Original research article

SELF-CONCEPT AS THE DETERMINANT OF PHYSICAL ACTIVITY OF PREADOLESCENTS IN PHYSICAL EDUCATION CLASSES

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Miroljub Ivanović[1], Srđan Milosavljević[2], Uglješa Ivanović[3]

[1]College of Vocational Studies for Teachers and Professional Computer Scientists - Sirmium, Sremska Mitrovica, Serbia
[2]Faculty of Physical Education and Sports Management, Singidunum University, Belgrade, Serbia
[3]Telekom Srbija, Belgrade, Serbia

Abstract. *The aim of this research was twofold: a) the examination of the relations between the construct of self-concept (sport competence and physical self) and the criterion (volume of physical activity and intensity of physical activity) in physical education classes for preadolescents and b) the examination of the contribution of the variables of self-concept to the predictions of the variance criterion, thus the partial influence of predictor variables in the prediction of physical activities of students in late childhood. The following instruments were used on the relevant sample of participants from Valjevo (N=212) whose average age was 12.5 years: self-perception of the self-concept questionnaire (SPPC), pedometer (CoachGear) and heart rate monitor (Suunto memory belt) for measuring the volume and intensity of the physical activity. The results of the regression equation indicated that the independent variable Sport Competence explained the variance in the Volume of physical activity and the Intensity of physical activity variables with preadolescents (β=.32, β=.30) in a statistically significant manner, while the variable Physical self was not a statistically significant partial predictor of any of the criteria. The obtained empirical findings are in accordance with the results of the previous studies.*

Key words: *Students, Sport competence, Predictors, Volume of physical activity, Intensity of physical activity.*

INTRODUCTION

Since the second decade of the XXI century, self-concept has been becoming relevant research subject of psychologists, especially within original publications in English-speaking countries. Current terms of self-concept, self-image, self-consciousness, self-awareness are usually used in the latest professional literature as synonyms, therefore today there is no single definition of the conceptualization and measuring of this construct.

Self-concept or self-awareness implies self-consciousness, knowledge of self, self-identity, ego, self-functions, as Zanden and associates (2017) state in their study, that is to say, it describes the awareness of oneself as the whole of emotions, perceptions and predictions of an individual as a participant interacting with the physical and social environment, which is stated in the study by Coelho, Marchante and Sousa (2016). Therefore, self-concept is the perception of oneself and it refers to what one considers existing and real within oneself. A favorable image of one's own body is perceived as the positive result in sport psychology or as an indirect variable which enables bringing physical movement – exercise for the purpose of a favorable health condition during preadolescence, when the peer connections are gaining in importance and when the process of individualization begins, when one achieves personal autonomy.

The term self-concept implies self-evaluation based on personal experiences and evaluation from other individuals, as it is stated by Vítor-Alexandre and Ana-Maria (2017), or all of the self-evaluation, emotions and predictions of an individual as an empirical object (Coelho et al., 2016), while Ramos-Díaz, Rodríguez-Fernández, Fernández-Zabala, Revuelta and Zuazagoitia (2016) regard the term self-concept as the envisaged plan of experiences which an individual has of oneself. The day-to-day positive self-concept is not purely the suitable result of an individual, but it also implies a relevant construct in the realization of other suitable results such as academic achievements (Veiga, García, Reeve, Wentzel & García, 2015), while Wong, Burkley, Bell, Wang and Klann (2017) claim that self-concept includes the ranking framework where the self-concept dominates, while two types are below it: a heavily studied self-concept and non-highly educated self-concept. Both categories of this term are further divided by the fact that the heavily studied self-concept represents the social, emotional and physical self, with the adequate factors of the lower level.

Apart from the mentioned standard ranking models, Zanden and associates (2017) identify the profile concept as more efficient for the specificity of a person. They believe that individuals evaluate themselves differentially within different aspects like body image, school accomplishment and such; therefore, the corresponding characteristic outlines within the relevant aspects of life are obtained. The main postulate of the cognitive-development theories which includes the developmental differentiation of an individual, can be, according to the conclusions of the aforementioned authors, used in the field of self-respect by increasing the number of fields with age. For example, during middle and late childhood students can differentiate a few areas of specific competence. The area of self-evaluation with this age group includes one's body image, school competence, sport skills, social acceptance, behavior control and general self-evaluation. The physical self includes body image and sport skills. The students who favorably evaluate their sport skills are motivated to a higher degree for physical movement – exercise, while the students who unfavorably evaluate their sport skills do not have the tendency to frequently participate in sport activities.

