

Development and validation of the Physical Education Attitude Scale for adolescents

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The goal of this research was to develop and validate a physical education (PE) attitude scale (PEAS) for students in early and middle adolescence, based on the contemporary theories of attitudes as a summary evaluation of different information related to the attitude object. In the first study, preliminary version of the scale was administrated on the sample of 547 students. Principal component analysis (PCA) revealed 4 factors, named Satisfaction, Comfort, Activity and Teacher. Second order PCA showed that these factors are a part of a single construct, general attitude toward PE. Based on the results of the first study, the final version of the PEAS is constructed, consisting of the 43 items. In the second study, on a new sample of 659 students, construct validity of the PEAS is confirmed through confirmatory factor analysis. PEAS has good psychometric properties. External validity of the scale is demonstrated through relations with relevant variables.

Keywords: attitudes, physical education, adolescence, attitude scale.

Highlights:

- Students' attitude toward physical education (PE) influencing participation in PE
- Development and validation of the PE Attitude Scale (PEAS) for adolescence students
- PEAS measures 4 dimensions: Satisfaction, Comfort, Activity and Teacher
- Second order factor implying existence of general attitude toward PE
- Hierarchical structure and external validity of PEAS are confirmed

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According to World Health Organization (2010), lack of physical activity is one of the leading risk factors of global mortality, and increase in physical activity is seen as one of the top priorities. This can be most effectively accomplished through physical education (PE) within the system of compulsory education, as it includes almost entire population. In most curricula the goals of PE encompass facilitation of physical, motor, affective, cognitive and social development, as well as development of physically active lifestyle (Hardmann, 2007; Herrmann, Gerkach, & Seelig, 2015; Lumpkin, 2014). The goals of PE are accomplished through physical activity: the goal of PE is „education to and via physical activity“ (Liukkonen & Auweele, 2007, p. XV).

Research have confirmed that well-structured classes of physical education can contribute to physical, emotional, social and intellectual development of students (for review see Bailey, 2006). Authors agree that students' attitude toward PE is an important factor influencing their active participation in PE classes. It was demonstrated that students' attitude toward PE is related to both their achievement in PE, and engagement in physical activity in their free time (Bailey, 2006; Carlson, 1995; Ennis, 1996; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003; Kretschmann, 2015, Portman, 2003; Prochaska, Sallis, Slymen, & McKenzie, 2003; Subramaniam & Silverman, 2000). In addition, positive attitude toward PE can facilitate the adoption of behaviours and values characterizing healthy lifestyle (Kamtsios, 2011; Rikard & Banville, 2006; Sallis, Prochaska, Taylor, Hill, & Geraci, 1999; Subramaniam & Silverman, 2007; Zeng, Hipscher, & Leung, 2011).

Research show that most students have positive attitude toward PE (Colquitt, Walker, Langdon, McCollum, & Pomazal, 2012; Koca, Asci, & Demirhan, 2005; Säfvenbom, Haugen & Bulie, 2015; Silverman & Subramaniam, 1999; Subramaniam & Silverman, 2007; Zeng et al., 2011), but also that there are some of them who have negative to extremely negative attitude (Säfvenbom et al., 2015). Regarding gender differences, most research show that boys have more positive attitudes than girls (Hünük & Demihan, 2010; Koca et al., 2005; Koca & Demirhan, 2004; Säfvenbom et al., 2015).

Different instruments for assessing attitude toward PE were developed in previous decades, e.g., Wear Attitude Inventory (Wear, 1951), Attitude Toward Physical Activity – ATPA (Kenyon, 1968), Children's Attitudes Toward Physical Activity – CATPA (Simon & Smoll, 1974), and Scale for measuring attitude toward physical education in the elementary school (Martens, 1979). One of the contemporary instruments, most thoroughly based on empirical findings, is *Student's Attitudes Toward Physical Education – SATPE* (Subramaniam & Silverman, 2000). The SATPE has two subscales: enjoyment and usefulness, each containing items about curriculum and about the PE teacher. SATPE is designed for assessment of the attitudes of students from 6th to 8th grade, but there is also a modification of this instrument validated for students of 4th and 5th grade (Phillips & Silverman, 2012), which has the same underlying structure (Donovan, Mercier, & Phillips, 2015).

Theoretical definition of attitude is one of the key issues in attitude scale development. Different definitions of *attitude* have been developed in previous

decades, where some of them stress that attitudes are constructions formed on the basis of currently available information (e.g., Schwarz & Bohner, 2001), while others highlight that attitude can be considered a permanent inner disposition (e.g., Allport, 1935). Dispositional view of attitudes differs in the number of components. Single-component view considers attitudes as single unitary constructs, usually with emphasis on affective reactions toward the attitude object (Ajzen & Fishbein, 2005). Two-component view includes cognitive and affective evaluations of attitude object (e.g. Bagozzi & Burnkrant, 1979), while three-component view additionally comprises motivational and behavioural tendencies toward attitude object (e.g. Krech, Crutchfield, & Ballachey, 1962).

