gender and place of residence. Although previous studies have suggested that demographic characteristics may influence consumer behavior, age and income were not significant determinants of attitudes toward sports marketing in this study. Some differences were identified according to respondents' place of residence. Respondents from the Vojvodina region purchased sports equipment more frequently and reported stronger responses to sponsored sports events. Respondents from Southern and Eastern Serbia participated more often in prize contests organized by sports brands. These findings suggest that regional characteristics may influence certain aspects of consumer behavior and should be considered when developing region-specific marketing strategies. From a practical perspective, these findings suggest that sports organizations and manufacturers should prioritize investments in product quality, functionality, and consumer value, while using sponsorship, digital communication, and influencer marketing primarily to strengthen brand awareness rather than as the principal drivers of purchasing decisions. In addition to promotional activities, the findings emphasize the importance of considering the broader marketing mix when analyzing consumer purchasing behavior. The present study primarily examined the influence of product quality, price, brand image, sponsorship, and selected promotional activities, whereas other marketing mix elements, such as distribution (place), availability of products, and the role of sales personnel, were not included in the analytical framework. These factors may also influence consumer purchasing decisions and therefore represent important directions for future research. Furthermore, the limited influence of social media observed in this study should not be interpreted as evidence that digital communication is generally ineffective. Previous studies have demonstrated that social media can significantly enhance consumer engagement, brand awareness, and purchase intentions in sports marketing, particularly among younger consumers (Mastromartino & Naraine, 2022; Kumar & George, 2024). A more plausible explanation for the present findings is the demographic structure of

the sample, in which respondents aged 46–60 years constituted the largest group. This age group is more likely to rely on traditional media, particularly television, as the primary source of sports information, which may explain why television remained the dominant communication channel while social media exerted only a limited direct influence on purchasing decisions. Unlike our previous study, which focused on the overall role of sports marketing activities in shaping consumer behavior, the present research provides a more detailed analysis of consumers' perceptions of individual marketing instruments related to sports equipment purchasing decisions and their variation across demographic groups. Another finding that deserves further consideration is the relatively limited influence of price on sports equipment purchasing decisions. Although price was identified as the second most important purchasing criterion, its importance was considerably lower than that of product quality. A possible explanation may be related to the demographic structure of the sample, in which respondents aged 46–60 years represented the largest age group. Individuals within this age category are more likely to have stable employment and relatively stable financial resources, which may reduce the importance of price compared with product quality and product performance. Consequently, these findings should be interpreted with caution, as different age and income structures could produce different purchasing patterns. Future studies including a more balanced age distribution may provide a clearer understanding of the role of price in sports equipment purchasing decisions.

These findings support the view that consumer behaviour in sport is shaped by a broader set of market influences rather than by a single determinant. Similarly, Pavićević et al. (2026) emphasized that sporting outcomes alone are insufficient to explain market reactions, as commercial activities, sponsorship agreements, and other external factors substantially contribute to market dynamics.

Recommendations for Future Research

Future research should build upon the findings and limitations of the present study. Since this research was conducted using a convenience sample of 112 respondents from the Republic of Serbia, future studies should include larger and more representative samples to improve the generalizability of the findings and enable more reliable comparisons across demographic groups and regions.

The present study demonstrated that product quality represents the dominant factor influencing sports equipment purchasing decisions, whereas sponsorship, athlete endorsements, influencer marketing, and social media promotion exert only a limited direct influence on consumer behavior. Future research should investigate the underlying reasons for these findings by examining additional variables such as consumer trust, perceived product value, brand loyalty, customer satisfaction, and involvement in sports activities. These variables may provide a more comprehensive explanation of purchasing behavior and clarify the relationships identified in the present study. Given that the sample was predominantly composed of respondents aged 46–60 years, future studies should compare different age groups, particularly younger consumers, in order to determine whether the effectiveness of digital marketing, influencer marketing, and athlete endorsements varies

across generations. Such analyses would contribute to a better understanding of demographic differences in sports marketing effectiveness. Future research should also employ longitudinal research designs to examine whether consumer attitudes toward sports marketing and purchasing behavior change over time as digital communication channels and consumer preferences continue to evolve. In addition, comparative studies involving different countries and cultural environments would provide valuable insights into whether the dominance of product quality observed in the Serbian market is also evident in other markets or whether cultural and economic factors modify consumer purchasing decisions. Overall, future studies should focus on developing more comprehensive models of consumer behavior that integrate product characteristics, marketing activities, psychological factors, and demographic variables in order to provide a deeper understanding of sports equipment purchasing decisions and to support the development of more effective marketing strategies.

Future research should adopt a more comprehensive approach by examining the full potential of all elements of the marketing mix in the context of sports equipment purchasing behavior. While the present study focused primarily on product-related characteristics, pricing, branding, and selected promotional activities, future studies should also investigate the influence of distribution channels (place), customer service, sales personnel, and other marketing mix elements. Considering the increasing complexity of sports marketing and changing consumer expectations, an integrated analysis of all marketing mix elements may provide a more comprehensive understanding of consumer purchasing behavior and contribute to the development of more effective marketing strategies in the sports equipment market.

Methodological Limitations

Several methodological limitations should be considered when interpreting the findings of this study.

First, the research was conducted using a non-probability convenience sample of 112 respondents from the Republic of Serbia. Although this sampling approach enabled efficient data collection, it limits the representativeness of the sample and the generalizability of the findings to the broader population of Serbian consumers. Furthermore, the predominance of respondents aged 46–60 years may have influenced the observed results, particularly those related to digital marketing, social media promotion, and influencer marketing.

Second, the study employed a structured questionnaire developed specifically for this research based on previous studies in sports marketing and consumer behavior. Although the questionnaire was reviewed by experts prior to data collection, several key constructs, including brand image, sponsorship effectiveness, promotional activities, and purchasing behavior, were measured using individual questionnaire items rather than previously validated multi-item scales. Consequently, these constructs may not have been fully operationalized, which should be considered when interpreting the findings.

Third, the study relied on self-reported responses. As with most survey-based research, respondents' answers may have been influenced by subjective perceptions, memory bias, or

socially desirable responding. Therefore, reported purchasing behavior may not always correspond to actual consumer behavior.

Another limitation concerns the statistical analyses applied in this study. Although descriptive statistics, independent-samples *t*-tests, and one-way ANOVA were appropriate for addressing the research objectives and hypotheses, these methods do not allow the examination of more complex relationships among variables, such as mediation, moderation, or causal effects.

Finally, the research employed a cross-sectional design and was conducted exclusively in the Serbian market during a single period. Consequently, the findings cannot be generalized to other countries or cultural contexts, nor can they explain changes in consumer attitudes and purchasing behavior over time.

Conclusion

This study examined consumer perceptions of sports marketing activities and purchasing behavior in the Serbian sports equipment market. The findings indicate that, among the respondents included in this study, product quality was identified as the most important criterion when purchasing sports equipment, while price represented the second most frequently selected factor. In contrast, sponsorship, athlete endorsements, influencer marketing, and social media promotion demonstrated only a limited direct influence on purchasing decisions. These conclusions are directly supported by the descriptive and inferential analyses presented in the Results section.

The study also showed that television remains the primary source of sports-related information for most respondents, whereas digital marketing activities and sports influencers currently play a less important role in shaping purchasing behavior. Furthermore, statistically significant differences were identified according to gender and place of residence for selected aspects of sports participation and purchasing behavior, while no significant differences were observed according to age or monthly income.

The findings contribute to a better understanding of consumer behavior in the Serbian sports equipment market and provide empirical evidence regarding the relative importance of product-related characteristics and sports marketing activities. Within the surveyed sample, respondents attached greater importance to product quality than to promotional activities when making purchasing decisions. These findings may assist sports organizations, manufacturers, and retailers in designing marketing strategies that combine high product quality with appropriate communication and promotional activities.

Although the findings provide useful insights, they should be interpreted in light of the methodological limitations of the study, particularly the use of a convenience sample and a cross-sectional research design. Future studies employing larger and more representative samples, validated measurement instruments, and more advanced statistical approaches may provide a more comprehensive understanding of consumer purchasing behavior in sports marketing.

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Turčinović, Ž., Radaković, M., Turčinović, M., Sredojević, D., & Pajović, I. (2026). Reassessment of asset values as well as the use of IT support systems in business operations of sports organizations and clubs in Serbia, *Sport media and business*, 12(2), 197-206

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Corresponding author: radakovic.milan@fzs.edu.rs

REASSESSMENT OF ASSET VALUES AS WELL AS THE USE OF IT SUPPORT SYSTEMS IN BUSINESS OPERATIONS OF SPORTS ORGANIZATIONS AND CLUBS IN SERBIA

Željko Turčinović[1], Milan Radaković[1], Milena Turčinović[2], Dejan Sredojević[3], Ivan Pajović[4]

Abstract: *Purpose: This study examines the role of asset revaluation and IT support systems in improving the financial transparency and decision-making processes of sports organizations and clubs in Serbia. Methods: A cross-sectional survey was conducted among 117 top managers of sports organizations in the Republic of Serbia. Data were collected using a structured questionnaire measuring five factors: realistic financial presentation of assets, reporting reliability, operating profit growth, cost reduction, and IT system security. Differences between managerial assessments before and after asset revaluation were analyzed using t-tests. Results: Statistically significant differences ($p < 0.001$) were observed across all analyzed factors, indicating that asset revaluation and improved IT support systems are associated with higher managerial confidence in financial reporting and decision-making. Conclusion: The findings suggest that systematic asset revaluation combined with IT-supported financial management may significantly improve transparency and strategic decision-making in sports organizations. Future research should examine causal mechanisms and organizational constraints affecting the implementation of such practices.*

Keywords: valuation, IT, business book, sports clubs.