Between self-evaluation in the physical area, the choice of physical activity and perseverance in participating in physical activity, there are high correlations, which is shown in the studies by Fuchs, Seelig, Schlatterer and Ntoumanis (2017) and Quested,

Ntoumanis, Thøgersen-Ntoumani, Hagger and Hancox (2017), and which manifests itself as the central predictor of motor behavior in sport (Anne-Sophie & Guay, 2017). The defined existence of bidirectional conditioning of self-concept, especially self-evaluation of sport skills, brings forward the fact that physical activity can, by perfecting motor skills, motivate more favorable self-perception of sport skills and self-concept (Azzarito, 2017). The physical self has a relevant function in driving students during the physical education class and in their intensive feeling of the class. Indirectly, it determines the student's rank of activity during the physical education class and the improvement of their motor skills (McCabe, Connaughton, Tatangelo, Mellor & Busija, 2017).

Álvarez, López, Gómez, Brito and González (2017) argue that the function of the perceived sport competence in physical education has a dominant influence on the students with no previous experience in various sport activities. Participants with a positive previous experience have a subjective idea about dominant physical skills, they understand that physical education is interesting and feel the need to participate in class activities in order to improve their sport skills, and the perceived sport competence is used for interpreting the relevant amount of variability in the results of student's intrinsic motivation in physical education classes, which is shown in the research by Ruiz-Juan & Baena-Extremera (2015). With that in mind, physical education teachers should direct motor matters with the aim of developing and improving movement and the self-concept (Coelho, Sousa, & Figueira, 2014) state. The physical self presupposes the cause and success of physical exercise and student accomplishment. However, if teachers are only developing students' motor skills, and disregard their self-assurance in their own skills, the effect of the exercise will be short-lived (Martins, Marques, Peralta, Palmeira, & Costa, 2017).

In our country, the dimensions of self-concept and engaging in sport during early adolescence were examined, as in the study by Tubić, Đorđić, and Poček (2012). The results of this research indicate that adolescents who engage in sport value themselves more favorably in most aspects of self-concept as opposed to their peers who do not engage in organized sport. The results confirm the existence of a positive connection between self-concept and engagement in physical exercise and sport, as well as the emphasized importance of body image evaluation within the general self-evaluation of adolescents. Pavlović (2016) determined, using a representative sample of third and fourth grade elementary school students, that self-concept can significantly contribute in predicting physical activities during physical education classes.

Summarizing previous empirical findings, it was recognized that there are identical patterns of connecting the construct of self-concept and student's physical activity, but thus far they have not been closely examined, as well as that the results are not completely mutually consistent. Besides, it is necessary to bear in mind that the largest part of empirical evidence comes from examining the participants from areas much different than our socio-political setting, so their findings cannot generally be used on the entire population of students in the Republic of Serbia.

The problem of this research is searching for answers about whether there is a connection between self-evaluation of self-concept and physical activity, and whether and based on which variables of self-concept can participants' physical activities during the period of preadolescent development be predicted. Bearing in mind the fact that previous research was seldom carried out on the Serbian population, the main aim of this transversal research of an exploratory nature is to examine linear correlations of the perceived construct of self-concept

(sport competence and physical self) and criterion (volume and intensity of physical activity) of fifth-grade elementary school students during physical education classes. In addition, the contribution of predictor variables of self-concept in explaining the criterion variance was examined, as well as which of the predictor variables is individually the best in predicting physical activities of the participants in late childhood.

Based on the findings of previous studies, but also on the theoretical discussions found in the consulted literature, two alternative hypotheses were formed as a starting point: H_1 –the statistically relevant mutual codependence between self-evaluated self-concept, volume and intensity of physical activity of preadolescents in physical education classes is presupposed; and H_2 - it is expected that the variables of self-concept (as the presupposed cause) will explain the significant part of the variance in the volume and intensity of physical activity criterion (as the effect) of students in physical education classes.

