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Original Article

Interrelationship between juniors' intrinsic and extrinsic motivation and self-efficacy parameters

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Abstract:
The aim of this study was to identify and substantiate the psychological correlations between junior athletes' intrinsic, extrinsic positive, and extrinsic negative motivations, and their self-efficacy during the stage of their professional development. **Methods:** The sample consisted of junior athletes aged 15–19 years, with equal representation from individual sports (n = 64) and team sports (n = 64). Gender parity was also maintained, with 64 males and 64 females included in the study. The descriptive characteristics of the junior athlete sample (n = 128) are as follows: mean (M = 16.97), median (Me = 17.00), and standard deviation (SD = ±3.32). **Results.** Five direct correlations and one inverse correlation of motivation parameters with self-efficacy and self-control were recorded ($p \leq .050$; $p \leq .010$). It was emphasized that the strongest correlations graphically comprised the "psychological triangle of sports results": intrinsic motivation with self-efficacy in subject activity and the general scale of internality; self-efficacy in subject activity with the general scale of internality. It was found that the superiority of intrinsic motivation on the general scale of internality and self-efficacy in sports activities confirms its crucial role in achieving competition results. **Discussion and conclusions.** It was substantiated that intrinsic motivation in juniors' sporting activities aims at achieving sports results for the sake of sports activities, in contrast to extrinsic motivation, which is based on incentives to be active due to external circumstances. It was noted that general internality is a universal dimension that can both encourage junior athletes and hinder them from achieving the desired result. It was proved that the optimal level of motivation, which is accompanied by sufficient self-control, does not allow a competitive situation to go beyond manageable boundaries and can ensure the highest self-efficacy of junior athletes. The empirical findings are of interest to all subjects in junior sports.
Key words: competitiveness, self-regulation, self-realization, mental health, psychological health, academic and professional activity, adolescence.

Introduction

Developing motivation for physical activities and sports has been a significant psychological and pedagogical problem over the past decade. Social cataclysms, the COVID-19 pandemic, and military conflicts have caused radical changes in the spatial and temporal organization of sports activities (Popovych et al., 2021a). In their research, A. Hudimova et al. (2021) recorded a correlation between excessive use of social media and athletes' physical activeness. It was substantiated that the time spent by junior athletes on social media allowed them to distract themselves from everyday routine training and displace negative thoughts, which the researchers consider to be a particular coping strategy. Moreover, it was established that "addiction" to social media, due to uncontrolled use of the Internet, reduces physical activeness, causes sleep disorders, and exacerbates depression. Undoubtedly, the lockdown has created conditions for excessive use of social media, which has negatively affected physical activeness, caused severe damage to sports, and impacted the mental health of sports participants (Popovych et al., 2023d). According to researchers I. Popovych et al. (2022f), junior athletes are required to develop a sufficient level of self-control, stress resistance, and resilience, which will allow forming relevant mental psycho-complexes of athletes who will be competitive in their sports. It was empirically studied and substantiated that the changed conditions of professional activity altered the architecture of dominant mental states as a result of societal transformations (Popovych et al., 2023a), increased subjects' anxiety (Kalamazh et al., 2023), and led to a revaluation of value orientations (Halian et al., 2024). Junior athletes who are at the stage of their professional growth and development take significant steps into the world of sports without having made

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a final decision to devote themselves to sports activities, coaching, or remaining an amateur. The sphere of value orientations of athletes aged 15 to 19 is unstable and undergoes constant changes. Sometimes, its amplitude can manifest the extreme points (Koval et al., 2024). The specificity of adolescents' new mental formations makes the representatives of this age period unpredictable for their opponents and partly for themselves and their coaches. This can lead to unexpectedly high results in competitive activities or unexpectedly low competition results (Popovych & Blynova, 2019a; 2019b), fatal failures, fatigue, and injuries (Shcherbak et al., 2023). Developing psycho-emotional stability and self-control, which are junior athletes' essential competencies, gives them a competitive advantage over their opponents. Psycho-emotional support (Chebykin et al., 2024; Plokhikh et al., 2024) and the coach's assistance (Zeng et al., 2024) become significant factors on the way to self-efficacy (Popovych et al., 2020a) and ensure a desired sports result (Popovych et al., 2022d).