[1] Faculty of Sport, Union – Nikola Tesla University, Belgrade, Serbia
[2] Faculty of Tourism and Hospitality Management, Singidunum University, Belgrade, Serbia
[3] Modern Business School, Belgrade, Serbia
[4] Faculty of Management, Metropolitan University, Belgrade, Serbia

Introduction

Asset revaluation has emerged as a critical mechanism for improving the accuracy, transparency, and credibility of financial reporting across diverse organizational contexts (Popović et al., 2025a). By aligning book values with current market conditions, revaluation enhances the informational quality of financial statements and supports more reliable managerial decision-making. While prior studies have predominantly examined asset valuation practices within traditional corporate or public-sector settings, considerably less attention has been devoted to their role in sports organizations and clubs, despite their increasing economic relevance and organizational complexity (Bakmaz et al., 2024a). This gap is particularly important given the hybrid nature of sports organizations, which often combine commercial objectives with social and non-profit functions, thereby requiring more nuanced financial management approaches.

From a managerial perspective, effective decision-making depends on the availability of accurate, timely, and relevant financial information. Among the various tools available to top management, asset revaluation—together with its systematic integration into accounting systems—represents a key instrument for improving performance measurement, financial control, and strategic planning (Bakmaz et al., 2024b; Dragosavac et al., 2023; Tamas-Miškin et al., 2022). However, the extent to which such practices are consistently implemented, particularly in sectors characterized by limited financial sophistication and institutional constraints, remains insufficiently understood. In this regard, sports organizations provide a relevant empirical setting in which to examine how financial reporting practices influence managerial perceptions and organizational outcomes.

The theoretical foundations of this study are grounded in the broader literature on financial governance and evidence-based management, which emphasizes the role of reliable information in enhancing organizational efficiency and accountability (Sharam, 2023; Sousa & Meireles, 2022; Kharoubi et al., 2024). Within this framework, managerial trust in financial data represents a critical determinant of decision quality, particularly when organizations operate under conditions of uncertainty and resource constraints. Previous research suggests that the effectiveness of decision-making processes depends not only on the availability of data, but also on its perceived reliability and relevance, which can be systematically examined through multidimensional analytical approaches such as factor-based evaluation (Irvine et al., 2004; Liu, 2019; Qiu et al., 2022).

In addition, the pursuit of operational efficiency and cost optimization remains a central objective of organizational management across sectors, including sports organizations (Rafoss & Troelsen, 2010; Iverson, 2018). Accurate asset valuation plays a fundamental role in this process, as it directly affects cost structures, investment decisions, and financial planning (Liu et al., 2024; Wang et al., 2025; Ampofo-Boateng, 2009). Furthermore, the integration of information technologies into financial management systems has become increasingly important for enhancing data accuracy, security, and accessibility, thereby supporting more

advanced decision-making processes (Silvestri et al., 2020; Kwon et al., 2019). The combined effect of asset revaluation and IT system implementation is therefore expected to contribute to improved organizational performance and governance.

Despite these developments, the empirical relationship between asset valuation practices, IT system support, and managerial decision-making in sports organizations remains underexplored. Existing studies have largely overlooked the extent to which revaluation influences managerial trust in financial information and how this, in turn, affects key organizational factors such as profitability, cost efficiency, and reporting reliability. Moreover, there is a lack of empirical evidence examining differences in asset valuation across temporal dimensions (e.g., before and after revaluation, or prior versus current accounting records), particularly within the context of sports organizations operating in transitional economies.

Accordingly, the present study aims to address these gaps by examining the effects of asset revaluation on managerial perceptions and decision-making in sports organizations and clubs in the Republic of Serbia. Specifically, the study investigates whether significant differences exist in the valuation of assets as recorded in business books, and how these differences relate to key organizational factors, including financial reporting accuracy, reporting reliability, profitability, cost reduction, and IT system security. By focusing on this context, the study contributes to the literature by providing empirical evidence on the role of financial management practices in a sector that remains relatively underrepresented in accounting and management research.

Based on the theoretical and empirical considerations outlined above, the study formulates the following hypotheses: There is no significant difference in top management's trust in asset values prior to the latest accounting entry compared to their current presentation in business records (H1); There is no significant difference in asset valuation before and after revaluation (H2); There is no significant difference in the observed organizational factors between previous and current accounting states in relation to asset values before and after revaluation (H3).

Methods

This study employed a quantitative, cross-sectional research design based on a survey methodology. Data were collected using a structured questionnaire distributed to top managers of sports organizations and clubs operating in Serbia. The questionnaire contained Likert-scale items (1–10) designed to assess managerial perceptions of asset valuation accuracy, reporting reliability, profitability, cost efficiency, and IT system security.

Prior to the main study, the questionnaire was reviewed to ensure conceptual clarity. Content validity was assessed through expert review involving specialists in accounting, sport management, and financial management.

Sample

For the purposes of the study, the authors conducted a survey completed by 117 top managers of sports organizations and clubs operating in the Republic of Serbia. Out of 140 distributed questionnaires, 117 were returned, resulting in a high response rate of 84%. The research period spanned from October 1 to October 30, 2025, and covered the entire territory of the Republic of Serbia.

Sampling was conducted using a random distribution approach, regardless of whether the organizations were professional or amateur clubs, as well as irrespective of their size or the age of the managers surveyed.

All respondents were guaranteed anonymity, and it was emphasized that no identifiable characteristics of the organizations would be disclosed. The collected data were used exclusively for scientific research and publication purposes.

The aim of this research was to examine the existence of differences in asset valuation before and after revaluation as recorded in the business books of sports clubs.

The factors analyzed included: the realism of financial asset presentation, reporting reliability, operating profit growth, total cost reduction, and IT system security.

Following data collection, standard statistical data processing procedures were applied.

Procedure

The research was conducted as part of a broader analysis of the development and operational performance of sports organizations and clubs in the Republic of Serbia.

The impact of asset valuation within sports organizations was evaluated through a two-phase analytical process. In the first phase, a paired-samples t-test was employed to compare managers' perceptions of asset values prior to the latest accounting entries versus their current reported status, focusing on financial accuracy, reliability, profit growth, cost reduction, and IT security. The second phase utilized the same statistical approach to examine differences in managerial assessments specifically before and after the asset revaluation process. This methodology was structured to isolate the effects of revaluation on financial reporting and decision-making. By applying a systematic analytical framework, the research ensured that the collected data provided an objective and statistically significant insight into the role of asset valuation in the sports sector.

Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics (Version 25). Descriptive statistics (means and standard deviations) were calculated for all variables. To examine differences between managerial assessments of asset valuation under different conditions (before vs. after revaluation and previous vs. current accounting records), inferential statistical methods were applied.

All results were analyzed using the paired samples t-test, which was applied to examine differences in perceived asset valuation across the specified conditions among top managers of sports clubs.

The level of statistical significance was set at $p \leq 0.05$, and all reported p-values are two-tailed.

Results

The results are presented in two tables (Tables 1 and 2), which summarize the key findings of the study.

The valuation of assets prior to their latest entry in business records represents an important basis for top management's trust in financial reporting and the effective functioning of sports organizations. The results of this evaluation, in relation to the analyzed factors, are presented in Table 1. No correction for multiple comparisons was applied, as all results were significant at $p < 0.001$.

Table 1. Valuation of assets prior to the latest recorded state compared with their current presentation in business records.

Factors	Current asset display in the business books	Previous asset display in the business books	t (paired)	p
	Mean ± SD			
The reality of the financial presentation of assets	7.78 ± 1.12	5.04 ± 1.35	18.92	<0.001*
Reporting security	7.68 ± 1.18	6.23 ± 1.29	9.84	<0.001*
Increase in business profits	7.48 ± 1.21	6.47 ± 1.24	7.12	<0.001*
Reduction of total costs	7.58 ± 1.34	6.40 ± 1.41	6.85	<0.001*
IT system security	7.98 ± 1.10	5.89 ± 1.28	14.67	<0.001*

Note: t - the mean difference between the current and previous asset valuations; p - statistical significance of the observed difference is set at the ≤ 0.05 level.

The results presented in Table 1 indicate statistically significant differences between the perceived valuation of assets prior to the latest accounting entry and the current reported valuation in the business records of sports organizations. In all analyzed factors, managers reported higher mean values for the current asset presentation.

These findings suggest that improved valuation practices and updated accounting procedures may increase managerial confidence in financial reporting.

Valuation of assets of sports organizations before and after revaluation

The second part of the results focuses on the comparison of asset valuation before and after revaluation, highlighting its importance for effective and reliable management decision-

making. The results are presented in Table 2. No correction for multiple comparisons was applied, as all results were significant at $p < 0.001$.

Table 2. Valuation of assets before and after revaluation.