Having complete insight into the regression function of the aforementioned variables, on the Serbian sample of participants from the school age population, can carry implications for further research, as well as for psychological practice, which represents one of the contributions of our empirical research because previous studies have not offered uniform, clear and explicit answers.

METHODS

Research sample and procedure

The relevant sample accounted for 212 fifth-grade elementary school students of "Vladika Nikolaj Velimirović", "Desanka Maksimović" and "Milovan Glišić" schools from Valjevo, aged 12 ($\pm$ *6* months).

Data was collected during January, 2017. Parents gave written consent for research participation, and the school principals gave formal consent for the students' participation, during regular physical education classes. The participants were informed about the aim and research procedure, as well as the option to talk to their examiner any time and to quit the research participation. Research participation was voluntary and all the participants filled in the identical questionnaires using pen and paper; the examiners were psychologists and physical education teachers. With the aim of ensuring data confidentiality and anonymity, the participants put the filled-in questionnaires inside the given envelopes and then filed them in the collection box. The average time of the participation was 45 minutes.

Physical activity of a student in physical education classes was measured during the training unit "Perfecting the natural form of *physical* movements" by Pavlović (2016). During the introductory phase, the students had 5 minutes for the basic "chain tag" type games, while during the primary phase they did loosening, stretching and muscle strengthening exercises. During the central part of the class station training method was used – six groups (4-5 students) and six stations where students were doing natural forms of physical movement (walking forward, jumping, crawling and walking backwards) for 25 minutes, and the final part of the class included a 5-minute easy run.

Instruments

I Self-perception of self-concept by Harter (2012). For identifying self-awareness, that is self-image, the short version of the SPPC questionnaire was used consisting of two

subscales with six items each: a) *Sport competence* subscale – it refers to the evaluation of one's own physical skills in sport and b) *Physical self* subscale – it refers to the evaluation of one's own physical skills satisfaction, that is to say satisfaction with body image. Each item of the subscale consists of a two-part sentence - within the domain of sport competence, the first part referred to competent behavior of a student, while the other part of the sentence referred to the student's incompetent behavior (for example, *Some children are very good at all types of sport, while some other children think they are not very good at sport.*). Within the domain of body image, the first part of the sentence referred to body image satisfaction, while the other part of the sentence referred to the body image satisfaction (for example, S*ome children are satisfied with their body image, while some other children are not satisfied with their body image.*). The participants were tasked with marking with an X or describing in more detail the first or the second part of the given sentence, that is to say, they were tasked with expressing the degree of agreement with the part of the sentence which describes them completely or refers to them in part. The total score is the arithmetic mean of all the participants' answers on all individual items.

The reliability of the questionnaire was evaluated using the internal consistency method, meaning the measured Cronbach alpha coefficient was (α=.82) for sport competence and (α=.85) for physical self, and based on the criterion set by Nunnally (1978) it can be agreed that the obtained metrical characteristic of reliability is satisfactory for both variables.

II Student's physical activity in physical education classes
Measuring the physical activity of the participants during physical education classes was done using a pedometer (*CoachGear*) and heart rate monitor (*Suunto memory belt*).

I *Volume* of physical *activity* is measured based on the number of steps a student has made during one class using a pedometer which is put around the waist of each student tested (shorts or training pants). In addition, this method was used to measure the average and maximum movement speed of the participants, it is stated in the study by Tudor-Locke and associates (2006), while the length of the road passed in meters was measured by multiplying each taken step with 65 cm (Sternfeld & Goldman-Rosas, 2012).

II *Intensity of physical activity* is determined as the total time during the intensive physical activity in physical education classes, or as the heart rate frequency, and it is measured via an electronic device heart rate monitor. An electrode attached the device to the student's thorax. Apart from the heart rate graph – number of beats per minute – the device measured the time spent on three different segments of the intensity of physical activity: a) low intensity segment (pulse per minute + x < 25% value of pulse per minute), b) medium intensity segment (pulse per minute + 25% < x < 50% value of pulse per minute) and c) high intensity segment (pulse per minute + x > 50% value of pulse per minute).