Silverman & Subramaniam (1999) state that most of the older PE attitude instruments are either atheoretical or based on single-component view of attitudes as dispositions for emotional reaction toward the attitude object. These authors consider that single-component view of attitudes leads to instruments assessing only a part of the attitude. Therefore, their instrument was theoretically based on the two-component viewpoint of attitudes. In their model, affective component refers to the feelings toward PE (enjoyment), while cognitive component includes beliefs about PE (usefulness). However, empirical research of attitudes shows that, in most cases, it is not possible to clearly distinguish between affective, cognitive and motivational/behavioural indicators of an attitude (Eagly & Chaiken, 1998). We believe that starting from component view of attitudes could leave an important part of experiences related to PE out of reach. Also, the content of SATPE items is related only to the teacher and curriculum, which disregards all other aspects of PE experience (e.g. environment, perception of self-competence, different behaviours during classes).

In this research we relied on the contemporary theory which describes attitude as summary evaluation of different information related to the attitude object (for review see Fabrigar, MacDonald, & Wegener, 2005). For example, Motivation and Opportunity as Determinants of the Attitude Behaviour Relation (MODE) Model defines attitude as a sum of associations between attitude object and its evaluations stored in memory that could vary in strength (Fazio, 2007; Fazio & Towles-Schwen, 1999; Olson & Fazio, 2009). Fazio (2007) emphasises these evaluations can originate from emotional reactions, cognitive appraisal or previous experiences related to the attitude object. Furthermore, they can originate from any of the possible combinations of these sources. Defined this way, attitudes can be observed as a kind of evaluative knowledge whose role is to direct behaviour with respect to particular objects (Fazio, 2007). An important implication of this view is that in different people attitudes toward the same object may originate from different sources and may be composed of different types of evaluative information stored in memory (Fazio, 2007; Zanna & Rempel, 1988).

The goal of this study was to develop and validate a PE attitude scale for students in early and middle adolescence. The scale was grounded on contemporary attitude theory (Fazio, 2007) and based on student experiences in the contemporary educational setting. The idea was to cover a wide range of experiences which students could relate to PE. We chose early and middle

adolescence period because previous research had demonstrated that attitude toward PE is sensitive to changes during the adolescence and frequently becomes less positive (Bryan & Solmon, 2012; Hünük & Demihan, 2010; Lazarević, Orlić, Lazarević, & Radisavljević Janić, 2015; Säfvenbom et al., 2015; Subramaniam & Silverman, 2007). Therefore, it is very important to have reliable and valid instruments for assessment of the attitude toward PE for this age span.

The research consisted of two studies. The aim of the first study was to develop PE attitude scale, while the second study was designed to investigate its construct and external validity. External validity was assessed through variables which are shown to correlate with PE attitude: gender, engagement in physical activity in leisure time and achievement in PE. We also included academic self-concept in PE, which represents a measure of perceived abilities and achievement in this subject and is related to the quality of engagement in PE (Marsh & Martin, 2011).

Study 1: Scale construction and preliminary analyses

Method

Sample. The sample consisted of 547 students from three primary (7th and 8th grade, i.e., 13/14 and 14/15 years old) and three secondary schools (1st and 2nd grade, i.e., 15/16 and 16/17 years old) from urban environment in Serbia. There were 259 (47.3%) primary school students, 138 (25.2%) 7th graders, and 121 (22.2%) 8th graders, and 288 (52.7%) secondary school students, 162 (29.6%) 1st graders, and 126 (23.0%) 2nd grade students. The sample consisted of 280 (52.0%) males and 258 (48.0%) females.

Item pool generation. In this phase, the goal was to generate items related to students' attitude toward different aspects of PE. Items were generated by authors of this report and 50 master students of Faculty of Sport and Physical Education who completed their professional practice in primary and secondary schools during their studies. In this phase 124 items were created. All items were in Serbian.

Item selection. Items for preliminary version were selected by authors of this report. Items overlapping in content, ambiguous, imprecise, or too specific were excluded. In addition, items covering as many different aspects of PE as possible were taken. Moreover, approximately the same number of positive and reversely keyed items was selected.

Preliminary version of the PE Attitude Scale had 57 items, quasi-randomly distributed with respect to item content and positive/negative form. Each item was followed by 5-point Likert type scale (1 – strongly disagree to 5 – strongly agree).

Procedure. Data were collected in schools with the approval of the school board and teachers. All students were informed about the goals and procedure of the study, anonymity and voluntariness of participation. The questionnaire took about 15 minutes to complete.