Factors	Asset display after revaluation	Asset display before revaluation	t (paired)	p
	Mean ± SD			
The reality of the financial presentation of assets	7.99 ± 1.09	6.72 ± 1.22	10.21	<0.001*
Reporting security	8.08 ± 1.14	6.79 ± 1.27	10.34	<0.001*
Increase in business profits	8.11 ± 1.16	7.69 ± 1.18	3.92	<0.001*
Reduction of total costs	8.28 ± 1.42	7.25 ± 1.36	6.11	<0.001*
IT system security	8.89 ± 1.05	7.92 ± 1.19	8.76	<0.001*

Note: t - the mean difference between the current and previous asset valuations; p - statistical significance of the observed difference is set at the ≤ 0.05 level.

The results shown in Table 2 clearly indicate that there are statistically significant differences between asset valuations before and after revaluation across all analyzed factors. In addition, there is a clear distinction between the two observed conditions, with higher values reported after revaluation, indicating increased managerial confidence in asset valuation, which subsequently forms the basis for their inclusion in business records. Finally, the results indicate that the highest absolute t-values were observed for the factor related to the realism of financial asset presentation, while the lowest values were associated with profit-related factors, based on the evaluations of top management.

Discussion

The findings of this study highlight the critical managerial importance of accurate asset valuation in sports organizations. Realistic financial reporting provides a more reliable basis for strategic decision-making, resource allocation, and financial planning within sports clubs.

Compared with previous research in asset management and financial governance (Bakmaz et al., 2025a; Popović et al., 2025a), the present results extend existing knowledge by situating these issues within the specific context of sports organizations. Nevertheless, the theoretical framework connecting asset valuation, IT governance, and organizational decision quality remains underdeveloped and requires further conceptual refinement in future research.

These findings can be applied in the operations of sports organizations and clubs, particularly by emphasizing the systematic verification of asset values prior to their inclusion in accounting records, as such values serve as a basis for informed managerial decision-making. This is consistent with previous studies (Popović et al., 2025b), which highlight the role of

accurate valuation in improving future business performance. Furthermore, building on the work of Jovanović et al. (2025), there is a clear need for the continuous development of innovative approaches to support reliable and effective management decisions.

In addition, the results clearly demonstrate significant differences between asset valuations prior to the latest accounting entry and those currently reported in the business records of sports organizations across all analyzed factors, namely: financial reporting accuracy, reporting reliability, profit growth, cost reduction, and IT system security (Table 1).

These findings support the rejection of hypothesis H1, indicating that there is a statistically significant difference in top management's trust in asset values prior to the latest accounting entry compared to their current presentation in business records.

Furthermore, the mean values of asset valuation before the last recorded balance and the current balance show consistent deviations in favor of the latter. These results are further supported by the application of the paired-samples t-test, which revealed statistically significant differences across all analyzed factors ($p < 0.001$). The highest absolute t-values were observed for the realism of financial asset presentation, while the lowest values were associated with cost reduction factors.

The second part of the results relates to the comparison of asset valuation before and after revaluation (Table 2), where statistically significant differences were also identified across all factors, with higher values reported after revaluation. This indicates increased managerial confidence in asset valuation following revaluation procedures.

Accordingly, hypothesis H2 is rejected, confirming the existence of significant differences in asset valuation before and after revaluation.

Third, based on the combined analysis of results presented in Tables 1 and 2, significant differences were identified across all individually observed factors, both in terms of previous versus current accounting states and before versus after revaluation. Therefore, hypothesis H3 is also rejected.

However, it is important to note that managerial confidence is consistently higher following the revaluation of assets, highlighting the importance of updated and realistic financial reporting for enhancing management quality. A more detailed analysis further reveals that the strongest effects were observed in the domain of realistic financial asset presentation, while the weakest effects were associated with profit-related factors, which is consistent with previous findings (Bakmaz et al., 2025b).

In summary, the results emphasize the necessity of continuous evaluation and transparent presentation of asset values in sports organizations, as these practices provide a foundation for sound managerial decision-making (Sredojević et al., 2025). At the same time, it is important to acknowledge the structural limitations of sports organizations, particularly in Serbia, where many clubs operate on a non-profit basis with limited financial and human resources.

Conclusions

The findings of this study indicate that systematic asset valuation and the implementation of IT-supported financial systems can significantly enhance the transparency and reliability of financial reporting in sports organizations.

However, several limitations should be acknowledged. First, the study relies on self-reported managerial assessments rather than objective financial data, which may introduce bias. Second, the cross-sectional design limits the ability to establish causal relationships between asset revaluation and organizational performance. Third, the sample includes only organizations operating in Serbia, which may restrict the generalizability of the findings.

Future studies should incorporate longitudinal financial data, apply more advanced econometric techniques, and further develop theoretical frameworks linking asset management practices with governance and performance in sports organizations.

First, there is a strong need for accurate and continuous valuation of assets in sports organizations and associations. However, these entities often face limitations in implementing such practices due to insufficient expertise and a lack of specialized personnel capable of conducting asset valuation and revaluation procedures.

Second, the study confirms significant differences in asset valuation before and after revaluation, with important managerial implications, particularly in relation to factors associated with cost reduction and profit generation, which require additional attention.

Third, the higher post-revaluation asset values compared to previous accounting balances may also indicate the presence of inflationary effects, which can significantly influence the financial operations of sports organizations in the Republic of Serbia.

Finally, there is a clear need for the continuous and transparent disclosure of asset values, as this enables more reliable and effective business decision-making. Future research could expand this line of inquiry by incorporating additional factors, such as joint investments in sports and the analysis of credit-related activities of sports clubs, in order to provide a more comprehensive understanding of financial management in this sector.

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Corresponding author: mcolovic@singidunum.ac.rs

PHYSICAL RECREATION AS A CORPORATE WELLNESS STRATEGY: WORK-FAMILY CONFLICT, STRESS, AND MEANING IN LIFE IN SERBIA

Milica Čolović[1]

Abstract: *Introduction: The modern corporate environment in SEE countries, including Serbia, imposes high professional demands on employees, often triggering professional stress and work-family conflict. This pressure is particularly critical during the midlife transition (ages 40–64), a period already vulnerable to existential and developmental crises. Aim: This study aimed to examine the relationship between work-family role conflict, professional stress, and the sense of meaning in life among active employees in Serbia, while positioning physical recreation as a strategic human resource management (HRM) intervention. Materials & Methods: From a larger nationwide sample, a distinct sub-sample of N=204 gainfully employed middle-aged participants (40–64 years) across five statistical regions of Serbia was analyzed. Standardized instruments were utilized: the Work-Family Conflict Scale (WFC), the Role Quality and Professional Stress Index, and the Meaning in Life Questionnaire (MLQ). Results: Statistical analysis revealed that overall work-family role conflict displays significant age-related variance (F=2.24, p=.041), reaching its absolute developmental maximum during late midlife (ages 55–59; M=39.51). Conclusions: Integrating these findings with empirical evidence on physical activity, the paper outlines actionable corporate wellness strategies for Serbian enterprises. Implementing targeted physical recreation within companies can systematically alleviate professional stress, enhance employee retention, and mitigate midlife burnout.*

Keywords: human resource management, work-family conflict, physical recreation, meaning in life, midlife crisis, corporate wellness.

[1] S ingidunum University, Belgrade, Serbia

Introduction

In the contemporary globalized economy, the boundaries between professional obligations and personal domains have become increasingly blurred. Human Resource Management (HRM) and organizational psychology heavily focus on the concept of Work-Life Balance (WLB) as a critical determinant of organizational efficiency, employee retention, and occupational health. This equilibrium is profoundly challenged when examining the demographic segment of middle-aged employees. From a developmental perspective, the midlife period—typically spanning ages 40 to 64—is not a static chronological phase but a dynamic and often turbulent transition characterized by a systematic re-evaluation of personal, familial, and professional trajectories (Levinson, 1978; Marmor, 1975). Within corporate hierarchies, these individuals frequently occupy pivotal roles, representing the core managerial, academic, and operational capital of an organization. However, this accumulation of professional responsibility coincides with a heightened vulnerability to psychosocial stressors. Middle-aged workers often operate within what developmental psychologists term the "sandwich generation," simultaneously navigating peak career demands while managing the complex emotional and financial responsibilities of caring for aging parents and supporting transitioning children (Haider & Jamil, 2023). This vulnerability is further amplified by the specific psychological nature of the midlife transition itself. Within the regional context, empirical evidence suggests that this developmental phase is inherently characterized by a profound interplay between visible lifestyle shifts and deep-seated internal transformations. As documented by Čolović and Stojković (2017), the external manifestations of the midlife crisis are often structural coping responses to intense internal re-evaluations of personal achievement and existential stability. When these developmental transitions intersect with rigid corporate expectations, the individual's adaptive capacity is doubly strained, accelerating the depletion of personal resources.

Consequently, the pressure to sustain high-level occupational performance under such multi-layered role strain significantly depletes individual cognitive and psychological resources, rendering this cohort exceptionally susceptible to chronic exhaustion and burnout (Nielsen & Taris, 2024).