External circumstances and internal needs motivate athletes to act. This complex is commonly referred to by scientists as extrinsic and intrinsic motivation (Rean et al., 2006). Notably, intrinsic motivation allows a junior athlete to experience more satisfaction from learning and training, competitive, and even restorative activities than extrinsic positive or negative motivation. The source of intrinsic motivation includes an individual's values, interests, and beliefs, which allows them to be more independent and creative. External pressure, which can have a positive effect through material incentives, comfortable conditions, and social comparison (Raievska et al., 2024; Zavatska et al., 2024), and a negative effect, which manifests through blind imitation of others (Popovych et al., 2021b), does not have such a powerful internal resource. At the same time, it is difficult for external factors to achieve something similar to internal incentives. Intrinsic motivation leads to more active involvement in the task, considerable productivity, and a longer duration. According to our observation experience and several empirical studies, many athletes lack attention (Popovych et al., 2023b), self-control (Shooli et al., 2024), regulatory capacity (Prokhorenko et al., 2023), and temporal competence to achieve a sufficiently high level of intrinsic motivation (Popovych et al., 2022a; 2022b). Researchers Y. Krasmik et al. (2024) focused on motivational determinants of athletes' professional self-realization and established a general low level in the samples of masters of sports, international masters of sports, and Paralympic athletes, which testifies to poor research into the problem and the athletes' low psychological culture. Studies in sports psychology can give sports subjects a competitive advantage over their opponents.

The research into interrelationships between junior athletes' intrinsic and extrinsic motivation and self-efficacy parameters is a theoretical-empirical study on the psychological correlations of the current level of respondents' sports incentives, which prevail in the context of achieving a competition result. The fact that internal incentives for juniors' sporting activities aim at a result for the sake of sports activities, in contrast to external incentives, which are based on motivation to be active due to external circumstances, seems to be contradictory. Though the respondents' dominant intrinsic motivation implies high self-efficacy in the context of sports activities, it is still hypothetical and requires verification. Moreover, high levels of the individual's intrinsic motivation do not always ensure winning outcomes. This is confirmed by the Yerkes-Dodson law (Yerkes & Dodson, 1908) which states that optimal motivation is required to achieve the highest sports results. Accordingly, a very high level of the desire for sports success can easily worsen the result and cause fatal consequences. It is obvious that excessively high levels of junior athletes' motivation will take up additional mental resources, which can lead to uncertain individual or team actions, which will manifest themselves at critical distances of a competition. Accordingly, the optimal level of motivation, which will be accompanied by sufficient self-control, will not allow a competitive situation to go beyond manageable boundaries and can ensure the highest self-efficacy of junior athletes.

Hypothesis. We hypothesize that: 1) the formation of respondents' intrinsic motivation, extrinsic positive and negative motivation will have significant direct and inverse correlations with self-efficacy parameters; 2) a high level of intrinsic motivation parameters will have no significant differences in the context of junior athletes' self-efficacy; 3) a high level of the parameters of extrinsic positive and extrinsic negative motivation will have significant differences in the research sample.

The aim is to establish and substantiate psychological correlations of junior athletes' intrinsic, extrinsic positive and extrinsic negative motivation with self-efficacy at the stage of professional development.

Methods

Methodology. The theoretical-empirical research into the interrelationship between juniors' intrinsic and extrinsic motivation and self-efficacy parameters is based on the tenets of the concept of personal self-regulation (Boryshevsky, 2012) and positioning a junior athlete as a subject of active self-development in the studies by S. Kuzikova (2017) and A. Rean et al. (2006). Junior athletes' self-regulation in sports activities is a complex structural and functional formation that combines several essential aspects, such as setting a goal, searching for methods to achieve it; comparing their abilities with the goal's requirements; analyzing the course of competitive, training, and restorative situation and forecasting – creating a model of the expected course of events (Boryshevsky, 2012). Creating a model of the expected course of events, which legitimately includes sports combinations on the competition ground, a change in the tactics of the match, offensive and defensive actions, and others, is a process and result of the coherent work of functions and mechanisms of sports subjects'