Results

Principal component analysis (PCA). Kaiser-Meyer-Olkin (KMO) measure of Sampling Adequacy and Bartlett's Test of Sphericity indicated that data were suitable for factor analysis, $KMO = .930$, $\chi^2(1596) = 10661.44$, $p < .01$. Principal Component Analysis (PCA) with Promax rotation (Kaiser criterion and Cattell's scree plot) indicated 4-factor solution, explaining 46% of variance.

Pattern matrix for 4-factor solution is shown in Table 1. The first factor was named *Satisfaction*, the second *Comfort*, the third *Activity* and the fourth *Teacher*. Correlations between the factors were moderate (Table 2).

Table 1
 Pattern matrix – Principal component analysis (Promax rotation)

Items	Component			
	1	2	3	4
I would like to have more PE classes weekly.	.887			
I can't wait to have a PE class.	.882			
Physical education is the most interesting school subject.	.868			
I can't wait for PE class to end.	-.709			
PE classes always seem to last too short.	.700			
I like to attend PE classes.	.697			
I am happy in PE classes.	.653			
I find PE classes interesting.	.644			
I don't like PE.	-.621			
I don't like to miss a PE class.	.595			
I like to be in PE class because we get on well there.	.529			
I'm having fun during the PE class.	.450			
I feel satisfied while exercising at PE classes.	.369		.330	
I never feel like going to PE	-.399	.375		
I'm mostly bored in PE classes.	-.390			
My PE teacher is too strict.	-.373		.331	-.300
I skip PE classes whenever I can.	-.381	.357		
I feel fear in PE classes.		.763		
I feel uncomfortable as soon as I enter the school gym.		.757		
I feel uncomfortable in PE classes.		.681		
Too much competition in PE classes bothers me.		.672		
I feel uncomfortable to change my clothes in front of others in the dressing room.		.657		
I think that PE is only waste of time.		.640		
PE classes are too tiring for me.		.624		
PE teacher is not interested in work with students.		.544		-.488
PE class does not stimulate socialising.		.541		
Sometimes I'm afraid while we exercise in PE classes.		.532		
I think it is not necessary to wear PE gear.	.336	.530	-.318	
I do not feel comfortable when wearing PE gear.		.480		
I have stage fright in PE assessment classes.		.442		.330
I avoid some exercises we perform in PE classes.		.390		
I prefer sitting on a bench rather than exercising in PE classes.	-.356	.383		
I think that PE is less important than other school subjects.		.338		
I like when PE teacher assigns us some harder exercises.			.712	
I like to show what I know in PE classes.			.709	
In PE class I like to show what I know.			.669	
I like to attend PE classes wearing appropriate gear.			.615	
I like when we use equipment and apparatus in PE class.			.604	
I've learnt a lot in PE classes.			.557	

Items	Component			
	1	2	3	4
I do my best in PE classes.			.528	
I am active in PE classes.			.526	
I like that we are in movement in PE classes.			.483	
What I learn in PE class is useful for everyday life.			.474	
I like when PE teacher pays me a compliment.			.409	
Students get along better after playing together in PE classes.			.374	.351
I think that PE class is useful.			.367	.302
I feel good after PE classes.			.331	.330
I think that PE teacher designs classess well.				.644
PE teacher is always eager to teach us new exercises.				.643
PE teacher encourages me in the class.				.629
PE teacher encourages me to exercise in my free time.			.358	.547
I like PE thanks to my teacher.				.544
PE teacher is friendly toward all of us.	.316			.480
PE class provokes quarrels among peers.	.301			-.329
I feel safe in PE class.	.049	-.145	.266	.188
PE grade matters to me.	-.180	-.130	.263	.244

Table 2
Factor intercorrelations

Component	1	2	3	4
1	1			
2	-.51	1		
3	.60	-.37	1	
4	.38	-.30	.37	1

Item selection. Nine items were excluded because they had lower and complex factor loadings, three because they were similar in content to items from the same factor and two items because of low saturations, i.e., <.30 on any factor. However, it was taken care that the number of positive and reversely keyed items is approximately equal, so we kept six negatively keyed items which had somewhat lower and/or double loadings. Taking all criteria into account, 43 items were chosen for the final version of the PE Attitude Scale (PEAS): 12 items measuring *Satisfaction*, 12 *Comfort*, 11 *Activity* and 8 the *Teacher* (6 from the corresponding factor, and 2 items that had secondary loadings on this factor but were relevant in content).