When the pressures and structural demands from the professional domain become structurally incompatible with the responsibilities of the domestic sphere, Work-Family Conflict (WFC) inevitably manifests. This phenomenon is deeply rooted in multi-role friction, which, as established in the foundational framework by Greenhaus and Beutell (1985), primarily operates through three distinct mechanisms: time-based conflict, strain-based conflict, and behavior-based conflict. In transition economies like Serbia, these three dimensions are heavily intensified because the time required by modern high-performance corporate regimes directly drains the energy required to execute deeply ingrained cultural and domestic roles. These macro-systemic transitions force modern organizations to constantly evaluate how technological and psychological factors influence managerial efficiency. In the contemporary Serbian enterprise culture, strategic human resource decisions are increasingly caught between automated operational demands and employee well-being. As highlighted by Čolović and Mitić (2026), understanding the psychological

aspects of accepting new organizational and technological frameworks is paramount for modern management and business decision-making. When firms fail to balance these systemic operational expectations with human-centric interventions, role friction inevitably escalates. In the specific socioeconomic landscape of Southeast Europe (SEE) and the Republic of Serbia, this conflict is further exacerbated by macro-systemic transitions. The shift from self-managed socialist economic models to aggressive corporate capitalism has structurally altered workplace dynamics, introducing heightened job insecurity, prolonged working hours, and a general lack of institutionalized employee support frameworks. Traditional cultural expectations in Serbia still place a heavy emphasis on dense extended-family support and domestic obligations, particularly for women, which directly collides with the rigid, high-performance demands of modern enterprise environments. This friction is further complicated by how modern Serbian lifestyle and consumption habits are shaped through contemporary information networks. Empirical insights into the domestic market reveal that specific socio-demographic characteristics and situational factors heavily dictate individual lifestyle choices and behavioral patterns, with primary communication channels acting as the critical baseline for how Serbian citizens process external information and balance daily life demands (Mitić & Čolović, 2025). Consequently, when professional obligations systematically infringe upon these deeply rooted familial domains, the resulting bi-directional role friction acts as a primary catalyst for psychological distress. Under these conditions, workplace stress ceases to be a localized, temporary pressure; instead, it evolves into a chronic structural hazard that systematically degrades both organizational productivity and the long-term mental health of the workforce (Grimani et al., 2019). Prolonged WFC and unchecked occupational stress are documented catalysts for burnout, psychological distress, and, critically, a profound disruption in the individual's existential framework—namely, the loss of a stable sense of meaning in life (Steger & Kashdan, 2013). Research indicates that midlife is characterized by an intense re-examination of existential questions; individuals frequently report a drop in the "presence of meaning" and a concurrent rise in the "search for meaning" (Steger et al., 2006). This developmental drop in existential stability is deeply intertwined with the erosion of personal efficacy on the job. When an individual's primary psychological resources are continuously expended on mitigating role conflict, their capacity to derive fulfillment from their achievements is severely compromised. In midlife, professional work is often expected to serve as a primary vehicle for self-actualization and generative contribution to society. However, when occupational stress becomes overwhelming, the workplace is transformed from a source of purpose into a site of existential alienation, leading to a profound disruption in the individual's existential framework—namely, the loss of a stable sense of meaning in life (Steger & Kashdan, 2013). This duality emphasizes that the workplace is inherently a double-edged sword regarding emotional and existential outcomes. When organizational dynamics are balanced, professional engagement acts as a potent driver of daily subjective well-being and positive emotional states, serving as a vital arena for personal growth. However, as Zelenski et al. (2008) demonstrate, the accumulation of positive affect at work is deeply tied to overall life satisfaction, meaning that when systemic stress converts the workplace into an alienated space, it actively halts the generation of vital psychological energy needed across all life domains. This existential vacuum not only diminishes subjective well-being but also triggers corporate liabilities, including rapid drops in employee

engagement, heightened turnover intentions, and a marked increase in absenteeism among senior staff.

To mitigate these severe organizational and psychological hazards, progressive enterprises have begun adopting corporate wellness frameworks. Among these, worksite physical activity and organized physical recreation have emerged as highly effective, resource-efficient strategic interventions (Proper & van Mechelen, 2018). Physical recreation is not merely a mechanism for physical health preservation; it serves as a powerful psychological tool. The conceptual architecture explaining how structured physical recreation mitigates this multi-domain strain is rooted in the Resource Recovery Theory and the Conservation of Resources (COR) framework. According to the core tenets of COR theory formulated by Hobfoll (1989), psychological stress occurs when individuals face the threat of resource loss, actual resource net loss, or a failure to gain resources after significant investment. In midlife, employees suffer a continuous, multi-front depletion of their cognitive and energetic pools; structured physical activity operates as a strategic intervention that halts this loss spiral by providing a dedicated space for resource generation and psychological capital renewal. Physical activity functions as an active behavioral strategy that facilitates what organizational scholars define as "psychological detachment" from work—the mental and emotional capacity to disconnect from professional anxieties during off-work hours (Van Hooff & Geurts, 2014; Buehler & Fletcher, 2020). This process is central to the broader recovery experience. As validated by Sonnentag and Fritz (2007), psychological detachment from work during off-work time is the most critical component of the recovery process, functioning as a vital protective shield that predicts lower exhaustion and higher somatic health. When corporate wellness frameworks explicitly design windows for physical recreation, they provide employees with a highly immersive, non-work focus that structurally guarantees this psychological detachment, allowing the cognitive system to fully disengage from workplace anxieties. This dynamic of resource renewal is further highlighted when examining the functional outcomes of regional cohorts. Local empirical evidence by Bubanj et al. (2015) demonstrates that structured physical activity regimes significantly stabilize and maintain the functional and motoric status of individuals, counteracting the natural somatic degradation caused by sedentary lifestyles. When translated to the corporate context of transition economies, this implies that physical recreation does not merely offer a fleeting psychological distraction, but actively sustains the physiological foundation required to withstand chronic occupational strain.

Engaging in structured recreation initiates a physiological and psychological reset; it shifts cognitive focus away from workplace stressors, thereby halting the continuous drain of emotional reserves. Furthermore, regular somatic engagement actively stimulates the generation of new energetic resources—such as elevated positive affect, physical vitality, and enhanced self-efficacy—which employees can subsequently reinvest into both their professional and domestic roles, effectively neutralizing the negative spillover between domains (Chawla et al., 2024). To comprehensively map these dynamics, it is theoretically essential to distinguish between occupational stress and bidirectional spillover effects. Within organizational psychology, professional stress is conceptualized as a chronic mismatch between perceived workplace demands and an individual's coping resources, structurally acting as a precursor to multi-domain role erosion (Nielsen & Taris, 2024). However, the

interaction between work and family life is not solely conflict-driven. The Job Demands-Resources (JD-R) model highlights that resource accumulation can facilitate a Work-Family Positive Spillover (PSS)-a process whereby skills, positive moods, and psychological capital acquired in one domain actively enrich and improve performance in the other (Chawla et al., 2024). Understanding the baseline of both chronic occupational stress and positive spillover mechanisms is crucial for determining how strategic corporate interventions can tip the scale toward optimal employee health.

Despite its evident organizational benefits, empirical exploration linking work-family dynamics, existential meaning, and physical recreation within the specific socioeconomic context of Southeast Europe (SEE) and Serbia remains scarce. Therefore, this study aims to examine the empirical baseline of WFC, professional stress, and meaning in life among middle-aged employees in Serbia, while providing a solid scientific justification for the implementation of recreation-based corporate wellness strategies.

Materials & Methods

Sample and Procedure

This paper extracts and analyzes a specific, rawness-validated sub-sample (N = 204) derived from a comprehensive, nationwide cross-sectional study investigating developmental transitions in the Republic of Serbia. The selected sub-sample exclusively comprises gainfully employed, active workers categorized within the midlife cohort (ages 40 to 64). Data collection utilized a stratified sampling technique across five major macro-regions encompassing 10 cities in Serbia: Northern Serbia (Belgrade, Novi Sad), Central Serbia (Jagodina, Kruševac), Southern Serbia (Leskovac, Lebane), Eastern Serbia (Niš, Knjaževac), and Western Serbia (Novi Pazar, Užice). Sociodemographic control variables, including marital status, educational level, employment status, and financial standing, were meticulously recorded via a customized sociodemographic biodata checklist.

Table 1. Socio-demographic profile of the employed midlife sample (N=204).

Socio-demographic Variable	Category	n	%
Gender	Male	104	*51.0%*
	Female	100	49%
Education Level	Primary	5	2.5%
	Secondary	130	63.7%
	Higher / Bachelor	17	8.3%

Socio-demographic Variable	Category	n	%
	University Degree	50	24.5%
	Master / PhD	2	1.0%
Marital Status	Married / Cohabitation	158	77.5%
	Other status	46	22.5%

Legend: *n* - frequency (number of participants); % - percentage; PhD - Doctor of Philosophy (doctoral degree).

Instruments

The psychological and organizational architecture of the participants was assessed using four highly reliable, psychometrically validated scales adapted for the local population:

1. Work-Family Conflict Scale (WFC): Measures the bi-directional friction between professional duties and family life, specifically capturing role over-enrichment, time sacrifice, and domain boundary infiltration.
2. Work-Family Positive Spillover Scale (PSS): Assesses the positive transfer of skills, moods, and behaviors from the workplace to the domestic sphere.
3. Role Quality and Occupational Stress Index: A modified metric evaluated the cumulative subjective stress experienced specifically during the performance of professional and familial roles.
4. Meaning in Life Questionnaire (MLQ; Steger et al., 2006): A 10-item instrument split into two robust subscales: *Presence of Meaning* and *Search for Meaning*.

Data Analysis

Statistical processing was executed utilizing SPSS version 20.0. Descriptive parameters (means, standard deviations) established developmental baselines across age micro-cohorts. Pearson correlation coefficients (r) determined the strength and direction of relationships between professional stress, WFC, and existential meaning.