social expectations (Popovych et al., 2020b; 2023c). According to the concept of self-regulation by M. Boryshevsky (2012), social-psychological expectations or expected evaluation are considered a mechanism of behavioral self-regulation. Our research regards junior athletes' social-psychological expectations as one of such mechanisms that directs their conscious activity towards disclosing their internal reserves and aligns them with the conditions of learning, training, and competitive environments. The work of this mechanism aims to achieve a significant result successfully. The dual combination of intrinsic and extrinsic motivations constitutes a central complex of contradictions, which are regarded as a condition for development. Athletes' behavioral self-regulation can be traced in every component of their expectations. Our research considers modern empirical studies on athletes' motivation (Benjaminse et al., 2024; Lundqvist et al., 2024; Takamatsu & Kawata, 2024), psychophysiological patterns in sports activities (Cretu et al., 2021; Ferraz et al., 2011), the anticipation complex of the individual's activity (Hrys et al., 2024; Popovych et al., 2022e; 2022g; 2022h), modern innovative research in other human activities (Nosov et al., 2020; Tymofiieva et al., 2022; Zinchenko et al., 2021; 2023).

Organization of Research. Between May and October 2024, the empirical cross-sectional study and initial processing of the empirical materials were carried out. The questionnaires, which were prepared in advance in Google Forms, were filled out by the respondents remotely. The algorithm and design of a confirmative research strategy with the elements of comparison of the main variables were developed. The respondents were informed in advance about the research aim and the time allocated to complete the questionnaires. Their participation was voluntary, which ensured that the answers to the questionnaires were reliable and complete. The research was part of the initiative research topics of the researchers' departments and laboratories.

Participants. The sample consisted of junior athletes aged 15 to 19. Junior athletes represented sports schools for children and youth, as well as academies of football and handball professional clubs. The participants were equally represented in individual sports (n = 64) and team sports (n = 64). The sample population was also represented by equal subsamples in terms of gender: males (n = 64) and females (n = 64). The descriptive characteristics of the sample of junior athletes are as follows (n = 128).

Procedures and instruments. To diagnose the variables “intrinsic motivation”, “extrinsic positive motivation”, and “extrinsic negative motivation”, the questionnaire “Motivation for Professional Activity” (MPA) (Rean et al., 2006) was used. The methodology allowed us to examine professional motivation as an optimal motivation complex of a junior athlete in the dimensions of the relevant activity, namely learning and training activity. This complex combined extrinsic and intrinsic motives for activity on three scales: intrinsic motivation (IM), extrinsic positive motivation (EPM), and extrinsic negative motivation (ENM). The respondents answered seven statements. A high level of empirical data homogeneity was recorded for the methodology “MPA” (Rean et al., 2006) using Cronbach's alpha (.965). To diagnose the variables “self-efficacy in subject activity” and “self-efficacy in interpersonal communication”, the psychodiagnostic tool “The Self-Efficacy Scale” (SES) (Sherer et al., 1982) was used. The dual factor structure relevantly reflected the phenomenon of junior athletes' self-efficacy. It represented a combination of the dimensions of self-efficacy in subject activity (SESA) and self-efficacy in interpersonal communication (SEIC). A high level of empirical data homogeneity was recorded for the methodology “SES” (Sherer et al., 1982) using Cronbach's alpha (.932). The overall level of self-control in sports activities is an additional variable, which is important in the dimensions of a junior athlete's self-regulation. It was determined using the valid and reliable questionnaire “Level of Subjective Control” (LSC) (Rotter, 1966). The general scale of internality (GSI) allowed us to record this dimension.

Statistical analysis. The confirmative cross-section of empirical data was processed by using “MS Excel”. Next, an empirical matrix was created, and the computer application “SPSS”, version 29.01.00.01, was used to perform several statistical operations: the main descriptive characteristics were identified; Cronbach's alpha (α) was used to determine empirical data homogeneity; the Kolmogorov-Smirnov test (λ) was used to examine data for a normal distribution; Spearman's correlation coefficient (r_s) was used to establish psychological correlations; the Mann-Whitney U-test (U) was applied to identify significant differences in the research variables.

