

ORIGINAL SCIENTIFIC PAPER

Motivation for Physical Education in Students Aged 12 to 15 – Structure Analysis

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Abstract

The quality of Physical education (PE) largely depends on the degree of students' motivation to participate in various kinesiological activities, whereby the level and structure of the motivational space are important. The aim of this research was to analyse the level and structure of student's motivation to perform tasks in PE classes, as well as gender differences. The research was conducted on 77 female and 61 male primary-school students from Split, Croatia, aged 12 to 15. Motivation assessment was carried out using the Motivation for PE questionnaire. Analysis confirmed that basic metric characteristics of all PE motivation measures are at a satisfactory level. In the total sample, measure of PE motivation is expressed as high, with intrinsic measures of motivation being significantly higher than extrinsic forms of student motivation. In general, no differences were found in measures of motivation according to the sex of the respondents. Differences in several measures of PE motivation were found between respondents of different grades, whereby students of 5th and 6th grades show higher results of PE motivation than students of 7th and 8th grades. Using cluster analysis, three different types of PE motivation were determined for both female and male students. For female student these clusters were defined as very low, high, and extremely high motivated types, while for male students clusters were defined as low, high, and extremely high motivated types. The structure and frequency of types of PE motivation is different for sub-samples of female and male students. Knowledge of the described structure will enable teachers to recognize and intervene in students' motivation, aiming to optimise work effects in kinesiological education.

Keywords: elementary school students, extrinsic motivation, intrinsic motivation, motivational types, PE motivation

Introduction

Nowadays, it is of essential importance to give answers to the demands placed on us by society and progress. The aforementioned aspects affect all levels of human life, including movement and exercise. Lack of movement greatly affects the health and psychological aspect of an individual. One such problem is childhood obesity, which represents a distinct problem (Androja et al., 2023). Physical education provides a controlled and guided educational process that fulfils the child's weekly need for movement. Complex interactions between teachers, students, and content within a larger social environment determine the quality of the teaching process (Bavčević, Babin, & Prskalo, 2006; Bavčević, Bavčević, & Androja, 2020). Kinesiological education adds to the complexity since physical education not only imparts new information

and skills but also changes students' general anthropological standing. Because of the aforementioned methodology, the impacts of physical education are evident in a larger range of morphological, motor, functional, cognitive, and conative qualities of students, exhibiting both quantitative and qualitative changes (Bavčević, Babin, & Prskalo, 2006; Bavčević, Bavčević, & Androja, 2020; Bavčević, Prskalo, & Bavčević, 2018). Therefore, it is extremely important to determine as many factors as possible that influence the process of physical education as a key segment in the formation of students in growth and development. Growth and development affect numerous aspects related to the educational process, and many parameters change in relation to the age and gender of individuals (Bavčević, 2020; Bavčević, Androja, & Bilić, 2022; Bavčević, & Bavčević, 2015). Student motivation is an import-



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ant factor for the successful implementation of the educational process (de Bruijn, Mombarg, & Timmermans, 2022; Owen, Astell-Burt, & Lonsdale, 2013; Säfvenbom, Haugen, & Bulie, 2015). The degree of motivation also affects cross-curricular outcomes (de Bruijn et al., 2023) and represents an extremely important component in the education process. Among other things, the role of the teacher as the leader of the educational process is important in the degree of student motivation in the course itself (Domville, Watson, Richardson, & Graves, 2019; Navarro-Patón, Lago-Ballesteros, Basanta-Camiño, & Arufe-Giraldez, 2019; Su, Pu, Yadav, & Subramnaiyan, 2022). When we look at motivation as a key factor in the successful implementation of physical exercise, it is important to determine the dynamics of the observed parameter. Some of the previous research dealt with this issue (Chanal, Cheval, Courvoisier, & Paumier, 2019; Bogdan & Babičić, 2015; Burić & Zovko, 2022).