Ethical Compliance and Informed Consent Statement

This research was conducted in strict adherence to international ethical benchmarks, the Declaration of Helsinki, and national personal data protection bylaws. Given the non-invasive nature of the study, which exclusively utilized fully anonymized surveys with no risk of participant identification or harm, formal review and a specific approval number from an Institutional Review Board or Ethics Committee were not required under applicable

institutional and national guidelines for social science research. Nonetheless, ethical safety was strictly maintained at the methodological level: prior to participation, all individuals received exhaustive digital disclosure briefs outlining the scope of the study, data aggregation methods, and strict identity masking mechanisms. Explicit, voluntary informed consent was mandatory and obtained from each participant before entering the survey.

Results

The ANOVA model confirmed that the levels of experiencing work-family role friction fluctuate significantly across the distinct age cohorts of the midlife transition.

Table 2. Descriptive indicators and ANOVA differences across midlife age groups.

Variable	40–44 yrs (M±SD)	45–49 yrs (M±SD)	50–54 yrs (M±SD)	55–59 yrs (M±SD)	60–64 yrs (M±SD)	F-value	p-value
Work-Family Conflict	36.90 ± 22.31	32.29 ± 18.95	36.49 ± 22.55	39.51 ± 24.45	37.20 ± 24.97	2.24	0.041
Professional Stress	15.53 ± 3.09	15.58 ± 2.60	15.83 ± 2.35	15.94 ± 2.39	15.50 ± 3.66	0.29	0.940
Presence of Meaning	27.10 ± 5.84	26.83 ± 5.68	26.81 ± 8.92	26.00 ± 5.81	29.70 ± 5.60	1.21	0.302
Search for Meaning	21.30 ± 8.19	22.98 ± 6.58	21.69 ± 7.33	22.20 ± 6.51	26.30 ± 7.72	1.17	0.322

Note: F-value = F-statistic from the one-way analysis of variance (ANOVA); p-value = probability value; values are presented as mean ± standard deviation (SD). *Statistical significance was set at* $p < 0.05$.

A more granular examination of the descriptive parameters across the micro-cohorts provides crucial insights into the precise trajectory of role strain and existential metrics during the midlife transition. As outlined in Table 2, the subjective experience of Work-Family Conflict initiates at an elevated baseline in the youngest cohort aged 40–44 (M = 36.90, SD = 22.31), experiences a temporary deceleration in the 45–49 cohort (M = 32.29, SD = 18.95), and subsequently exhibits a sharp, monotonic developmental incline. This escalation culminates in late midlife within the 55–59 age bracket, reaching its absolute maximum value (M = 39.51, SD = 24.45) before slightly tapering off in the oldest cohort aged 60–64 (M = 37.20, SD = 24.97). The omnibus ANOVA model confirmed that this age-related variance in role friction is statistically significant (F = 2.24, p = .041), validating that late midlife represents an empirical peak of structural vulnerability within the Serbian corporate sector. Conversely, the levels of

subjective Professional Stress remain phenomenologically rigid and remarkably stable across all examined age brackets (F = 0.29, p = .940), hovering consistently near a mean score of 15.50 to 15.94. This stability indicates that occupational pressure is an omnipresent, systemic baseline hazard within these enterprises, affecting workers uniformly regardless of their specific age milestone. Furthermore, regarding existential structures, the Presence of Meaning reveals its absolute lowest developmental level within the highly vulnerable 55–59 age group (M = 26.00, SD = 5.81), corresponding precisely with the developmental peak of role conflict. Concurrently, the Search for Meaning reaches its absolute peak among the oldest workforce members aged 60–64 (M = 26.30, SD = 7.72). Although the omnibus F-tests for both Presence (F = 1.21, p = .302) and Search (F = 1.17, p = .322) did not cross the formal threshold for statistical significance, these descriptive cross-sectional variations indicate a profound psychological trend of existential re-evaluation as retirement approaches.

As values in Table 2 indicate, a statistically significant difference across the age micro-cohorts was observed exclusively for overall Work-Family Conflict (F=2.24, p=.041). The highest conflict is recorded in the 55–59 age group (M=39.51±24.45), closely followed by the oldest cohort (60–64 years; M=37.20±24.97). Professional stress and both dimensions of meaning in life remained statistically stable across the groups (p>0.05).

Table 3. Pearson correlation matrix among the investigated variables.

Variables	1. Work-Family Conflict	2. Professional Stress	3. Presence of Meaning	4. Search for Meaning
1. Work-Family Conflict	1.00	-0.120*	-0.049	0.151*
2. Professional Stress	-	1.00	0.143*	-0.065
3. Presence of Meaning	-	-	1.00	-0.011
4. Search for Meaning	-	-	-	1.00

Note: *Statistical significance was set at* *p<.05.

Correlation analysis (Table 3) revealed a statistically significant, positive correlation between Professional Stress and the Presence of Meaning in life (r=0.143, p=.042). Additionally, Work-Family Conflict exhibited a significant positive correlation with the Search for Meaning (r=0.151, p=.031), suggesting that heightened role conflict prompts individuals to actively search for existential answers.

Discussion

The empirical reality of the Serbian workforce in midlife outlines a critical zone of vulnerability, particularly highlighted by the prominent peak in Work-Family Conflict between the ages of 55 and 59 (M=39.51). Although the developmental decline in the Presence of Meaning within this exact same age group (M=26.00) did not reach formal statistical significance in the ANOVA model (p=.302), it outlines a clear and descriptive trend of existential vulnerability. When professional demands and role friction culminate in late midlife, employees face a concurrent risk of diminishing existential fulfillment. From a corporate strategy standpoint, leaving these dynamics unaddressed leads to diminished productivity, executive burnout, and increased absenteeism, which severely harms organizational performance (Grimani et al., 2019). This identification of late midlife (ages 55–59) as the absolute chronological and empirical peak of role friction (M=39.51) challenges the traditional corporate assumption that older, more senior employees represent a stabilized, low-risk segment of the internal talent pool. Instead, this period represents a critical zone of structural vulnerability where peak professional obligations, rigid organizational demands, and complex domestic transitions (such as eldercare and preparing for retirement) converge to rapidly deplete the individual's remaining cognitive and psychological reserves.

To further dissect the internal operational mechanisms of this strain, the Pearson correlation matrix (Table 3) yields critical, multi-layered empirical correlations that demand academic scrutiny. While seemingly counterintuitive at a surface glance, this inverse relationship reveals a sophisticated psychological coping strategy typical of the Serbian socioeconomic climate. Middle-aged workers who face intense, structural role friction at home may actively detach emotionally from their workplace, downplaying or suppressing the cognitive salience of occupational stress as a defensive mechanism to protect their remaining psychological resources from total burnout. These sophisticated correlation patterns identified within our datasets provide profound, non-linear insights into employee coping mechanisms. The statistically significant negative correlation between overall Work-Family Conflict and localized Professional Stress ($r=-0.120$, $p<.05$), structurally mirrored by the strong negative alignment between Role Burden and occupational pressure ($r=-.302$, $p<.01$), confirms a defense mechanism of psychological detachment where middle-aged workers facing unsustainable multi-domain role friction actively choose to emotionally disengage from the workplace as a survival strategy to protect their psychological health from full-scale clinical burnout.

This interpretation is structurally reinforced by examining the specific variable of Role Burden, which exhibits a profound, highly significant negative correlation with Professional Stress ($r=-0.302$, $p<.01$). This strong negative coefficient demonstrates that as the subjective weight and structural exhaustion of balancing multiple life roles becomes overwhelming, the individual's capacity to process and internalize localized professional problems becomes blunted or detached. Crucially, the correlation analysis also reveals a significant positive relationship between Professional Stress and the actual Presence of Meaning in life ($r=0.143$, $p<.05$). This indicates that within the Serbian enterprise context, professional challenges and job demands are not viewed solely as negative stressors; rather, when successfully navigated, they serve

as a primary psychological vehicle for personal validation, competence, and existential purpose. However, when these demands cross the threshold into full-blown Work-Family Conflict, they directly trigger an existential crisis, as evidenced by the significant positive correlation between WFC and the active Search for Meaning ($r=0.151$, $p<.05$). This empirical linkage explicitly demonstrates that role friction actively destabilizes the individual's inner foundation, forcing middle-aged employees to look outside their standard routine to actively search for new sources of existential answer and life clarity.

This physiological necessity is particularly striking given the physical demands of modern workspace design. In regional studies tracking bodily adaptation and movement efficiency, Bubanj et al. (2012) emphasized that prolonged structural imbalances and lack of targeted locomotive patterns rapidly compromise individual biomechanical efficiency. For middle-aged corporate employees who spend years in static, desk-bound environments, physical recreation serves as a corrective mechanism that directly mitigates these silent somatic strains, consequently reducing overall subjective fatigue and burnout.

This shift in existential focus highlights the dynamic tension inherent in cognitive restructuring during crises. Longitudinal insights by Steger et al. (2009) confirm that while the actual presence of meaning is cross-sectionally linked to high well-being, the active search for meaning often marks a turbulent but necessary transitional phase where individuals process underlying psychological distress and re-evaluate their life choices. Therefore, the positive correlation between work-family conflict and the active search for meaning in the Serbian sample demonstrates that structural stress serves as an existential trigger, driving employees to look beyond their professional identities to reconstruct their purpose.