Results

The main descriptive characteristics were determined to ensure replication of the empirical research. According to the research design, they included the mean (M), the median (Me), and the standard deviation (SD). Tabl. 1 shows the descriptive characteristics of all research variables according to the following psychodiagnostic tools.

Table 1. Descriptive frequency characteristics of the research variables (n = 128)

Scale	M	Me	SD
IM	4.39	4.50	±1.14
EPM	2.67	3.00	±.98
ENM	3.59	3.50	±1.03
SESA	39.04	39.00	±6.82
SEIC	5.67	5.75	±1.15
GSI	107.24	106.50	±15.04

Note: M – the mean; Me – the median; SD – the standard deviation.

Notably, rather high values of the parameters of intrinsic motivation (M = 4.39; SD = ±1.14) and extrinsic positive motivation (M = 2.67; SD = ±.98) were recorded. At the same time, we had slightly higher values of the parameters of extrinsic negative motivation (M = 3.59; SD = ±1.03). These levels of extrinsic and intrinsic motives in the context of learning and training activity can testify to high variability and considerable depth of junior athletes' motives and needs. The self-efficacy parameters – SESA (M = 39.04; SD = ±6.82) and SEIC (M = 5.67; SD = ±1.15) – do not have significant differences from the average values of normative indicators, recorded in sports studies on similar junior samples (Halian et al., 2023a; 2023b). The positive trend of self-control measurements on the GSI (M = 107.24; SD = ±15.04) is quite encouraging.

The empirical data were tested for a normal distribution using the Kolmogorov-Smirnov statistical parameter (λ), which allowed us to find that a considerable portion of variables correspond to a normal distribution, but not all of them. Since a normal distribution was not recorded for all the parameters, non-parametric statistical criteria were legitimately used in further calculations. Psychological correlations between motivation and self-efficacy parameters were established using Spearman's correlation coefficient (r_s). Tabl. 2 shows the matrix of correlations.

Table 2. Matrix of correlations between motivation and self-efficacy parameters (n = 128)

Scale	IM	EPM	ENM
SESA	**.345****	**.203***	**-.217***
SEIC	.165	**. 196***	.143
GSI	**.368****	.166	-.123

Note: * – p ≤ .050; ** – p ≤ .010.

Psychological correlations between the GSI and the research parameters were established by using Spearman's correlation coefficient (r_s). Tabl. 3 shows the matrix of correlations.

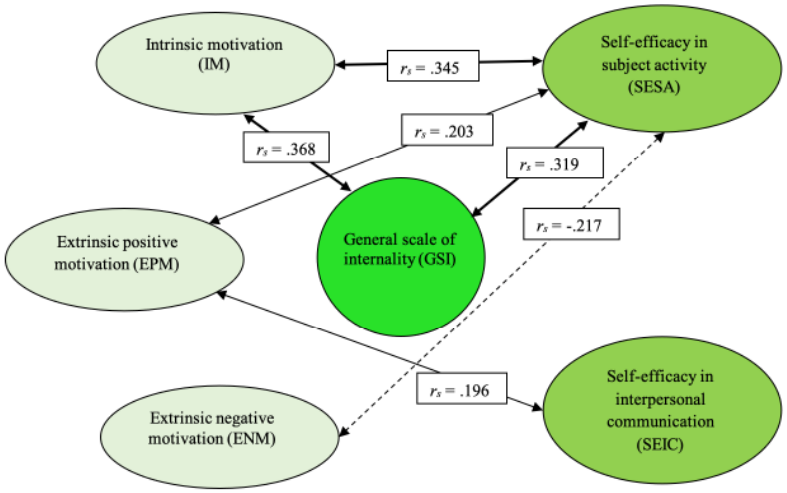
Table 3. Matrix of correlations between the general scale of internality and the research parameters (n = 128)

Scale	General scale of internality (GSI)
IM	**.368****
EPM	166
ENM	-.123
SESA	**.319****
SEIC	.154

Note: * – p ≤ .050; ** – p ≤ .010.

Fig. I illustrates a correlation pleiade that unites the psychological correlations (see Tabl. 2 and Tabl. 3) of the parameters of junior athletes' intrinsic, EPM and ENM, GSI and SESA, SEIC.