The aforementioned studies dealt with the motivation for sports or PE in different age groups. The joint findings of these studies show a decline in motivation concerning age, especially in the study by authors Chanal, Cheval, Courvoisier and Paumier (2019) who for the first time show a decline in primary school students' motivation for physical education. The findings of other authors provide a strong foundation for a deeper insight into the structure of motivation among students in the period from 12 to 15 years.

The aim of this paper was to examine the motivation structure of seventh and eighth grade elementary school students and the differences in the degree of motivation between female and male students of the specified age.

Methods

Sample of participants

The research was conducted on a sample of 138 subjects, average age of 13.51 ± 0.87 years, of which 77 were female students and 61 were male students from the fifth up to eighth grades of the elementary school in the City of Split, Croatia. All subjects were clinically healthy with no recorded psychophysical aberrations. Participation in the research was voluntary with the regular consent of parents or custodians. The research is part of the research project "The integrative and developmental role of kinesiological education in the educational system – facing the challenges of modern schooling" approved by the Faculty Council of the Faculty of Kinesiology, University of Split (No.: 2181-205-02-01-23-0166, 15 December 2023). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data collection methods and procedures

Assessment of students' motivation for PE was performed using the adapted Sport Motivation Scale (SMS-28). The original SMS-28 questionnaire (Pelletier et al., 1995) was modified by selecting the items which allow students to assess motivation in relation to PE. In accordance with the recommendations of the authors of the modified questionnaire (Milavić, Milić, Jurko, Grgantov, & Marić, 2015), 20 items measuring 5 subscales were applied for the purposes of this research, as follows: Intrinsic Motivation to Know (IM – Know), Intrinsic Motivation to Accomplish Things (IM – Accomplish), Intrinsic Motivation – Stimulation (IM – Stimulation), Extrinsic Motivation – Identified (EM – Identified), and, Extrinsic Motivation – External Regulation (EM – Ext. Reg.). Total motivation for PE (Σ MOTIVATION) was determined

as the mean value of all five variables. All items were evaluated on a Likert scale from 1 (I don't agree) to 5 (I fully agree). The variables were formed by the condensation of items using the item's mean determination method.

Data processing methods

Basic metric characteristics of all motivation scales were determined: homogeneity (by using Principal Component Analyses), reliability (Cronbach alpha coefficients were calculated), and sensitivity (by using more distribution goodness-of-fit indices). As part of the data processing, the following descriptive parameters were calculated: Mean, standard deviation (SD), minimum result (Min), maximum result (Max), Skewness (Skew), Kurtosis, (Kurt). All results of student motivation were interpreted according to the scale: extremely low (1.00-1.74), very low (1.75-2.24), low (2.25-2.74), moderate (2.75-3.25), high (3.26-3.75), very high (3.76-4.25), extremely high (4.26-5.00). The normality of the distribution was tested using the Kolmogorov-Smirnov goodness-of-fit test (K-S D test).

Differences between subsamples of students in the area of motivation were determined using Student t-test and significance level (p) were calculated.

Cluster analysis using the K-means method was applied with the aim of determining groups of students with different types of PE motivation. Descriptive statistics parameters were also calculated for each cluster: Mean and standard deviation (SD). Significance of differences between clusters was determined using One-way ANOVA [F-statistic (F) coefficient, and significance level (p)].

The software STATISTICA v.14.0.1.25 was used for data processing (TIBCO Software Inc, USA).