To break this negative cycle, corporate management must implement strategic wellness interventions that target the root cause of role strain. A compelling body of empirical evidence positions physical recreation as the most optimal tool for this purpose.

Our prior baseline investigations have conclusively shown that the frequency of physical activity stands as one of the most powerful predictors for mitigating psychological distress, actively alleviating severe symptoms of depression, and elevating self-esteem in adults (Čolović & Mitić, 2021). Furthermore, empirical validation has established that structured physical activity operates as one of the most optimal mechanisms for active fatigue elimination and serves as an effective behavioral pathway for overcoming midlife crisis symptoms (Čolović, et al., 2019). When individuals engage in regular physical recreation, they undergo a somatic and psychological transformation that directly boosts their resilience against work-related pressures. This baseline aligns with contemporary longitudinal data confirming that workplace physical exercise systematically buffers the daily cognitive and emotional drain caused by intense work-family conflict (Chawla et al., 2024). This is structurally reinforced by the fact that frequent physical activity directly facilitates an individual's satisfaction with their physical appearance and body image (Čolović & Mitić, 2022). In a corporate setting, improved physical self-appearance and heightened bodily satisfaction act as core pillars for personal branding, executive confidence, and interpersonal self-efficacy during high-stakes professional role execution.

Integrating these findings with international literature explains *why* recreation is uniquely capable of resolving work-family conflict. As demonstrated by Buehler and Fletcher (2020), physical exercise provides an immediate, non-work-related focal point that forces "psychological detachment." This psychological mechanism is empirically substantiated by the specific, multi-domain interaction variable captured in our empirical data: the conflict between work, family, and recreation subscale (integrated within the Role Quality Index). This specific sub-metric reveals that this triad of friction displays a highly significant positive correlation with the active Search for Meaning ($r=0.156$, $p<.05$). This statistical alignment provides definitive empirical proof for the primary hypothesis of this study. When corporate environments do not provide flexible, structured avenues for physical activity, the individual's leisure and recreational time is completely absorbed by the competing demands of professional duties and domestic chores. This systemic elimination of recreation leaves the employee completely trapped within a closed loop of continuous exhaustion, without any behavioral pathway for resource restoration. The resulting double-layered strain directly fuels existential anxiety, forcing the individual into an intense, unguided search for life purpose. Conversely, when enterprises actively sponsor and integrate corporate wellness strategies, they directly break this triad of conflict, providing employees with the dedicated space and time required to experience psychological detachment, reconstruct their cognitive resources, and ultimately protect their developmental well-being throughout the midlife transition.

A middle-aged executive engaging in structured sports or fitness training cannot simultaneously process workplace anxieties. This clear mental boundary prevents professional stress from spilling over into the domestic environment, thereby reducing work-family conflict.

Furthermore, regular somatic activation restores the energetic resources depleted by professional strain (Van Hooff & Geurts, 2014), directly addressing the occupational fatigue identified in our previous work (Čolović et al., 2019). Ultimately, maintaining physical vitality through corporate-sponsored recreation programs helps middle-aged workers protect their psychological well-being. This support enables them to maintain a stable sense of purpose and meaning throughout their adult developmental transitions (Delle Fave et al., 2018). In the evolving post-pandemic corporate ecosystem, worksite physical activity has transitioned from a supplementary benefit to a core strategic tool for human capital preservation, directly reducing absenteeism and reinforcing the subjective value and meaning employees derive from their professional roles (Andersen et al., 2023; García-Sánchez & López-Sánchez, 2025).

Conclusions

This study successfully addressed its primary aim by establishing the empirical baseline and relationships between work-family role conflict, professional stress, and the sense of meaning in life among middle-aged active employees in Serbia, while positioning physical recreation as a strategic Human Resource Management (HRM) intervention.

The investigation yields several definitive conclusions:

- Developmental Peak of Conflict: Work-Family Conflict is not uniform across adulthood but reaches its absolute empirical maximum during late midlife (ages 55–59). This identifies older senior staff as a high-risk corporate segment navigating simultaneous peak career and domestic pressures.
- Existential Destabilization: While professional stress can serve as a source of life meaning when successfully managed, severe work-family conflict acts as an existential destabilizer, actively driving employees into an intense search for meaning due to domain friction.
- Coping through Disengagement: Middle-aged employees facing high role burden utilize psychological detachment from the workplace as a defense mechanism against burnout, creating a significant corporate liability in terms of engagement and productivity.

Corporate Implications and Strategies: To mitigate these risks, Serbian enterprises must transition from passive employee care to active corporate wellness frameworks. Based on the empirical links established, organizations should implement the following strategic HRM interventions:

1. Targeted Physical Recreation Programs: Designing low-barrier, high-frequency physical initiatives specifically optimized for the vulnerable 55–59 age cohort to protect experienced managerial capital.
2. Flexible Recreational Windows: Providing corporate fitness memberships and structured stress-relief breaks during working hours to dismantle the conflict between work, family, and leisure time.
3. Promoting Psychological Detachment: Normalizing regular exercise as an institutionalized mechanism to ensure full cognitive disconnect from professional anxieties post-work, thereby reducing negative spillover into the family domain and enhancing long-term employee retention.

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Corresponding author: smarkovic@singidunum.ac.rs

BEYOND ECONOMIC AND MARKETING BENEFITS: GENERATION Z PERCEPTIONS OF THE WORLD ATHLETICS INDOOR CHAMPIONSHIPS

Slavko Alčaković[1], Srdjan Marković[1], Miloš Marković[2], Ivan Ćuk[2]

Abstract: *Sport mega-events can contribute to destination visibility and social engagement, but younger residents' perceptions of such events remain insufficiently explored. This study examined Generation Z university students' perceptions of the socio-cultural, direct economic, and tourism-related impacts of the World Athletics Indoor Championships Belgrade 2022, as well as their associations with excitement and support for event hosting. Data were collected during the championships through an online survey of 173 students from Belgrade and analyzed using descriptive statistics, Pearson correlations, and one-way ANOVA. Participants reported the most positive perceptions of tourism-related impacts, followed by socio-cultural impacts, while direct economic impacts received lower ratings. Tourism-related and socio-cultural perceptions were positively associated with excitement and support for hosting the event, whereas direct economic perceptions were not significantly associated with support. Female participants reported more positive socio-cultural and tourism-related perceptions than male participants. The findings suggest that, in this sample, international athletics events were evaluated primarily through tourism, symbolic, and social benefits rather than direct economic expectations.*

Keywords: resident perception; socio-cultural impact; tourism impact; event support; destination image

[1] Singidunum University, Belgrade, Serbia
[2] Faculty of Sport and Physical Education, University of Belgrade, Belgrade, Serbia

Introduction

Mega-events are large-scale international gatherings that receive significant media attention, substantial economic investment, and considerable social impact. Roche (2000) described them as "modern society's big shows," emphasizing their role in shaping the cultural, economic, and political landscapes of the host societies. Sports mega-events, in particular, have increasingly become vital tools for tourism development, destination marketing branding, urban transformation, and international visibility (Roche, 2000; Müller, 2015; Ludvigsen et al., 2022). In the Serbian and regional context, previous studies have also emphasized the importance of sport marketing, sponsorship, digital communication, and strategic planning of sport and tourist events for the development and promotion of sport-related services and destinations (Ratković, 2023; Milačić, 2024; Trkulja et al., 2025).

The success of mega-events is not evaluated solely on financial outcomes or media exposure. It also considers the perceptions and attitudes of local residents. Research indicates that residents' support is significantly influenced by their perceptions of the economic, social, and cultural effects of hosting a major sporting event (Kim et al., 2006; Zhou & Ap, 2009; Kaplanidou et al., 2013). Positive perceptions are generally linked to benefits such as tourism growth, infrastructure improvements, community pride, increased sports participation, and international recognition. In contrast, negative perceptions often relate to rising living costs, traffic congestion, overcrowding, and disruptions to daily life (Andereck et al., 2005; Preuss, 2007).

Within the existing literature, Social Exchange Theory (SET) has emerged as a prominent theoretical framework for understanding residents' support for mega-events. SET suggests that individuals evaluate events based on perceived benefits and costs, likely supporting initiatives that yield positive outcomes for their communities (Woosnam, 2012; Giango et al., 2022). In the context of sports mega-events, perceived economic opportunities, tourism development, and social benefits can positively influence attitudes towards hosting such events. Meanwhile, Social Representations Theory (SRT) examines how societies collectively construct meanings and symbolic interpretations around social phenomena, including mega-events (Moscovici, 2000). Thus, sporting events can contribute not only to economic expectations but also to shaping destination images, fostering national pride, and facilitating symbolic international recognition (Bodet & Lacassagne, 2012; Kenyon & Bodet, 2018).

Research on mega-events has consistently highlighted the socio-cultural and economic dimensions as crucial aspects of resident perceptions. Socio-cultural impacts include community pride, cultural exchange, enhanced social cohesion, and increased interest in sports participation, while economic impacts are generally linked to tourism growth, infrastructure investments, employment opportunities, and destination branding (Kim & Petrick, 2005; Prayag et al., 2013; Ribeiro et al., 2020). Among these aspects, perceptions related to tourism are particularly important, as residents often associate mega-events with heightened international visibility and a long-term appeal for their destinations.

