

THE SHORT FORM OF THE PHYSICAL SELF- DESCRIPTION QUESTIONNAIRE: VALIDATION STUDY AMONG SLOVENIAN ELEMENTARY AND HIGH SCHOOL STUDENTS

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Abstract

The objective of the study was to examine psychometric characteristics of the short form of the Physical-Self Description Questionnaire (PSDQ-S) in a Slovenian adolescent sample and to examine the differences in multidimensional physical self-concept in relation to age and gender. Participants were 362 elementary and high school students (189 girls, 173 boys, $M_{age}=15.28$). Confirmatory factor analysis provided support for factor validity and reliability of the Slovenian version of the PSDQ-S. The results of the multivariate analysis of variance indicated significant overall effects of age and gender on student's self-perceptions. The Slovenian version of the PSDQ-S displayed acceptable measurement properties and may be confidently used in research and practice to assess multidimensional physical self-concept among adolescent students.

Keywords: PSDQ-S; validity; reliability; school-aged students

Introduction

Self-concept is one of the most studied psychological constructs and an important aspect of our personality. Self-concept refers to the way people perceive, evaluate and think about themselves. These perceptions are based on

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experiences and interaction with social environment, and the attributions that we make when examining our own behavior (Shavelson, Hubner, & Stanton, 1976). Self-concept develops from early childhood through adolescence and adulthood (Broderick & Blewitt, 2006), becoming increasingly differentiated with age. It includes the evaluation of abilities, skills, feelings and attitudes in different areas (e.g. social, physical, academic, emotional) considered important to individuals. Numerous studies have confirmed the relationship between self-concept and psychological adjustment and well-being among adolescents. Favorable self-perceptions in youth were found to be associated with a more socially desirable behavior, greater emotional stability (Garaigordobil & Durá, 2006), less aggressive behavior at school (Musitu, López, & Emler, 2007), fewer loneliness experiences and greater life satisfaction (Moreno, Estévez, Murgui, & Musitu, 2009), better academic achievement (Guay, Marsh, & Boivin, 2003) and sport performance (García et al., 2014). Given that identity formation is the key developmental task of adolescence, education has a crucial role in fostering positive and healthy self-concepts in young people.

Physical self-concept is considered an important subdomain of overall self-concept that incorporates different components such as self-perceived health, physical appearance and physical abilities (Marsh, 2002). In physical activity, sport, and physical education settings, physical self-concept can be viewed either as a mediating factor that promotes physical activity and allows the acquisition of health-related physical fitness as well as result of exercise (Marsh, Chanal, & Sarrazin, 2006). A significant association has been consistently demonstrated between physical activity and physical self-concept in children and adolescents (Babic et al., 2014). The physical self-perceptions significantly influence psychological health and well-being of young people (Shapka & Keating, 2005), thus, they are particularly important in adolescent years. Many authors emphasize the importance of physical education in schools for their physical self-concept development (Gehris, Kress, & Swalm, 2010), since positive physical self-perceptions increase engagement levels and motor learning (Peart, Marsh, & Richards, 2005).

Different measurement tools for assessing physical self-concept among youth have been proposed in the last two decades, reflecting its multidimensional and hierarchical organization. Among them, the most commonly used are the Physical self-perception profile (PSPP; Fox, 1990) and the Physical self-description questionnaire (PSDQ; Marsh, Richards, Johnson,

Roche, & Tremayne, 1994). Based upon Shavelson's model of self-concept, the PSDQ (Marsh et al. 1994) remains currently the most comprehensive and widely validated instrument for measuring multidimensional physical self-perceptions. It contains 70 items with nine specific (strength, body fat, activity, endurance, sport competence, coordination, health, appearance and flexibility) and two general components (global physical self- concept, and self-esteem). Confirmatory factor analysis conducted on a sample of Australian secondary school students supported the factorial validity of the original PSDQ, as well as convergent and discriminant validity of the instrument with other physical self-concept measures (Marsh et al., 1994). Furthermore, adequate psychometric properties of the PSDQ have been extensively documented in different language and cultural adolescent samples (Schipke & Freund, 2012): Spanish Italian, French, German, Norwegian, Turkish, Greek, and more recently, Serbian and Slovenian samples.

Nevertheless, an important weakness of this measure (compared to alternative instruments) is certainly its length. It seems to be excessively long to complete, especially when used in combination with other measures and inventories within comprehensive studies. To solve this concern, Marsh and colleagues developed a 40-item short form of the PSDQ (PSDQ-S), balancing brevity and psychometric strength (Marsh, Martin, & Jackson, 2010). The questionnaire was validated using different samples: Australian adolescents, elite athletes and older adults, Spanish adolescents and Israeli university students. The PSDQ-S factor structure (11 factors) was consistent and reliability was high across these samples making the PSDQ-S a suitable instrument to assess physical self-concept (Marsh et al., 2010). Although several contemporary studies have used various linguistic adaptation of the PSDQ-S, only few studies have reported psychometric characteristics of the PSDQ-S in non-English speaking adolescent samples. Validity and reliability of the PSDQ-S have been systematically examined only in a French (Maïano, Morin, & Mascret, 2015) and Chinese adolescent samples (Wang, Sun, Liu, Yao, & Pyun, 2015).