Results

By analysing the results of the sample of respondents in this study, it was determined that all motivation scales, including the overall measure of PE motivation, have satisfactory measurement characteristics. The scales are homogeneous because all items in each of the scales were projected onto one component, i.e. onto one latent dimension, whereby the percentage of variance explained by that component varies in the scales between 55.1% (extrinsic motivation - identified) to 76.1% (intrinsic motivation - to know). The component consisting of all 5 elements of the motivation measure explains 66.3% of the common variance in the total measure of PE motivation. The scales are at least satisfactorily reliable because the values of all reliability coefficients are above 0.70, with even 5 out of 6 motivation measures having a good level of reliability. Although it was determined for 4 measures of motivation that their distribution of results deviates significantly from the normal distribution (the significance of the K-S D test is $p < 0.05$), it is still possible to assess that the sensitivity of all measures of motivation is satisfactory because the values of all other indicators of sensitivity are within acceptable limits. All measures of motivation have a maximum possible range of results (from 1.00 to 5.00). The skewness and kurtosis indices of the distribution of the results are within the range that George and Mallery (2003) stated as acceptable (range of ± 2.00).

Descriptive parameters of motivation measures on the total sample vary from low for extrinsic motivation - identified (2.63) to very high for the measure of intrinsic motivation - to accomplish (3.86). The total measure of PE motivation, the

Table 1. Descriptive and metric parameters of PE motivation scales (n=138)

Variable	Mean	SD	Min	Max	Skew	Kurt	K-S D	D test p	Eigen value	Variance %	Cronbach Alpha
IM – Know	3.61	1.17	1.00	5.00	-0.67	-0.61	0.12	p<0.05	3.05	76.1	0.89
IM – Accomplish	3.86	1.10	1.00	5.00	-0.98	0.17	0.15	p<0.01	2.95	73.8	0.88
IM – Stimulation	3.64	1.13	1.00	5.00	-0.73	-0.42	0.15	p<0.01	2.83	70.8	0.86
EM – Identified	2.63	1.20	1.00	5.00	0.42	-0.92	0.13	p<0.05	2.53	63.2	0.81
EM – Ext. Reg.	3.12	1.01	1.00	5.00	-0.04	-0.89	0.09	p>0.20	2.22	55.5	0.73
Σ MOTIVATION	3.37	0.90	1.00	5.00	-0.42	-0.39	0.08	p>0.20	3.32	66.3	0.86

average of 5 elements - facet of motivation, is high (3.37). All three distributions of the results of measures of intrinsic motivation are negatively asymmetric (negative skewness), and the measure of extrinsic motivation has been identified as positively asymmetric (positive skewness).

Results of the Student t-test for independent samples (Table 2) conducted between subsamples of female and male students revealed a difference only in the measure of intrinsic motivation - stimulation, with male students (3.85) having more pronounced results than female students (3.47).

Table 2. Gender differences of PE motivation variables

Variable	Female (n=77)		Male (n=61)		t-test	p
	Mean	SD	Mean	SD		
IM – Know	3.66	1.14	3.56	1.21	0.49	0.62
IM – Accomplish	3.89	1.14	3.83	1.06	0.31	0.76
IM – Stimulation	3.47	1.20	3.85	1.02	1.98	0.05*
EM – Identified	2.62	1.19	2.65	1.21	0.12	0.91
EM – Ext. Reg.	3.04	0.96	3.22	1.08	1.05	0.30
Σ MOTIVATION	3.33	0.91	3.42	0.90	0.55	0.58

Note. *p<0.05

The Student t-test for independent samples conducted between two subsamples of students belonging to different grades revealed a difference in 4 measures of PE motivation (Table 3): in the measures of intrinsic motivation – to know (p<0.001) and stimulation (p<0.05), in the measure of extrinsic motivation - external regulation (p<0.05) and consequently also in the overall measure of PE motivation (p<0.05). In all these measures of motivation younger students (5th and 6th grade elementary school students) have higher results than older students (7th and 8th grade elementary school students).

Although the findings on the absence of differences between respondents of different genders apparently allow the

implementation of further statistical analyses on the entire sample of respondents of this study, the authors of this study decided to conduct a types analysis of students' PE motivation separately for male and female students due to a number of different reasons.

In the implementation of type analysis (K-means clustering), the authors chose a setting in which membership to a particular cluster is determined in such a way as to minimize the differences in the results of members within one cluster (intracluster differences) and to maximize the differences of the arithmetic means of different clusters (intercluster differences) independently about how many members each cluster will have.