Additionally, generational differences are becoming increasingly significant in sports consumption research. Generation Z, typically defined as individuals born between the mid-1990s and early 2010s, represents the first fully digital-native generation (Seemiller & Grace, 2019). Their patterns of media consumption, communication, and sports engagement differ markedly from those of previous generations. Existing studies suggest that Generation Z primarily consumes sports through digital and social media platforms, values short-form and interactive content, and places a greater emphasis on experiences and social engagement than on traditional forms of sports fandom (Katz et al., 2022). Despite their strong digital orientation, younger audiences still show interest in live sports events due to the social and experiential value these events provide.

Previous studies have examined resident perceptions of mega-events, particularly in contexts such as the Olympic Games and the FIFA World Cup, including the 2002 FIFA World Cup in South Korea, the Beijing 2008 Olympic Games, the Vancouver 2010 Olympic Games, the South Africa 2010 FIFA World Cup, and the Rio 2016 Olympic Games (Kim et al., 2006; Zhou & Ap, 2009; Kaplanidou & Karadakis, 2010; Kaplanidou et al., 2013; Ribeiro et al., 2020). However, significantly less attention has been paid to athletics events and to younger population groups. This gap is particularly relevant because younger audiences represent future consumers, participants, and supporters of international sporting events, and their support may be shaped not only by economic expectations but also by symbolic, experiential, and tourism-related perceptions.

The World Athletics Indoor Championships Belgrade 2022 represented one of the most visible international athletics events hosted in Serbia in recent years. As such, it provided an appropriate context for examining how Generation Z perceive the broader socio-cultural, direct economic, and tourism-related meanings of hosting an international sporting event in Southeast Europe.

Therefore, this study aims to explore Generation Z's perceptions of the socio-cultural, economic, and tourism-related impacts of the World Athletics Indoor Championships in Belgrade 2022 and to analyze how these perceptions relate to excitement and support for hosting the event. It was hypothesized that more positive perceptions of the event's socio-cultural, direct economic, and tourism-related impacts would be associated with higher excitement and stronger support for hosting the event.

Methods

This study focused on the World Athletics Indoor Championships held in Belgrade in 2022. It was an international athletics mega-event organized by World Athletics. The event featured 612 athletes from 129 countries and received extensive media coverage, with broadcasting rights extended to over 100 countries. This championship was one of the most significant international sporting events hosted in Serbia in recent years and provided a suitable context for examining perceptions of Generation Z regarding mega-event hosting.

A cross-sectional survey design was used to investigate perceptions of the socio-cultural, economic, and tourism-related impacts associated with the event. The study also explored excitement about the championships and support for hosting such events in Belgrade.

Participants

The study involved 173 Generation Z participants from Belgrade, Serbia (age: 21.36±1.58, range 19-25). These participants were university students recruited from various higher education institutions in the city using a convenience sampling method.

Participation in the study was voluntary and anonymous, with all participants providing informed consent before taking part. Before completing the survey, participants were informed about the purpose of the research and assured that their responses would be used exclusively for scientific purposes. The study adhered to the ethical principles outlined in the Declaration of Helsinki and was approved by the Ethics Committee of Singidunum University (Approval No. 705-1, dated May 25, 2026)

Data collection

Data were collected using an electronic questionnaire created with Google Forms. The questionnaire was distributed during the competition to university students in Belgrade.

It was adapted from the instrument developed by Al-Emadi et al. (2017) for research on residents' perceptions of the FIFA World Cup in Qatar. The original instrument developed by Al-Emadi et al. (2017) was previously used in research on residents' perceptions of the 2022 FIFA World Cup in Qatar and included dimensions related to perceived event impacts, excitement, and support for event hosting. In the present study, the questionnaire was contextually adapted to the World Athletics Indoor Championships Belgrade 2022, and internal consistency was assessed for all multi-item scales in the present sample. All items were measured using a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree").

The perceived socio-cultural impact was assessed through nine items that examined perceptions related to cultural exchange, national pride, community cohesion, sport development, and potential negative consequences of hosting the event. Composite scores were calculated as arithmetic means after reverse coding negatively worded items. The internal consistency of the scale was found to be acceptable, with a Cronbach's alpha of .74.

The economic impact was evaluated through nine items divided into two dimensions. The first dimension assessed perceptions of economic and business development, focusing on employment opportunities, infrastructure development, and business investment. The second dimension addressed tourism-related impacts, including destination image, international visibility, and tourism attractiveness. Composite scores for economic impact were calculated as arithmetic means of item responses, with reverse coding applied where necessary. Reliability coefficients indicated acceptable to good internal consistency for

economic impact (Cronbach's alpha of .77) and tourism-related impact (Cronbach's alpha of .85).

To evaluate excitement and support for the event, two single-item measures were used: 1. Excitement about the event, and 2. Support for hosting the championships in Belgrade. Both were measured on a five-point scale, ranging from 1 ("not excited at all" or "not supported at all") to 5 ("very excited" or "fully supported").

Statistical analysis

Data analysis was conducted using IBM SPSS Statistics 27. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to summarize the demographic characteristics and the primary study variables.

The internal consistency of multi-item scales was assessed using Cronbach's alpha coefficients. Pearson correlation analysis was used to explore the relationships between perceived socio-cultural, economic, and tourism-related impacts and the dependent variables of excitement and event support. Additionally, one-way analysis of variance (ANOVA) was employed to analyze differences in perceptions based on gender and levels of excitement. A statistical significance level of $p < .05$ was established.

Results

The final sample consisted of 173 Generation Z participants residing in Belgrade, Serbia. Detailed demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic characteristics of participants.

Variable	Category	n	%
Gender	Male	52	30.1
	Female	121	69.9
Study field	Economics	89	51.4
	Tourism & hospitality	38	22.0
	Sports-related studies	20	11.6
	Other	26	15.0
Sport participation	Active	71	41.0
	Non-active	102	59.0

Note: F - number of respondents; **%** - percentage of the total sample.

Participants reported moderately positive perceptions of the socio-cultural impact of the World Athletics Indoor Championships Belgrade 2022 (M = 3.62; Table 2). Tourism-related impact received the highest rating (M = 4.13), whereas direct economic impact was evaluated less positively (M = 2.87). Participants also reported moderate excitement about the event (*M* = 3.23) but very high support for hosting it (*M* = 4.71).

Table 2. Descriptive statistics of examined variables.

Variable	M	SD
Socio-cultural impact	3.62	0.68
Direct economic impact	2.87	0.87
Tourism impact	4.13	0.73
Excitement	3.23	1.11
Event support	4.71	0.65

Pearson correlation analysis revealed significant positive relationships among socio-cultural impact, tourism impact, excitement, and support for event hosting (Table 3). Specifically, socio-cultural impact was positively associated with excitement ($r = .44$, $p < .001$) and with support for hosting events ($r = .20$, $p < .01$). Additionally, tourism-related impact exhibited significant positive relationships with excitement ($r = .38$, $p < .001$) and support for event hosting ($r = .37$, $p < .001$). In contrast, perceptions of direct economic impact were not significantly related to support for hosting the event ($r = .06$, $p > .05$).

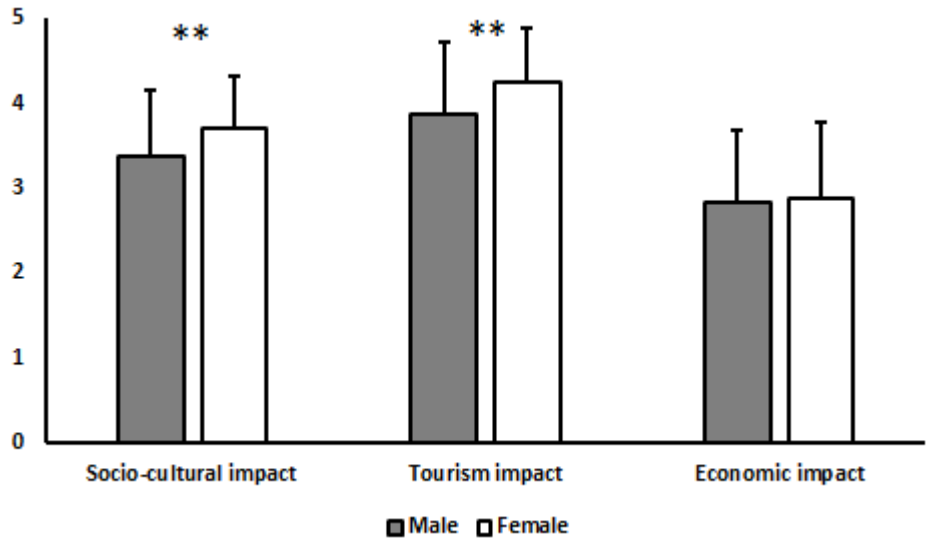
Table 3. Correlations among variables.

Variable	Socio-cultural impact	Economic impact	Tourism impact	Excitement	Event support
Socio-cultural impact	—				
Economic impact	.536**	—			
Tourism impact	.572**	.391**	—		
Excitement	.437**	.284**	.381**	—	
Event support	.203**	.058	.371**	.224**	—

Note: Pearson correlation coefficients are presented. **p < .01.

A one-way ANOVA revealed significant gender differences in socio-cultural impact ($F = 9.14$, $p = .003$) and tourism-related impact ($F = 9.61$, $p = .002$). Female participants reported more positive evaluations than male participants in both dimensions (Figure 1).