Final version of the Scale – Preliminary Analyses. In this phase, first order PCA (Promax rotation) was conducted on the final version of PEAS. Data was suitable for factor analysis, $KMO = .931$, $\chi^2(903) = 7669.97$, $p < .01$. Kaiser criterion and Cattell’s scree plot indicated 4-factor solution explaining 48% of variance, which correspond to the dimensions extracted from preliminary scale. Second order PCA was conducted on factor scores for dimensions *Satisfaction*, *Comfort*, *Activity* and *Teacher*, since factors related to PE attitude intercorrelate moderately. One factor explaining 54% of variance was extracted and named PE attitude.

In order to calculate scores and psychometric properties negative items were recoded so that higher values reflect more positive attitude. The results show that data are not normally distributed and that the attitudes are positive, which is not unusual for scales assessing PE attitude (e.g. Subramaniam & Silverman, 2007). All psychometric properties are satisfactory (Table 3).

Table 3
 Descriptive statistics and psychometric properties of PEAS

	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>	<i>zSk</i>	<i>zKu</i>	<i>KMO</i>	α	<i>r</i>
Attitude toward PE	1.51	5.00	4.05	0.64	-7.65	0.67	.98	.94	.26
Satisfaction	1.00	5.00	4.09	0.86	-10.46	3.58	.98	.91	.47
Comfort	1.25	5.00	4.11	0.79	-11.81	4.69	.95	.84	.31
Activity	1.00	5.00	4.00	0.79	-9.34	3.27	.96	.87	.37
Teacher	1.29	5.00	3.96	0.76	-8.47	2.83	.88	.75	.28

Note. *Min* – minimum, *Max* – maximum, *M* – mean, *SD* – standard deviation, *zSk* – standardized skewness, *zKu* – standardized kurtosis, *KMO* – Kaiser-Mayer-Olkin measure of representativeness, α – Cronbach α reliability measure, *r* – average item intercorrelation. Higher means indicate more positive attitudes.

Discussion

Primary goal of Study 1 was to construct a PE Attitude Scale. Principal component analysis extracted 4 factors named *Satisfaction*, *Comfort*, *Activity* and *Teacher*. These 4 subscales load on higher order factor, implying that they measure a single construct – attitude toward PE. The final version of the scale included 43 items. The Serbian version (Appendix A) of the scale was used in the validation study. PEAS was translated and back-translated into English (Appendix B).

Study 2: Scale validation

Method

Sample. For the validation study, new sample consisting of 659 students from three primary (7th and 8th grade, i.e. 13/14 and 14/15 years old) and three secondary schools (1st and 2nd grade, i.e. 15/16 and 16/17 years old) from urban environment in Serbia was recruited. There were 341 (51.7%) primary school students, 175 (26.6%) 7th graders, and 166 (25.2%) 8th graders, and 318 (48.3%) secondary school students: 131 (19.9%) 1st graders, and 187 (28.4%) 2nd graders. The sample consisted of 311 (47.4%) males and 345 (52.6%) females.

External validity measures.

Academic Self-concept in PE. The scale for assessment of academic self-concept in PE is part of Academic Self-Description Questionnaire (ASDQ II). This instrument is developed as part of the Marsh/Shavelson Model of Academic Self-Concept for adolescents and is designed for assessment of academic self-concept in different school subjects (Marsh, 1990). The scale consisted of eight items (e.g., I have always done well in PE classes), which in this study was followed by a 5-point Likert-type scale. Higher scores indicate more positive academic self-concept in PE. Scale reliability (Cronbach α) in this study was .87.

Gender, PE grade and participation in organized sport. Short socio-demographic questionnaire was constructed for measuring gender, mid-term PE grade, and participation in organized sport activities outside school (trains/does not train).

Results

Confirmatory factor analysis – Construct validity. Negatively keyed items were recoded before the analysis. Because of high degree of non-normality in the data, Robust Maximum-likelihood Confirmatory factor analysis (RML – CFA) was conducted with Lisrel 8.8. Based on the Principal component analysis results from the first study, a hierarchical model was tested. Each item was loaded to its corresponding first-order factor – *Satisfaction*, *Comfort*, *Activity* or *Teacher*. Each first-order factor was loaded to the second-order factor representing general attitude toward PE. Four item regression weights (one for each first-order factor) and second-order factor variance were fixed to 1.

As shown in Table 4, model fit was evaluated by several indices. Recommended cut-off point indicating good model fit varies from .05 to .08 for SRMR (Byrne, 2010; Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003). RMSEA below .06 indicates good fit (Hu & Bentler, 1999). Regarding relative indices, both CFI and TLI should be larger than .95 (Byrne, 2010; Hu & Bentler, 1999; Schermelleh-Engel et al., 2003). Using the described criteria, all fit indices indicate acceptable to good fit. In the lower part of the model, each item’s standardized regression weight was significant ($p < .01$) and positive. All loadings were $> .30$, while most of them (35) were $> .50$. Regarding the upper part of the model, all first-order factors were positively loaded on the general attitude: *Satisfaction* .95, *Comfort* .85, *Activity* .90 and *Teacher* .66.