Table 3. Age category differences of PE motivation variables

Variable	Grades 5 & 6 (n=73)		Grades 7 & 8 (n=65)		t-test	p
	Mean	SD	Mean	SD		
IM – Know	3.98	1.05	3.20	1.16	4.15	<0.001*
IM – Accomplish	3.92	0.98	3.79	1.22	0.69	0.49
IM – Stimulation	3.82	0.99	3.43	1.26	1.99	0.05*
EM – Identified	2.72	1.20	2.54	1.20	0.88	0.38
EM – Ext. Reg.	3.29	0.96	2.93	1.04	2.13	0.04*
Σ MOTIVATION	3.55	0.83	3.18	0.95	2.42	0.02*

Note. *p<0.05, ***p<0.001.

Three types of PE motivation were determined for both female and male students (Table 4). According to the characteristics of the expression of motivation measures, the types

of PE motivation for female students are named: very low motivated type (22.1% of female students), high motivated type (50.6%), and extremely high motivated type (27.3%).

According to the characteristics of the expression of motivation measures, the types of PE motivation for male students are named: low motivated type (27.8% of male students), high motivated type (37.7%), and extremely high motivated

type (34.4%). All established types of PE motivation within the subsamples of female and male students differ significantly from each other in terms of motivation (all differences are at the $p < 0.001$ level).

Table 4. Types of PE motivation among female and male students

Variable	Female students						F	p
	Very low motivated (n=17)		High motivated (n=39)		Extremely high motivated (n=21)			
	Mean	SD	Mean	SD	Mean	SD		
IM – Know	2.18	1.01	3.78	0.73	4.62	0.45	51.79	<0.001
IM – Accomplish	2.12	0.84	4.29	0.60	4.57	0.46	88.55	<0.001
IM – Stimulation	1.78	0.72	3.65	0.79	4.49	0.52	70.72	<0.001
EM – Identified	1.94	0.89	2.18	0.85	4.00	0.77	39.09	<0.001
EM – Ext. Reg.	1.88	0.45	3.03	0.70	3.99	0.58	53.90	<0.001
Σ MOTIVATION	1.98	0.49	3.39	0.35	4.33	0.34	180.42	<0.001

Variable	Male students						F	p
	Low motivated (n=17)		High motivated (n=23)		Extremely high motivated (n=21)			
	Mean	SD	Mean	SD	Mean	SD		
IM – Know	2.22	1.08	3.85	0.85	4.32	0.65	30.17	<0.001
IM – Accomplish	2.44	0.69	4.20	0.56	4.55	0.53	66.81	<0.001
IM – Stimulation	2.63	0.89	4.24	0.58	4.40	0.59	37.74	<0.001
EM – Identified	1.87	0.65	1.95	0.68	4.05	0.66	70.87	<0.001
EM – Ext. Reg.	2.09	0.64	3.04	0.66	4.33	0.48	67.44	<0.001
Σ MOTIVATION	2.25	0.39	3.45	0.33	4.33	0.41	144.97	<0.001

Note. F – One-way ANOVA coefficient; p – significance of the One-way ANOVA coefficient

Figure 1 shows the average values of PE motivation types for female and male students. The features of each of the different types are noticeable, as well as their comparative values on individual measures of PE motivation. The very low motivated type of PE motivation of female students differs from the low

motivated type of PE motivation of male students in terms of expression and to some extent in terms of the structure of the expression of motivation measures. The two types of higher PE motivation of female students are very similar to the higher types of PE motivation of male students