Data processing method

In accordance with the aims set in this research, data processing included standard methods of descriptive statistics: measure of central tendency – arithmetic mean, measure of variability – standard deviation and coefficient of variance, range of variation – minimal value of variable and maximal value of variable, distribution of asymmetry coefficient – skewness and data form coefficient (flattening and lengthening) – kurtosis and the Kolmogorov–Smirnov bivariate correlation (*Pearson's*) or Pearson's product – moment coefficient correlation. The linear model of the multiple regression analysis was applied in defining the prediction of physical

activity depending on the participants' self-concept. The level of statistical significance was set at $p \leq .05$. Data processing was done using the SPSS software (*Statistical Package for the Social Science*), version 17.0, where quantitative data were obtained which were used for further analysis and interpretation.

<center>RESULTS</center>

Table 1 shows the results of the basic descriptive statistic of the variables used in the self-perception of self-concept questionnaire on the entire sample of preadolescents.

Table 1 Descriptive parameters of the measurements of variables of the self-concept (N=212)

Variables	AM	SD	Min	Max	CV%	*KS*	*Sk*	*Ku*
Sport competence	3.00	.62	1.48	3.9	19.56	.12	-.08	-.71
Physical self	3.54	.63	1.90	3.9	15.17	.12	-1.14	.30

Legend: AM – arithmetic mean; *SD* = standard deviation; range of variation (Min – minimal value of variable; Max – maximal value of variable); CV% – coefficient variance; *KS* – value of Kolmogorov-Smirnov test; *Sk* – standardized skewness (asymmetry coefficient– curvature or skewness of distribution); *Ku* = standardized kurtosis (coefficient of flattening or lengthening of distribution); *p* – degree of statistical relevance.

The data indicate that preadolescents more clearly perceive the variable Physical self (AM=3.54) than the variable Sport competence (AM=3.00). The obtained values of skewness and kurtosis for the results of both variables are satisfactory, because they range from -1 to 1. They, just as the values of the Kolmogorov–Smirnov test of relevance, show that there is no statistically relevant deviation from normal data distribution; therefore, it was concluded that the results are set for further statistical processing.

Table 2 gives the main descriptive parameters of criterion variables, the volume of physical activity in physical education classes as well as the time which students spent on the segment of intensive, medium and low intensity.

Table 2 Descriptive parameters of the criterion variable (N=212)

Variables	AM	SD	Min	Max	CV%	*KS*	*Sk*	*Ku*
Volume of physical activity	2332.98	428.17	594	3.352	20.04	.11	-.63	1.26
Segment of intensive physical activity	24.06	4.73	7.94	35.06	24.10	.10	.19	-.08
Segment of medium intensity	12.04	3.72	2.47	19.86	29.25	.08	.29	-.47
Segment of low intensity	12.01	5.66	.06	23.14	49.12	.06	.25	-.51

Legend: AM – arithmetic mean; *SD* = standard deviation; range of variation (Min – minimal value of variable; Max – maximal value of variable); CV% – coefficient variance; *KS* – value of Kolmogorov-Smirnov test; *Sk* – standardized skewness (asymmetry coefficient– curvature or skewness of distribution); *Ku* = standardized kurtosis (coefficient of flattening or lengthening of distribution); *p* – degree of statistical relevance

The obtained values from the Kolmogorov–Smirnov test of relevance, asymmetry coefficient and standardized kurtosis indicate that there is no statistically relevant deviation from Gaussian distribution of data. The mean value of the total number of steps taken by preadolescents is 2.333 steps, and the intensive physical activity was practiced for 24 minutes. Male students on average spent equal amounts of time on physical activities of both

low and medium intensity (12 minutes). Based on the relative relationship of standard deviation and arithmetic means, there have been individual variations in the percentage of variables Volume of physical activity and Segment of intensive physical activity in physical education classes (CV%=20.04%, or 24.10%).