Figure 1. Perceived socio-cultural, tourism-related, and direct economic impacts by gender.



Note: Columns represent mean values; error bars represent standard deviations. ** $p < .01$ for gender differences.

Significant differences in perceived impacts were also observed across levels of excitement, including socio-cultural impact ($F = 10.41$, $p < .001$), economic impact ($F = 3.82$, $p = .005$), and tourism-related impact ($F = 7.41$, $p < .001$).

Discussion

The aim of this study was to examine Generation Z perceptions of the socio-cultural, economic, and tourism-related impacts of the World Athletics Indoor Championships Belgrade 2022 and to analyze how these perceptions relate to excitement and support for event hosting. The findings indicate that Generation Z generally perceived the event positively, particularly regarding tourism promotion and socio-cultural benefits, while perceptions of direct economic impact were considerably less positive.

One of the main findings of the study is that tourism-related impacts received the highest evaluations among all measured dimensions. Respondents strongly associated the event with international visibility, destination promotion, and improvement of Serbia's image abroad. These findings are consistent with previous research suggesting that residents often perceive mega-events as important instruments for destination branding and tourism development (Kim & Petrick, 2005; Kaplanidou & Karadakis, 2010). In the context of Social Representations Theory, such perceptions may reflect the symbolic value of hosting an international sporting event, where the event functions not only as a sports competition but also as a mechanism for international recognition and image construction.

In contrast, perceptions of direct economic impact were notably lower. Respondents appeared more skeptical regarding employment opportunities, infrastructure development, and broader economic benefits associated with the championships. Furthermore, economic

impact was not significantly related to support for event hosting. This finding is particularly important because it suggests that Generation Z may evaluate mega-events less through traditional economic expectations and more through experiential, symbolic, and social dimensions. Such findings partially support the assumptions of Social Exchange Theory, but also indicate that perceived intangible benefits may be more influential than material outcomes among younger populations.

Socio-cultural perceptions also played an important role in shaping attitudes toward the event. Positive associations were identified between socio-cultural impact, excitement, and support for hosting. Respondents perceived the event as beneficial for national pride, social atmosphere, cultural exchange, and promotion of sports participation. Similar findings have been reported in previous mega-event studies, where community pride and social cohesion were identified as important predictors of resident support (Kim et al., 2006; Zhou & Ap, 2009; Ribeiro et al., 2020). The present findings further suggest that younger generations may particularly value the emotional and social experience surrounding sports mega-events.

Another important finding relates to excitement as a psychological factor associated with event perceptions. Significant differences in perceived impacts were observed across levels of excitement in all three measured dimensions. This finding indicates that emotional engagement is associated with how participants evaluated the event. Previous studies on Generation Z have emphasized that younger audiences value experiences, social interaction, and emotionally engaging content more strongly than previous generations (Katz et al., 2022). The current results appear to support these observations within the context of athletics mega-events.

The study also identified gender differences in socio-cultural and tourism-related perceptions, with female respondents reporting more positive evaluations than males. These differences were statistically significant for socio-cultural impact ($F = 9.14$, $p = .003$) and tourism-related impact ($F = 9.61$, $p = .002$), as shown in Figure 1. Although previous research on gender differences in mega-event perception remains inconsistent, some studies have similarly reported stronger emotional and symbolic engagement among female respondents, particularly regarding social and community-related dimensions of sports events. However, these findings should be interpreted cautiously due to the gender imbalance within the sample.

From a practical perspective, the findings suggest that organizers of athletics mega-events should place greater emphasis on experiential, social, and destination-related aspects when targeting Generation Z audiences. Traditional narratives focused exclusively on economic benefits may be less effective for younger populations. Instead, communication strategies emphasizing community atmosphere, international visibility, social interaction, and unique live-event experiences may contribute more strongly to engagement and event support.

Several limitations of the study should be acknowledged. First, the study relied on a convenience sample of university students from Belgrade, which limits the generalizability of the findings to the broader Generation Z population. Second, the dependent variables related

to excitement and support were measured using single-item indicators. Single-item indicators were used due to the exploratory nature of the study and to reduce participant burden. Third, the study focused on a single athletics mega-event within a specific socio-cultural context, which may limit transferability to other countries or event types. Future research should include larger and more diverse samples, longitudinal approaches, and comparative analyses across different mega-events and cultural settings.

Overall, the findings contribute to the growing literature on sports mega-events and Generation Z by demonstrating that younger populations may evaluate athletics mega-events primarily through tourism, symbolic, and socio-cultural dimensions rather than through direct economic expectations.

Conclusion

This study examined Generation Z perceptions of the World Athletics Indoor Championships Belgrade 2022 and found that respondents viewed the event positively, particularly regarding tourism promotion, destination image, and socio-cultural benefits, while direct economic benefits were perceived less positively. Tourism-related perceptions and emotional engagement were significantly associated with support for event hosting, suggesting that Generation Z evaluates athletics events primarily through symbolic, experiential, and social dimensions. Despite methodological limitations, the findings contribute to the limited literature on younger audiences and sports events in Southeast Europe and provide a basis for future research on Generation Z and perceptions of mega-events.

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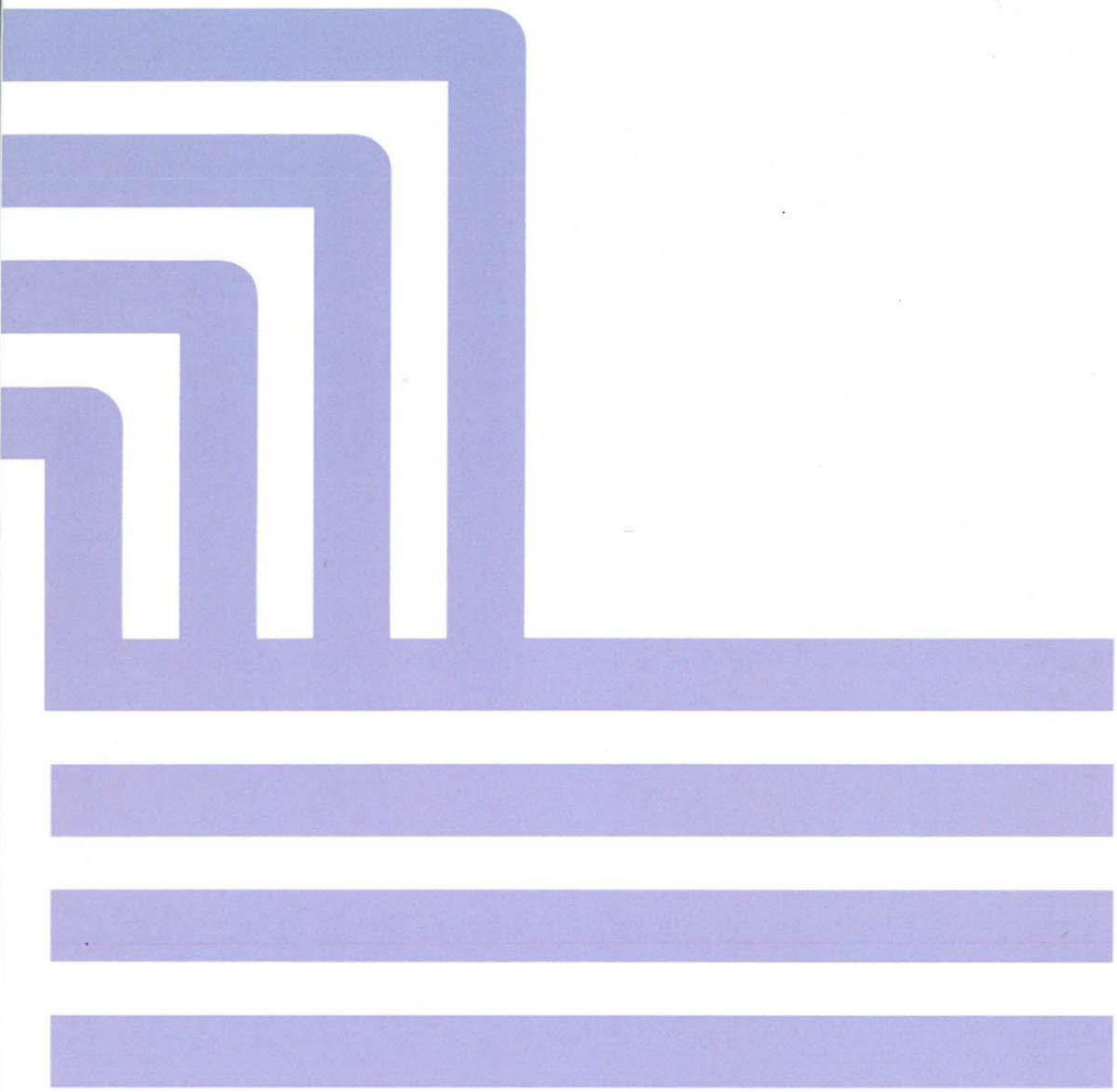
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UNIVERZITET „UNION NIKOLA TESLA"
FAKULTET ZA SPORT
BEOGRAD

Fakultet za sport, Narodnih heroja 30/1, 11070 Novi Beograd, Republika Srbija
T: +381 11 404 40 50 , +381 11 404 40 60; F: +381 11 404 40 65; E: info@fzs.edu.rs

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