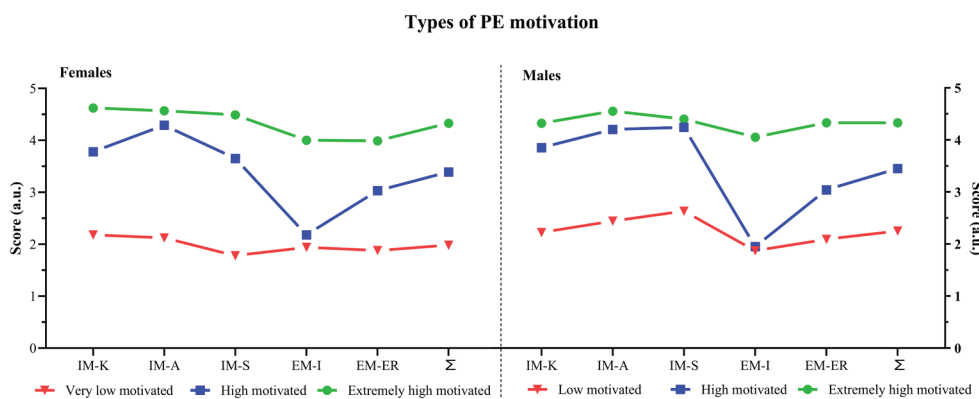


FIGURE 1. Types of PE motivation among female and male students.

Note. IM-K – Intrinsic Motivation to Know, IM-A – Intrinsic Motivation to Accomplish Things, IM-S – Intrinsic Motivation - Stimulation, EM-I – Extrinsic Motivation - Identified, EM-ER – Extrinsic Motivation - External Regulation, Σ – Total Motivation for PE.

Discussion

There are several major findings from this study. First of all, the metric value of all the scales of the PE motivation questionnaire has been confirmed when applied to this sample of

respondents. In the total sample, measures of PE motivation vary between low to very high, and the overall measure of PE motivation is expressed as high. Also, intrinsic measures of motivation are significantly higher than extrinsic forms of stu-

dent motivation. In general, no differences were found in measures of motivation according to the sex of the respondents (a difference was found in one single element - measure of PE motivation). Differences were found in several measures of PE motivation by belonging to different grades, whereby students of lower grades (5th and 6th grades) show higher results of PE motivation than students of higher grades (7th and 8th grades). Furthermore, three different types of PE motivation were determined for female students (named as very low, high, and extremely high motivated types) and for male students (named as low, high, and extremely high motivated types). The structure and frequency of types of PE motivation is different for sub-samples of female and male students. These findings require a more precise and detailed interpretation and will be further presented.

In this study, the PE motivation questionnaire was confirmed as a good instrument. The metric characteristics of all PE motivation measures used are at least at a satisfactory level. These findings are in accordance with the research of the authors Milavić et al. (2015). In the total sample, measures of PE motivation vary between low to very high, and the overall measure of PE motivation is expressed as high. Measures of intrinsic motivation are expressed as high (IM Know; IM Stimulation) or as very high (IM Accomplish). Measures of extrinsic motivation are expressed as low (EM Identified) or moderate (EM External regulation). The total measure of PE motivation is expressed as high. The aforementioned claims were confirmed in the research conducted in the study by Milavić et al. (2015). In the total sample, all three measures of intrinsic motivation are significantly higher than the two measures of students' extrinsic motivation. This shows that students are more intrinsically motivated for PE classes and that they do not expect special external rewards from these classes and PE teachers. These findings are in line with previous research by other authors (Bogdan & Babičić, 2015; Domville, Watson, Richardson, & Graves, 2019; Navarro-Patón, Lago-Ballesteros, Basanta-Camiño, & Arufe-Giraldez, 2019; Su, Pu, Yadav, & Subramnaiyan, 2022).