The Pearson correlation coefficient was used in testing the relation of self-evaluation variables Sport competence and Volume of physical activity, which manifested itself in the total number of steps taken by students in physical education classes. The obtained values are given in Table 3.

Table 3 Intercorrelations of the variables Physical self-concept
and Volume of physical activity (N=212)

Variables	Sport competence	Physical self	Volume of physical activity
Sport competence	1		
Physical self	.36	1	
Volume of physical activity	.36	.25	1

$** p \leq .01.$

A correlation analysis on the level of statistical significance of $p \leq .01$ indicates a relatively low and identical positive linear connection between the variability of the examined pairs of variables Sport competence and physical self and Sport competence and Volume of physical activity (r=.36), as well as the connection between Volume of physical self and Physical self (*r*=.25), which is suitable for conducting a multiple regression analysis. The obtained Pearson product moment correlation coefficient of the same direction (the value of both variables rises), signals the fact that students with a higher perception of sport competence value and body image value achieve better results in the volume of physical activities, when compared to the students with lover values of Sport competence value and Physical self-value.

The obtained values of the Pearson correlation coefficient for the variables Sport competence, Physical self and Volume of physical activity indicate that the level of probability ($p \leq .01$) can be rejected by the null hypothesis of disconnection between variables.

A multiple linear regression analysis model was used with the aim of defining the mathematical function used to predict the contribution of the value in explaining the variance between the criterion variable – Volume of physical activity based on the information about predictor variables – Sport competence and Physical self (Table 4).

Table 4 The results of multiple regression analysis for
the criterion Volume of physical activity (N=212)

Variables	β
Sport competence	$.32^{**}$
Physical self	.09
R	.75
R^2	.19
SE	423.75

Legend: β – standardized partial multiple regression coefficient; R – multiple correlation coefficient;
R^2 – determination coefficient: multiple correlation coefficient; SE – standard error of the estimate of
dispersion measures in the estimated results during regression
$**p \leq .01$

The multiple correlation coefficient between two independent variables and volume of physical activity amounts to (R=.75), which indicates a statistically significant functional correlation of the predictors and criterion. The determination coefficient or the proportion of the sum of the squares of deviations in the total sum of the squares is ($R^2 = .19$). The regression equation explains 19% of the total criterion variance ($p \leq .01$) of variables, while 81% of unexplained (residual) variability is due to the influence of some other unidentified latent variables which are not empirically examined. For that reason, future research should include other mechanisms as well which could be used in interpreting an additional segment of variations within the applied regression model. The standard error of estimation, as the measure for dispersion of variable distribution in comparison to the anticipated results, is (SE=423.75). This points to the fact that, based on the statistical correlation of the sample, the real linear correlation of population estimation is probably within 99% exact as the anticipated result, or that the pertinent sample is the reliable prediction indicator of the parameters of the preadolescent population.

Sport competence is a significant predictor in the regression equation and it has the highest value of standardized Beta coefficient ($\beta = .32$). This points to the fact that, based on this predictor, the total contribution of the criterion variance of preadolescents' Volume of physical activity can be predicted to a significant degree, or that better sport competence is achieved by male participants who partake in physical activities more intensively. On the other hand, contrary to the expectations of the obtained value of Beta coefficient, a significant quantitative agreement between perception of the variables physical self and Volume of physical activity ($\beta=.09$) was not determined, which indicates that based on this predictor the result of criterion variable cannot be statistically relevantly predicted.

With the aim of determining the relations of the variables of preadolescents' self-concept and intensity of physical activity, expressed in minutes in physical education class, the Pearson coefficient correlation was used (Table 5).

Table 5 Intercorrelations of the variables sport competence, physical self and intensity of physical activity (N=212)

Variables	Sport competence	Physical self	Volume of physical self
Sport competence	1		
Physical self	.37	1	
Volume of physical self	.37	.28	1

$** p \leq .01.$

The results of the correlation analysis show that between variability of the examined pairs of variables preadolescents' Physical self and Intensity of physical activity, there are statistically relevant positive but still relatively low bivariate correlations. A direct linear functional relationship was determined between variables sport competence and intensity of physical activity ($r=.37$), sport competence and volume of physical activity ($r=.37$), or between physical self and intensity of physical activity ($r=.28$). The calculated values of the Pearson product-moment correlation coefficient between the stipulated variables emphasizes that with a probability of 99% the hypothesis formulated in null form (H_0) can be rejected due to the absence of a correlation between the variables.