Table 4
Fit indices for the PE attitude scale

Model	Satorra-Bentler χ^2	df	χ^2/df	SRMR	RMSEA (90% CI)	CFI	TLI
Hierarchical	2567.24***	856	3.00	.06	0.055 (0.053–0.058)	.98	.96

Note. SRMR – standardized root mean square residuals, RMSEA – root mean square error of approximation, CFI – comparative fit index, TLI – Tucker-Lewis Index

*** $p < .001$.

Descriptive statistic, psychometric properties and intercorrelations.

Mean scores indicate that students have moderately positive attitudes toward PE. All psychometric properties are good (Table 5), which is consistent with Study 1.

Table 5
Descriptive statistic and psychometric properties of the PEAS

	Min	Max	M	SD	zSk	zKu	KMO	α	r
Attitude toward PE	1.56	5.00	3.81	0.75	-8.00	-0.51	.99	.95	.32
Satisfaction	1.00	5.00	3.82	1.06	-9.03	-1.62	.99	.95	.59
Comfort	1.42	5.00	4.14	0.70	-11.58	5.35	.94	.83	.29
Activity	1.27	5.00	3.64	0.83	-4.87	-1.89	.96	.85	.34
Teacher	1.00	5.00	3.55	0.97	-7.28	-1.82	.97	.87	.46

Note. Min – minimum, Max – maximum, M – mean, SD – standard deviation, zSk – standardized skewness, zKu – standardized kurtosis, KMO – Kaiser-Mayer-Olkin measure of representativeness, α – Cronbach α reliability measure, r – average item intercorrelation. Higher means indicate more positive attitudes.

Correlations between subscales of the PEAS are shown in Table 6. All correlations between PEAS subscales are positive and moderate to high.

Table 6
 Correlations between PEAS subscales (Pearson)

	1	2	3	4	5
Attitude toward PE	1				
Satisfaction	.93**	1			
Comfort	.82**	.71**	1		
Activity	.88**	.77**	.63**	1	
Teacher	.74**	.58**	.45**	.57**	1

Note. ** $p < .01$

External validity. Results indicate that correlation between PEAS total score and Academic self-concept in PE is positive and high. The same is true for all the subscales except *Teacher*, where the correlation is somewhat lower. Correlation between PEAS total score and PE grade is positive, but low intensity. That is also the case with all the subscales except *Teacher*, where correlation is not significant.

Table 7
 Correlations of PEAS with Academic self-concept in PE and PE grade (Pearson)

	Academic self-concept in PE (ASDQ II)	PE grade
Attitude toward PE	.74**	.15**
Satisfaction	.69**	.16**
Comfort	.70**	.12**
Activity	.71**	.19**
Teacher	.37**	.01

Note. ** $p < .01$.

Gender differences and differences between students who do or do not train some sport were tested with independent sample t-tests. Results show that males ($N=311$) have more positive attitudes toward PE than females ($N = 345$), $t(654) = 8.11, p < .01, d = 0.63$. Gender differences in favour of the boys exist on all subscales: *Satisfaction*, $t(654) = 10.46, p < .01, d = 0.83$, *Comfort*, $t(645) = 7.46, p < .01, d = 0.59$, *Activity*, $t(654) = 5.42, p < .01, d = 0.43$, and *Teacher* $t(654) = 3.99, p < .01, d = 0.31$. Students who train some sport ($N = 390$) have more positive attitudes than those who do not ($N = 265$), $t(653) = 6.01, p < .01, d = 0.47$, both on the total score and subscale scores: *Satisfaction*, $t(653) = 6.55, p < .01, d = 0.52$, *Comfort*, $t(653) = 6.69, p < .01, d = 0.53$, and *Activity*, $t(653) = 5.63, p < .01, d = 0.45$. There is no significant difference between students who train and those who do not on *Teacher* subscale.

Discussion

Goal of Study 2 was to examine construct validity, psychometric properties and external validity of PEAS. Construct validity of PEAS was assessed by CFA. Hierarchical model, derived from Study 1, showed good fit to the data. Psychometric properties of PEAS are good. Results indicate that PEAS and both Academic self-concept in PE and PE grade correlate positively. In addition, expected gender differences and differences between students engaged in sport activities in their free time and those who are not, were obtained. These results go in favour of external validity of the scale.