Six significant correlations were established, five of them being direct and one being inverse. The strongest correlations (p ≤ .010) were recorded between IM and SESA (r_s = .345) and the GSI (r_s = .368); between SESA and the GSI (r_s = .319). There was only one inverse correlation between ENM and SESA (r_s = -.217). It was found that the SESA parameter has all (four) significant statistical correlations, unlike the other self-efficacy parameter – SEIC. The SEIC parameter has only one significant correlation with EPM. The correlation pleiade (see Fig. I) shows junior athletes' high focus on the competition result and higher value of efficacy in subject activity compared to interpersonal communication.



Note: - - - - - - negative correlations with p ≤ .050; ——— positive correlations with p ≤ .050; ——— positive correlations with p ≤ .010.

Figure I. Correlation pleiade of junior athletes' parameters (n = 128)

The non-parametrical Mann-Whitney U-test (*U*) was used to find significant differences between two independent groups. According to the research hypothesis, comparing high and low levels of the parameters of intrinsic and extrinsic motivation was of scientific interest. Group 1 consisted of respondents with low motivation values, and Group 2 comprised respondents with high motivation values. The division into groups was performed by the Me (see Tabl. 1). Tabl. 4 shows the comparison results.

Table 4. Comparison of the research parameters by motivation levels in Group 1 and Group 2

Compared parameters	CM-W	Research parameters		
		GSI	SESA	SEIC
IM	*U*	**1045.500****	**1125.000****	
	p	<.001	<.001	
EPM	*U*			
	p			
ENM	*U*		. **1712.000***	
	p		.041	

Note: CM-W – coefficients of the Mann-Whitney U-test; U – the value of the Mann-Whitney parameter; p – the level of significance by the Mann-Whitney U-test; * – the level of significance at $p \leq .050$ and ** – the level of significance at $p \leq .010$, the data is given **in bold type**.

Significant superiorities were identified in three comparisons. Group 2, with a high level of IM, has a significant superiority in the parameters GIS (U = 1045.500; p <.001) and SESA (U = 1125.000; p <.001). No superiority was recorded in Group 1 and Group 2 in the levels of extrinsic positive motivation. The only superiority of Group 1, with a low level of ENM, was identified in the parameter SESA (U = 1712.000; p = .041). Two significant superiorities recorded for the SESA parameter confirm that this parameter is the most dependent in the context of our research.

Discussion

In the scientific literature on the psychology and pedagogy of sports activities, there are numerous studies examining athletes' motivation (Karpenko et al., 2024) and physical activity (Tóth et al., 2024). A significant number of researchers consider operationalization of essential components of competitive activity (Blynova et al., 2022b; Peris-Delcampo et al., 2024; Popovych et al., 2023e), demonstrate algorithms of effective solutions in learning and training activity, and offer innovative tested programs (Blynova et al., 2022a; Galan et al., 2020; Yaremchuk et al., 2924). Intrinsic and extrinsic motivation in the context of professional activity is also not new. Our focus on establishing psychological correlations and comparing the levels of these motivation dimensions with self-efficacy, introducing an additional variable – the general scale of internality, has proved to be relevant. General internality is a universal dimension that can both encourage junior athletes and hinder them from achieving the desired result. The development of volitional self-regulation and the desire to be efficient and successful in relevant activities prompted us to pay attention to internality as an important trait at the stage of the junior athlete's personality development. Internality is connected with intrinsic motivation. It outlines the contour of internal control, which manifests in the desire to take responsibility for everything that happens to the individual. Constant internalized intentions activate the corresponding mental states. It is the duration of mental states that makes them dominant (Kurova et al., 2023; Popovych et al., 2022c).