Multiple linear model of regression analysis was used for determining the possibility of predicting the criterion variance of intensity of physical activity with preadolescents based on the function of predictor variables of self-concept (Table 6).

Table 6 The results of multiple regression analysis
for the criterion Intensity of physical activity (N=212)

Variables	β
Sport competence	.30[**]
Physical self	.11
R	.78
R^2	.20
SE	419.36

Legend: β – standardized partial multiple regression coefficient; R – multiple correlation coefficient;
R^2 – determination coefficient: multiple correlation coefficient; SE – standard error of the estimate of dispersion
measures in the estimated results during regression
**$p \le .01$

The results have shown that the multiple correlation coefficient between two predictor variables and intensity of physical activity as the criterion is (R=.78). That reveals that between the predictors on one side, and criterion variability on the other, there is a significant and excellent functional correlation in the preadolescent population. The obtained multiple determination coefficient, as the measure of overlapping or linear correlation between the predictor and criterion, is (R^2 =.20). That means that 20% of the total variance of intensity of physical activity is reliably determined by individual contributions to the variable self-concept, and that 80% of residual variance proportion can be explained by including other factors which are the consequence of accidental errors or are under the influence of some other unidentified latent dimensions which are not examined within this regression model. Therefore, future research should include other variables which could be used for explaining an additional segment of the criterion variation. Standardized error of estimate or dispersion of the obtained results in relations to predicted ones is (SE=419.36). That points to the possibility that, based on the statistical sample correlation, the objective linear correlation of population prediction will probably be within 99% reliability of the predicted result, or that the relevant sample is a reliable indicator for evaluating population parameters.

A s predictor in the regression equation is Sport competence (β=-.30) which shows that preadolescents who have better sports skills dedicate more time to intensity of physical activity in physical education classes. Contrary to that, the obtained value of the Beta coefficient with the variable Physical self (β=.11) shows the absence of quantitative agreement with the variable Intensity of physical activity. Their zero correlation, from the partial aspect, points to the fact that the result of the criterion variable cannot be statistically significantly predicted since regression inflections are not statistically significant.

DISCUSSION

Given the fact that this research question is current and insufficiently explored, this research examined the relations between perceived self-concept, volume of physical

activity and intensity of physical activity in physical education classes, as well as the contribution of perceived sport competence and physical self to the prediction of volume and intensity of physical activity during preadolescence.

Harter's self-perception questionnaire was used in this research to examine the body image. A factor analysis was conducted in order to examine what the structure of the measuring instruments on the Serbian population is. The obtained factorial solution has many substantial similarities with Harter's defined structure of questionnaire, which confirms the validity of the instrument used.

The research results of the correlation analysis reveal a statistically relevant (albeit low) positive mutual codependence between the examined variables Sport competence and Volume of physical activity, Volume of physical activity and Physical self, and Volume of physical activity and Physical self with preadolescence. The low intensity of the linear correlation can most likely be explained as the outcome of poorly developed "critical thinking" in physical education, that is, the lacking development of various argumentation which refer to variations of the analyzed partial variables. The obtained quantitative rectilinear congruence of unidirectional variants between the examined numerical variables, with positive signs (the values of both variables rise), indicate that the students' perception of self-concept represents a relevant factor of the intensity of physical activity, or that students with developed sport competence and physical self-achieve better results on the intensity of physical activity test than the students with less developed construct of self-concept. These results match the findings of the studies conducted using similar methodology (Li, Bunke & Psouni, 2017; Lohbeck, Tietjens, & Bund, 2017; Garn et al., 2017; González-Cutre, Sierra, Beltrán-Carrillo & Peláez-Pérez, 2017; Lalor, Brown, & Murdolo, 2016). This fulfills the expectations of the first alternative hypothesis about the obtained statistically significant correlation between self-evaluated self-concept, volume and intensity of physical activity of preadolescents during physical education.