General discussion

The basic goal of this research was the development of PE attitude scale for students in early and middle adolescence. We relied on the theoretical view of attitudes as a group of associations related to the object of attitude (Fazio, 2007), in this case PE. The research consisted of two studies. In the first study, 4 factors were extracted from a pool of items. *Satisfaction* factor was saturated by items related to general emotional experience about PE. *Comfort* factor comprised of somewhat more specific emotions toward PE, like relaxation or anxiety related to PE. Third factor, *Activity*, covered motivational processes related to participating in PE classes. The last factor, *Teacher*, was saturated by items measuring the students' view of the PE teacher. Second order FA showed that these factors are part of a single construct, PE attitude. Looking at the content of the scale, it could be said that PEAS covers wide array of experiences which students can connect to PE classes, which is in line with theoretical framework of this research (Fazio, 2007).

Validity study provided evidence to support construct and external validity of PEAS. CFA confirmed the hierarchical structure of the scale, i.e. PEAS measuring general attitude toward PE through different aspects of the attitude assessed by four subscales: *Satisfaction*, *Comfort*, *Activity* and *Teacher*. These results indicate that general score on the PEAS should be calculated, but if there is a theoretical or practical interest, one could also calculate scores on each of the subscales separately. In addition, analysis of reliability, representativeness and homogeneity showed that all subscales of the PEAS have very good psychometric properties.

Several variables were used for determining external validity of the PEAS: academic self-concept in PE, PE grade as an achievement measure, students' gender and engagement in organized sport activities. Previous research showed that academic self-concept, which refers to students' perception of their own competence in a particular subject, is related to the quality of participation and relationship toward the classes (Marsh & Craven, 2006; Marsh & Martin, 2011). Therefore, it was expected that these two concepts positively correlate, and it was confirmed in this research. Somewhat lower correlation of Academic self-concept with Teacher subscale than with the rest of the instrument was expected because the construct of academic self-concept is more related to

the experience of competence in a subject than experience of the person who teaches the subject (Marsh, 1990). Research about the relationship of attitudes toward PE and PE achievement are sparse. Kretschmann (2015) found a low positive correlation between PE attitude and PE grade, which was confirmed in our research. Correlation between PE grade and attitude was significant on total score and all subscales, except for the Teacher subscale. Considering that one of the important roles of a teacher is to evaluate students' achievement, the relationship between PE grade and attitude toward the teacher should be checked in further research. Gender differences analysis showed that boys have more positive attitudes toward PE than girls, both on total score and subscale scores, which is in accordance with majority of previous research (Hünük & Demirhan, 2010; Koca et al., 2005; Koca & Demirhan, 2004; Lazarević et al., 2015; Säfvenbom et al., 2015). It was also shown that students who train some sport have more positive attitudes toward PE from those who do not, which is also consistent with previous research (Prochaska et al., 2003). Obtained results about relationship of PEAS and Academic self-concept in PE, PE grade, gender and engagement in organized sport speak in favour of external validity of the scale. Additionally, both total PEAS score and subscale scores point that students have moderately positive attitudes toward PE, which is in line with the results of previous research (Colquitt et al., 2012; Koca et al., 2005; Säfvenbom et al., 2015; Silverman & Subramaniam, 1999; Subramaniam & Silverman, 2007; Zeng et al., 2011).

On the basis of obtained results we can conclude that PEAS is valid and reliable instrument for measuring attitudes toward PE in early and middle adolescence. Taking into account that PEAS relies on the theoretical view of attitudes as summary evaluation of different information related to the attitude object (Fazio, 2007), in this instrument the attitude toward PE is assessed by wider scope of indicators in comparison to existing instruments for assessing attitudes toward PE. Content of the items encompasses different experiences students can associate with PE classes: from specific ones related to individual aspects or situations in PE classes to those related to PE class perception in general. If we have in mind that in different people attitudes toward the same attitude object may be composed of different types of evaluative information stored in memory (Fazio, 2007; Zanna & Rempel, 1988), this approach can provide more detailed insight into the structure of student attitudes toward PE. In addition, PEAS is aimed for wider age span than other existing instruments. Research shows that with age positivity of PE attitude declines (Lazarević et al., 2015); therefore a scale for measuring attitudes in early and middle adolescence can help us to evaluate the changes happening with age more reliably.

Conclusion

Bearing in mind the significance of positive attitudes toward PE for high-quality engagement of students in both PE classes and extracurricular physical activities, it is important to develop reliable and valid instruments for its measurement. In this research PE attitude scale (PEAS) was developed

for measuring attitudes of students in early and middle adolescence. Based on study results, it can be concluded that PEAS meets the criteria for construct and external validity and that it could be recommended for use in theoretical and practical purposes. Attitude scale designed in this study comprises wide spectrum of experiences related to PE, from the ones very specific related to certain aspects of PE, to the general perception of PE. Informing the teachers about students' attitudes on different aspects of PE can help them modify the teaching process (if the need for it is identified) by specifying what should they primarily pay attention to (e.g. activity, satisfaction, etc.), both in the whole class and particular students.