Additionally, no gender-based variations were observed in the motivation measures taken from the respondents, with the exception of one intrinsic motivation measure called "stimulation," where male student respondents demonstrated a higher degree of "stimulation" in physical education exercises. This phenomenon has been observed in previous research by different authors (de Bruijn, Mombarg, & Timmermans, 2022; Owen, Astell-Burt, & Lonsdale, 2013; Säfvenbom, Haugen, & Bulie, 2015). Differences were found in four of the six measures of PE motivation (IM Know, IM Stimulation, EM Ext. Reg. and total PE motivation) according to belonging to different grades, with students from lower grades (5th and 6th grades) showing higher PE results motivation from students of higher grades (7th and 8th grades). The most pronounced difference is in the IM Know variable, where the prevalence of this variable in the "lower" grades is very high, while in the "higher" grades it is expressed as moderate. These findings suggest that perhaps the transition between the 6th and 7th grade of elementary school is a "key" period for the decline in PE motivation. We cite some possible reasons for this "decline" in PE motivation: entering the 7th grade, students enter a period that is important for students to enrol in high-quality secondary schools, so they pay more attention to subjects important for later enrolment in secondary school, and less to PE. Also, in sports

clubs, this period collides with the implementation of a more frequent number of selections for U-16 sports categories, so those who "drop out" of the clubs due to lower sports competences may lose interest in exercise in general (Eliasson & Johansson, 2021). Consequentially, it is possible for children to develop some new interests that at the same time contribute to the reduction of PE motivation, i.e. there is a loss of interest in exercise and in PE classes (Back, Johnson, Svedberg, McCall, & Ivarsson, 2022). The effect of decreasing motivation in a function of time was also observed in other studies (Bogdan & Babičić, 2015; Burić & Zovko, 2022).

Three different types of PE motivation were determined for female students (named as very low, high, and extremely high motivated types) and for male students (named as low, high, and extremely high motivated types). Three types of PE motivation were identified for female and male students. Female students had very low, high, and extremely high motivated types, while male students had low, high, and extremely high motivated types. The structure of these motivational types differed for sub-samples of female and male students, with female students having very low motivation and male students having slightly more PE expressed motivation. Extremely high and high motivational types were similar in their characteristics. The described findings are in accordance with the conclusions of the research of Milavić et al. (2015) in which the complex motivational structure associated with physical activity is also described. The frequency of PE motivation varied for sub-samples of female and male students. Female students had the most numerous type, which contained approximately half of the subsample, and two similar types (extremely high and very low motivated). Male students had two similar types, containing about one-third of the male subsample, and the low motivated type had a slightly lower number. In conclusion, there are similar motivational types in female and male students, but with different frequencies in their subsamples. The obtained findings indicate a complex motivational structure when it comes to gender differences, where the differences were identified only on a partial level. Previous research that has dealt with this topic also does not provide a definitive answer to the issue of gender differences in the field of motivation (Aelterman et al., 2012; Arsani, Maksum, SyamTuasikal, & Kusnanik, 2020; Lee, Fredenburg, Belcher, & Cleveland, 1999).

The general limitation of this research is the relatively small number of the sample which prevents the authors of this study from having a high scientific value of the established scientific findings and conclusions. In this study, a cross-sectional research design was applied, so it is not possible to qualitatively interpret and clarify the possible reasons for the established differences in PE motivation by age (by grade affiliation) of female and male students. The limit of the study is also in the impossibility of qualitatively "describing" the characteristics of each established individual type of PE motivation a sufficiently wide number of socio-demographic variables were not collected, nor variables related to engaging in organized kinesiology (sports) activities (either at school or in sports clubs), which would make it possible. Directions for future research stem from attempts to address the aforementioned limitations of this study. The most important improvement would be to repeat a similar study on a large sample and try to determine an even wider/larger number of types or subtypes (for example 4 types or even 5 types) of PE motivation. It would also

be beneficial to use more socio-demographic, academic and kinesiology/sports variables for analysis and possible subsequent description of the characteristics of a particular type of PE motivation. Finally, conducting a longitudinal study on a

larger sample of respondents would allow to determine more precisely the reasons for the reduction of motivation or for the lower PE motivation of students in the 7th and 8th grades of elementary school.

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Conflicts of interest

The authors declare that there are no conflict of interest.

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