The research question on whether there is a connection between self-evaluation of physical self-concept and physical activity of preadolescents, and whether based on this construct their physical activities can be predicted, is answered by applying a multiple linear model of regression analysis. Even though the regression model shows that the evaluated predictor variables Sport competence and Physical self statistically significantly contribute to the prediction of criterion variables Volume of physical activity and Intensity of physical activity, by seeing the contribution of individual variables, it can be concluded that only Sport competence is a significant independent criterion predictor. The results indicate that the male students' construct of self-concept represents a relevant determinant of physical activity in physical education. The statistically significant contribution of the evaluation of the criterion variable Volume of physical activity in physical education classes, from partial aspect, is made by the value of the β-coefficient sport competence of preadolescents. That means that students who perceive themselves as more skilled at sport, do a greater number of leg movements while walking and spend more time within the segment of volume of physiological load during physical education, which is in accordance with the results of previous research (Jekauc, 2015). Therefore, it has been determined that between the predictor of self-concept and criterion Volume of physical activity, there is bidirectional influence: the volume of physical activity can through social interaction stimulate sport competence by improving motor skills, which

can reflect on the behavior that refers to the construct of self-concept. Moreover, it is important to mention that the analyzed predictor and criterion do not explain more than four fifths of the percent variance, which indicates that apart from the independent variable Sport competence, there are many other factors which are dominant in forming students' perception of the volume of physical activity during early adolescence, and that should be examined in future research.

Compared to sport competence, the physical self represents qualitatively different domain from other domains of self-perception, which is in accordance with previous research (Naik, Raskar, & Hidalgo, 2017). According to the mentioned author, physical self is constantly under the influence of other domains, while over other characteristics a person possesses a greater degree of domination, for example – whether they will be manifested, and why and when. However, it is vital to emphasize that in our research, the examined predictor variable Physical self is not, as it was expected within this regression model, a statistically significant determinant of the criterion variables Volume of physical activity and Intensity of physical activity, which is confirmed in the findings of (Biddle, Atkin, Cavill, & Foster, 2011; Kobel et al., 2015; Okely, Booth, & Patterson, 2001). The main reason for obtaining zero correlations in this study is probably the period of early adolescence, when students have not yet developed standards of self-evaluation, which does not enable them to express the connection between physical self, volume of physical activity and intensity of physical activity. The anticipated correlation between the mentioned variables probably failed because physical self has delayed effect on the range and degree of physical activity of preadolescents over a longer period.

It should be noted that the multiple regression analysis of our sample reveals that over four fifths of residual variance of measuring predictor variables is not included in the regression model, which presupposes that some other factors (for example biological, sociological, personal characteristics, socio-economic status, social support, individual and cultural beliefs) are crucial for developing the criterion Volume of physical activity and intensity of physical activity of boys in early adolescence.

Finally, analyzing the research data of the second alternative hypothesis tested, it was partially confirmed that the variable of self-concept will account for a significant part of the variance volume and intensity of physical activity of students in physical education classes.

In the empirical research conducted on a population from a culture different from the western one, the relations between the perceived construct of self-concept and physical activity in preadolescents are examined. It can be assumed that this study is a contribution in the area of research methodology and measuring of self-concept and physical activity, especially in the area of empirical research of this construct's correlates. The literature analysis shows that this study represents an original contribution in the mentioned area that is dominated by theoretical analyses. This research, apart from theoretical significance, enables designing a program and directions for a pedagogical intervention for realizing the optimal volume and intensity of physical activity in accordance with the students' potential, which will contribute the improvement of specific variables of self-concept. That would influence their engagement in physical education classes.

In the end, it is necessary to point out a few shortcomings of this research which refer to some of its methodological aspects that can limit the interpretation of the obtained results from the preadolescent population. Firstly, the pertinent sample was relatively

small, with a limited age (12.5 years of age), which limited the control of even data distribution, which to an extent limited the actual possibility of generalizing the obtained findings. Secondly, the analyzed variables became operational through students' self-evaluation at the specific (transversal) moment, which can cause a problem due to the unreliability and a distorted self-image, and the appearance of methodological variance which can significantly limit the reliability of the examined variables between the measures of various constructs. Thirdly, the correlational design which is most common in this type of research was applied. However, this design has limited options for drawing conclusions about possible assumed causal relations between the examined variables (McDonald, 2008); therefore, those conclusions should be viewed with caution.