In order to confirm convergent validity of PEAS, the relationship of this scale with other scales for measuring PE attitude such as SATPE (Subramaniam & Silverman, 2000) should be explored. Further research should check the relationship of PEAS and concepts related to active participation in PE classes, such as perceived competence in PE (Scrabis-Fletcher & Silverman, 2010), anxiety in PE (Barkoukis, 2007) and physical self-efficacy (Ryckman, Robbins, Thornton, & Cantrell, 1982) in order to additionally verify the external validity of the scale. Validity of the PEAS should be evaluated with students of different age than covered in this research and the English version of the scale should be validated in English-speaking population. Finally, given that the research about the relationship of PE attitudes and objective indicators of achievement in PE (such as grades, motor ability test etc.) are sparse, we suggest further research in this direction.

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Appendix A

Skala stavova prema fizičkom vaspitanju (PEAS)

	1 Nimalo se ne slažem	2 Uglavnom se ne slažem	3 Neodlučan/ neodlučna sam	4 Uglavnom se slažem	5 U potpunosti se slažem			
1	Volim da dolazim na čas fizičkog.			1	2	3	4	5
2	Nekada me je strah dok vežbamo na časovima fizičkog vaspitanja.			1	2	3	4	5
3	Volim kad me nastavnik fizičkog pohvali.			1	2	3	4	5
4	Nastavnik fizičkog se ponaša prijateljski prema svim učenicima.			1	2	3	4	5
5	Uglavnom se dosađujem na časovima fizičkog.			1	2	3	4	5
6	Izbegavam neke vežbe koje radimo na času fizičkog.			1	2	3	4	5
7	Dajem sve od sebe na času fizičkog.			1	2	3	4	5
8	Čas fizičkog mi je zanimljiv.			1	2	3	4	5
9	Smatram da je nastava fizičkog vaspitanja samo gubljenje vremena.			1	2	3	4	5
10	Volim što smo na času fizičkog u pokretu.			1	2	3	4	5
11	Smatram da nastavnik dobro drži čas fizičkog.			1	2	3	4	5
12	Jedva čekam da se završi čas fizičkog.			1	2	3	4	5
13	Ne osećam se dobro u opremi za fizičko.			1	2	3	4	5
14	Ono što naučim na času fizičkog korisno mi je za svakodnevni život.			1	2	3	4	5
15	Ne volim fizičko.			1	2	3	4	5
16	Osećam se neprijatno na času fizičkog.			1	2	3	4	5
17	Dosta sam naučio/la na časovima fizičkog.			1	2	3	4	5
18	Nastavnik fizičkog vaspitanja nije zainteresovan za rad sa učenicima.			1	2	3	4	5
19	Voleo/la bih da imam više časova fizičkog nedeljno.			1	2	3	4	5
20	Smeta mi što na času fizičkog ima previše takmičenja.			1	2	3	4	5
21	Volim da pokažem šta znam na času fizičkog.			1	2	3	4	5
22	Izbegavam čas fizičkog kad god mogu.			1	2	3	4	5
23	Časovi fizičkog me previše zamaraju.			1	2	3	4	5
24	Volim da dolazim na čas fizičkog u odgovarajućoj opremi.			1	2	3	4	5
25	Nastavnik fizičkog me podstiče da vežbam i van časova.			1	2	3	4	5
26	Jedva čekam čas fizičkog.			1	2	3	4	5
27	Smatram da je fizičko vaspitanje manje važno od ostalih predmeta u školi.			1	2	3	4	5
28	Volim kad na času fizičkog koristimo sprave i rekvizite.			1	2	3	4	5
29	Fizičko je najzanimljiviji predmet.			1	2	3	4	5
30	Čas fizičkog ne podstiče druženje.			1	2	3	4	5
31	Volim kad nam nastavnik fizičkog daje i teže vežbe.			1	2	3	4	5
32	Nastavnik fizičkog je previše strog.			1	2	3	4	5
33	Srećan/na sam na času fizičkog.			1	2	3	4	5

1	2	3	4		5		
Nimalo se ne slažem	Uglavnom se ne slažem	Neodlučan/ neodlučna sam	Uglavnom se slažem		U potpunosti se slažem		
34	Neprijatno mi je što se u svlačionici presvlačim pred drugima.		1	2	3	4	5
35	Fizičko me podstiče da vežbam i van škole.		1	2	3	4	5
36	Nastavnik fizičkog vaspitanja nas uvek rado uči novim vežbama.		1	2	3	4	5
37	Čini mi se da čas fizičkog uvek kratko traje.		1	2	3	4	5
38	Osećam strah na času fizičkog.		1	2	3	4	5
39	Aktivan/na sam na času fizičkog.		1	2	3	4	5
40	Zbog nastavnika sam zavoleo/la fizičko.		1	2	3	4	5
41	Ne volim kada propustim čas fizičkog.		1	2	3	4	5
42	Osećam se neprijatno čim uđem u salu za fizičko.		1	2	3	4	5
43	Nastavnik me podstiče na času fizičkog.		1	2	3	4	5