Let us analyze the psychological correlations established in our research (see Tabl. 2 and Tabl. 3). The strongest correlations (see Fig. I) graphically comprised the “psychological triangle of sports results”, the primary function of which consists in the fact that the direct correlation of IM with SESA and SC, under conditions of constructive influence, can have an effect in all sports activities: learning and training, competitive, and restorative. Proper use and consideration of the established correlation can become a latent resource for junior athletes at the stage of their professional growth and development. We cannot recommend and extrapolate the obtained results to other age categories of athletes, as the age-related and psychophysiological aspects of adolescence are essential for the significance of this correlation (Tavrovetska et al., 2023). Verification is needed for other age samples. SESA, which is the basis for juniors' learning and training activity, is the most dependent and loaded dimension. This parameter is too sensitive and dependent on self-esteem, self-concept, and self-image (Duisenbayeva et al., 2024). Social comparison for many junior athletes is a sufficiently important driver determining the content and nature of relationships (Raievska et al., 2024). The inverse correlation between ENM and SESA confirms that even if negative emotions, destructive aggression, and hatred of the opponent result in success, this success will be local or accidental. It is evident that the desire for revenge has to be primarily based on focusing on one's strengths in tactical and physical preparation, rather than on the emotional image of revenge, which is accompanied by the desire to win at all costs. Such aspirations make it difficult to control the emotional component, which results in defeat or trauma. The strongest and most effective correlation is based on high internal intentions, which reflect self-control and significant intrinsic motives for activity. A different situation can be observed in a derby between eternal opponents or in a game of a mid-table team or outsider with a leader. Constructive motivation and the desire to demonstrate strengths against the stronger usually dominate. In such cases, the predominance of intrinsic motivation can contribute to a positive,

unexpectedly high, result of an individual performance or team match. Accordingly, underestimating the competitor can result in excessive difficulties, defeat, or loss of points. Intrinsic motivation allows an athlete to experience a strong internal need to achieve a desired sports result since it stems from personal needs. Intrinsic motivation is more difficult to form as it depends on internal regulators, value orientations, and meanings. When studying the role and positive effect of intrinsic motivation in the interaction between the coach and the athlete, researchers S. Takamatsu and Y. Kawata (2024) found that the constructive work of the coach and the athlete affects the athlete's intrinsic motivation and competitive performance. At the same time, it is worth remembering that intrinsic motivation is less stable and more dependent on the mood swings and emotional fluctuations of adolescents. Maintaining intrinsic motivation at a proper level is quite labor-intensive. The continuous predominance of extrinsic positive motivation over intrinsic motivation increases stress and worsens mental health. The constant race for external incentives exerts excessive pressure and exhausts a junior athlete.

Comparing the levels of motivation parameters allowed us to state that intrinsic motivation has superiorities on the general scale of internality and self-efficacy in subject activity. This confirmed our hypothetical explanations about its key role in the competition process.

The research aim was achieved, the first hypothesis was confirmed, the second hypothesis was disproved, and the third hypothesis was confirmed. The formation of junior athletes' intrinsic motivation and extrinsic positive and negative motivation has significant direct and inverse correlations with self-efficacy parameters. The second hypothesis was disproved since high levels of intrinsic motivation parameters have significant differences in the parameter of self-efficacy in subject activity. It was proved that a low level of the parameter of extrinsic negative motivation has a significant superiority in self-efficacy of subject activity. The research findings are of scientific interest and can be implemented in the learning and training process at sports schools for children and youth and academies of professional clubs.

Conclusions

It was substantiated that intrinsic motives for juniors' sporting activities aim at the results for the sake of sporting activities, in contrast to extrinsic motives, which are based on the incentive to be active due to external circumstances. It was noted that general internality is a universal dimension that can both encourage junior athletes and hinder them from achieving the desired result. It was explained that internality is connected with intrinsic motivation. It outlines the contour of internal control, which manifests in the young individual's desire to take responsibility for everything that happens to them. It was proved that the optimal level of motivation, which is accompanied by sufficient self-control, does not allow a competitive situation to go beyond manageable boundaries and can ensure the highest self-efficacy of junior athletes. It was established that the strongest correlations graphically comprise the “psychological triangle of sports results” ($p \leq .010$): intrinsic motivation with SESA and the general scale of internality; SESA with the general scale of internality. It was explained that the direct correlation of intrinsic motivation with SESA and SC, under conditions of constructive influence, can have an effect in all areas sports activities: learning and training, competitive, and restorative. It was underscored that proper use and consideration of this correlation can become a latent resource at the stage of a junior athlete's personal growth and development. It was established that the superiority of intrinsic motivation on the general scale of internality and SESA confirms its crucial role in achieving the competition result. The obtained empirical results are of scientific interest to all subjects in junior sports.

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