Taking into account that this is an empirical study of an exploratory character, further research is necessary for attempting to eliminate the mentioned methodological shortcomings and to confirm the obtained results. With the aim of defining more fully the relations between measuring variables and reaching the conclusion about their causal relations during physical education, future research should fulfill the following criteria: (a) it should include a bigger and more representative participant sample with gender stratification and a broader age range, (b) it should apply other measurements beside self-evaluation (for example, peer, parent and teacher perception, (c) it should identify other potential sources of the self-concept variance, such as the social self, emotional self and (d) it should use a longitudinal research design on various time samples in order to obtain more consistent and valid results.

CONCLUSION

Indicators from quantitative and qualitative analysis of this research have shown that the ability to understand the correlation between self-evaluation of the variable Self-concept (sport competence and physical self) and two criterion variables (volume of physical activity and intensity of physical activity) with preadolescents is vital because identifying them is relevant for the improvement of physical education. Despite methodological limitations, the conclusion has been reached that the given results contribute to the methodology of examining self-concept and physical activity, and give motivation for further theoretical and empirical research within this relevant domain.

Empirical research has served as a test for reliability of Evaluation of self-concept questionnaire in the context of our education system. The obtained coefficients of internal reliability have shown a satisfactory metric characteristic of reliability of the measuring instrument used and its applicability for scientific, professional and practical purposes of the Serbian population in early adolescents.

The findings of the correlation analysis are in favor of the first alternative hypothesis, so it has been concluded that there is a statistically relevant linear positive correlation between students' perception of self-concept, volume and intensity of physical activity.

The multiple linear regression model is the defined statistically relevant degree of quantitative agreement between criterion and predictor variables, whereby one fifth of the total variance has been explained. In addition, this multivariate process has shown that only the perception of sport competence in adolescents is a statistically relevant positive predictor in anticipating criterion variability, which has partly confirmed the other

research hypothesis because the used variable Physical self has proven to be statistically insignificant. The empirical findings of this and similar studies can contribute to preparing and conducting physical exercises in physical education classes in order to improve self-concept of students in early adolescence.

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SELF-KONCEPT KAO DETERMINANT FIZIČKE AKTIVNOSTI PREADOLESCENTA U NASTAVI FIZIČKOG VASPITANJA

Cilj ovog istraživanja bio je dvostruki: a) ispitivanje odnosa između konstrukta self-koncepta (sportske kompetencije i physical self) i kriterijuma (obim fizičke aktivnosti i intenzitet fizičke aktivnosti) u časovima fizičkog vaspitanja za preadolescente i b) ispitivanje doprinosa varijabli self-koncepta prema predviđanjima kriterijuma varijanse, odnosno delimičan uticaj prediktorskih varijabli u predikciji fizičkih aktivnosti učenika u dobi kasnog detinjstva. Sledeći instrumenti su korišćeni na relevantnom uzorku učesnika iz Valjeva (N=212) prosečnog uzrasta 12.5 godina: samopercepcija self-koncept upitnika (SPPC), pedometar (CoachGear) i monitor srčane frekvencije (Suunto memorijski pojas) za merenje obima i intenziteta fizičke aktivnosti. Rezultati jednačine regresije pokazali su da je nezavisna varijabla Sportska kompetencija objasnila statistički značajnu varijansu u varijablama Obim fizičke aktivnosti i Intenzitet fizičke aktivnosti sa preadolescentima (b=.32, b=.30), dok je promenljiva Physical self nije statistički značajan parcijalni prediktor bilo kog od kriterijuma. Dobijeni empirijski nalazi su u skladu sa rezultatima prethodnih studija.

Ključne reči: *učenici, sportska kompetentnost, prediktori, obim fizičke aktivnosti, intenzitet fizičke aktivnosti.*