Objectives

Given that physical self-perceptions can significantly affect the adolescent's self-esteem, there is an even greater need for appropriate

assessment tools designed to measure this psychological construct. Although the Slovenian long form of the PSDQ is currently available (Dolenc, 2014), we decided to validate the short form of the questionnaire to provide a less time-consuming instrument to examine physical self-concept among Slovenian-speaking youth. Within the present study we were also interested in comparing specific components of physical self-concept across age and gender. Some previous studies have revealed that early adolescents tend to have higher levels of physical self-perceptions than middle and late adolescents (Mañano, Ninot, & Bilard, 2004; Marsh, 1998), while other studies did not confirm these findings (Mañano et al., 2015). According to gender, the majority of past research indicates that adolescent males show more favorable self-perceptions compared to adolescent girls across most components of physical self-concept (Çağlar, 2009; Mañano et al., 2004; Mañano et al., 2015; Marsh et al., 2010).

Therefore, the purpose of the current study was twofold: to examine reliability and validity of the Slovenian short version of Physical self-description questionnaire (PSDQ-S) and to evaluate age and gender differences in physical self-concept among adolescent students.

Method

Participants

A sample of 362 Slovenian adolescents aged between 12 and 19 years ($M_{\text{age}}=15.28$, $SD=1.73$) attending elementary and high schools in Central Slovenia and Coastal-Karst region was used in this study. Of those 189 were girls (52.2%) and 173 were boys (47.8%); 139 (38.4%) were early adolescents ($\text{age}_{\text{range}}$: 12-14 years), 180 (49.7%) were middle adolescents ($\text{age}_{\text{range}}$: 15-17 years) and 43 (11.9%) were late adolescents ($\text{age}_{\text{range}}$: 18-19 years). Only adolescents who returned consent forms signed by their parents were included in the study. All participants completed the questionnaires during regular classes in presence of the researcher of the study.

Instruments

A Slovenian short form of the Physical self-description questionnaire (PSDQ-S) was used to measure multidimensional physical self-concept. Previously, a Slovenian version of the 70-item PSDQ was adapted and validated on a sample of primary school students (Dolenc, 2014) whereby

support for the 11-factor structure and reliability of the instrument was provided.

To build the short version used in the current study, we retained from these 70 items the same 40 items selected by Marsh and colleagues (2010) to develop the English PSDQ-S. The authors have demonstrated that the PSDQ-S maintains the same factor structure and reliability of the original 70-item PSDQ. The internal consistency of the PSDQ-S was high with Cronbach's alpha coefficients ranging from 0.84 to 0.91, making the PSDQ-S a reliable measure to assess physical self-concept (Marsh et al., 2010). The questionnaire includes the following eleven subscales measuring different components of the physical self-concept: Health (i.e., *When I get sick it takes me a long time to get better*), Coordination (i.e., *Controlling movements of my body comes easily to me*), Physical activity (i.e., *I do sports, exercise, dance or other physical activities almost every day*), Sport competence (i.e., *I am good at most sports*), Body fat (i.e., *My waist is too large*), Global physical self (i.e., *I am satisfied with the kind of person I am physically*), Appearance (i.e., *I am good looking*), Strength (i.e., *I have a lot of power in my body*), Flexibility (i.e., *I am quite good at bending, twisting, and turning my body*), Endurance (i.e., *I can be physically active for a long period of time without getting tired*), and Self-esteem (i.e., *Overall, most things I do turn out well*). Each scale consists of three to five items representing declarative statements that are scored on a six-point true/false scale.

Data Analysis

In order to demonstrate construct validity of the Slovenian version of the PSDQ-S, confirmatory factor analysis (CFA) was performed using LISREL (Jöreskog & Sörbom, 2015). The CFA is a type of factor analysis that allows to test whether the hypothesized measurement model which is based on theory or previous research fits empirical data. The assumptions of a CFA include univariate and multivariate normality, a sufficient sample size ($n > 200$) and correct *a priori* model specification (Statistics Solutions, 2013). Data were checked for univariate normality by inspecting items distributions for skewness and kurtosis, whereby these values should be within the range ± 2 . Multivariate normality implies that there is linearity between all pair of variables under consideration. The assumption of multivariate normality was measured using Mardia's statistic (obtained with PRELIS, a companion software for LISREL).

If the critical ratio of Mardia's coefficient of multivariate kurtosis is less than 1.96, a sample can be considered multivariate normal at significance level of 0.05 (Tabachnick & Fidell, 2007).