Legenda. Zadovoljstvo – stavke 1, 5, 8, 12, 15, 19, 22, 26, 29, 33, 37, 41; *Lagodnost* – stavke 2, 6, 9, 13, 16, 20, 23, 27, 30, 34, 38, 42; *Aktivitet* – stavke 3, 7, 10, 14, 17, 21, 24, 28, 31, 35, 39; *Nastavnik* – stavke: 4, 11, 18, 25, 32, 36, 40, 43. Obrnute stavke: 2, 5, 6, 9, 12, 13, 15, 16, 18, 20, 22, 23, 27, 30, 32, 34, 38, 42.

Appendix B

Physical Education Attitude Scale (PEAS)

1 Strongly disagree		2 Disagree		3 Undecided		4 Agree		5 Strongly agree		
1	I like to attend PE classes.					1	2	3	4	5
2	Sometimes I'm afraid while we exercise in PE classes.					1	2	3	4	5
3	I like when PE teacher pays me a compliment.					1	2	3	4	5
4	PE teacher is friendly toward all of us.					1	2	3	4	5
5	I'm mostly bored in PE classes.					1	2	3	4	5
6	I avoid some exercises we perform in PE classes.					1	2	3	4	5
7	I do my best in PE classes.					1	2	3	4	5
8	I find PE classes interesting.					1	2	3	4	5
9	I think that PE is only waste of time.					1	2	3	4	5
10	I like that we are in movement in PE classes.					1	2	3	4	5
11	I think that PE teacher designs classes well.					1	2	3	4	5
12	I can't wait for PE class to end.					1	2	3	4	5
13	I do not feel comfortable when wearing PE gear.					1	2	3	4	5
14	What I learn in PE class is useful for everyday life.					1	2	3	4	5
15	I don't like PE.					1	2	3	4	5
16	I feel uncomfortable in PE classes.					1	2	3	4	5
17	I've learnt a lot in PE classes.					1	2	3	4	5
18	PE teacher is not interested in work with students.					1	2	3	4	5
19	I would like to have more PE classes weekly.					1	2	3	4	5
20	Too much competition in PE classes bothers me.					1	2	3	4	5
21	I like to show what I know in PE classes.					1	2	3	4	5
22	I skip PE classes whenever I can					1	2	3	4	5
23	PE classes are too tiring for me.					1	2	3	4	5
24	I like to attend PE classes wearing appropriate gear.					1	2	3	4	5
25	PE teacher encourages me to exercise in my free time.					1	2	3	4	5
26	I can't wait to have a PE class.					1	2	3	4	5
27	I think that PE is less important than other school subjects.					1	2	3	4	5
28	I like when we use equipment and apparatus in PE class.					1	2	3	4	5
29	Physical education is the most interesting school subject.					1	2	3	4	5
30	PE class does not stimulate socialising.					1	2	3	4	5
31	I like when PE teacher assigns us some harder exercises.					1	2	3	4	5
32	My PE teacher is too strict.					1	2	3	4	5
33	I am happy in PE classes.					1	2	3	4	5
34	I feel uncomfortable to change my clothes in front of others in the dressing room.					1	2	3	4	5
35	PE classes encourage me to exercise in my free time.					1	2	3	4	5
36	PE teacher is always eager to teach us new exercises.					1	2	3	4	5
37	PE classes always seem to last too short.					1	2	3	4	5

38	I feel fear in PE classes.	1	2	3	4	5
39	I am active in PE classes.	1	2	3	4	5
40	I like PE thanks to my teacher.	1	2	3	4	5
41	I don't like to miss a PE class.	1	2	3	4	5
42	I feel uncomfortable as soon as I enter the school gym.	1	2	3	4	5
43	PE teacher encourages me in the class.	1	2	3	4	5

Note. Satisfaction – items 1, 5, 8, 12, 15, 19, 22, 26, 29, 33, 37, 41; Comfort – items 2, 6, 9, 13, 16, 20, 23, 27, 30, 34, 38, 42; Activity – items 3, 7, 10, 14, 17, 21, 24, 28, 31, 35, 39; Teacher – items: 4, 11, 18, 25, 32, 36, 40, 43. Reversed items: 2, 5, 6, 9, 12, 13, 15, 16, 18, 20, 22, 23, 27, 30, 32, 34, 38, 42.