Based on the recommendations presented by Jackson, Gillaspay, and Pure-Stephenson (2009) and Hooper, Coughlan and Mullen (2008) several fit indices were examined to evaluate the adequacy for the PSDQ-S 11-factor model: the chi-square by degrees of freedom ratio (χ^2/df), the root mean square error approximate (RMSEA) and its 90% confidence interval, the Tucker-Lewis index (TLI), and the comparative fit index (CFI). The following cut-off values were used to indicate acceptable model fit: $\chi^2/df < 3$ (Kline, 2011), TLI and CFI ≥ 0.95 , RMSEA ≤ 0.05 and ≤ 0.080 (for close and acceptable fit, respectively), and SRMR ≤ 0.08 (Hu, & Bentler, 1999). Item analyses, descriptive statistics and inferential statistics were performed using IBM SPSS. Internal consistency reliability was measured using Cronbach's alpha coefficient. Multivariate analysis of variance (MANOVA) was conducted to determine age and gender differences in physical self-concept subscales.

Results and discussion

This study was designed primarily to determine the psychometric characteristics of the PSDQ-S among a sample of Slovenian primary and secondary school students. Confirmatory factor analysis was used to determine the factor structure of the instrument. Prior to testing the factor structure of the PSDQ-S a preliminary item analysis was conducted. Data were checked for univariate normality by inspecting the variables' distributions for skewness and kurtosis. Skewness values for all items were always lower than |1.5| and kurtosis values were lower than |2.0|. These values were all within the acceptable range limits for performing CFA (Kline, 2011). Multivariate normality of the items was assessed statistically by Mardia's test in the LISREL program. The critical ratio of Mardia's coefficient of multivariate kurtosis was less than 1.96, thus the sample has been considered multivariate normal. Multicollinearity was assessed by constructing a correlation matrix of the items. The inter-item correlations ranged between 0.09 and 0.75; no correlation exceeded 0.80, indicating that multicollinearity was not a problem (Kline, 2011). The *maximum likelihood estimation method* was used for parameter estimation.

Table 1. Results of confirmatory factor analysis of the Slovenian version of the PSDQ-S: association of observed variables to their latent factors

PSDQ-S factors	Observed variables	Factor loadings (λ)	R^2
Health	HE1	0.82	0.67
	HE2	0.74	0.55
	HE3	0.86	0.77
	HE4	0.67	0.45
	HE5	0.71	0.50
Coordination	CO1	0.58	0.34
	CO2	0.70	0.58
	CO3	0.84	0.71
	CO4	0.37	0.14
	CO5	0.83	0.69
Physical activity	PA1	0.84	0.70
	PA2	0.89	0.89
	PA3	0.87	0.76
	PA4	0.82	0.67
Sport competence	SC1	0.81	0.66
	SC2	0.85	0.72
	SC3	0.86	0.74
Body fat	BF1	0.85	0.72
	BF2	0.91	0.83
	BF3	0.82	0.67
Global physical self	GPS1	0.88	0.77
	GPS2	0.79	0.62
	GPS3	0.69	0.48
Appearance	AP1	0.85	0.72
	AP2	0.78	0.61
	AP3	0.86	0.74
Strength	ST1	0.86	0.74
	ST2	0.80	0.64
	ST3	0.77	0.59
Flexibility	FL1	0.84	0.71
	FL2	0.79	0.62
	FL3	0.78	0.61
Endurance	EN1	0.78	0.67
	EN2	0.85	0.72
	EN3	0.73	0.54
Self-esteem	GSE1	0.46	0.21
	GSE2	0.68	0.46
	GSE3	0.81	0.66
	GSE4	0.77	0.59
	GSE5	0.73	0.53

The overall fit of the model to the data was reasonably good based on commonly recommended cut-off values for evaluating model adequacy: $\chi^2/df=1.93$, RMSEA=0.054 [90% CI 0.051-0.057], SRMR=0.038; CFI=0.97, TLI=0.96). The CFA parameter estimates are presented in Table 1. All factor loadings were substantial and significant ($M_\lambda=0.78$), only in the case of item from the Coordination subscale (CO4) the factor loading was somewhat lower ($\lambda=0.37$). Squared multiple correlation coefficients (R^2), describing the proportion of factor variance explained by observed variables were also displayed. The (R^2) values ranged from 0.14 to 0.83 (median $R^2=0.67$).

The latent factor correlations and reliability coefficients for the PSDQ-S subscales are shown in Table 2. All correlations were significant (r range between 0.13 and 0.75; $M_r=0.40$), except for some correlations involving the Health subscale, which proved not to be significantly associated with the Physical activity, Sport competence and Body fat subscales. In addition, the results also showed strong correlations ($r \geq 0.70$) between the Endurance and Sport competence subscales, the Physical activity and Endurance subscales, the Coordination and Flexibility subscales, and the Coordination and Sport competence subscales. All PSDQ-S subscales had adequate internal consistency of Cronbach's alpha coefficients, ranging from 0.81 to 0.92 ($M_\alpha=0.86$).

Table 2. Correlations between PSDQ-S factors and internal consistency coefficients

	1	2	3	4	5	6	7	8	9	10	11	α
1 HE												.83
2 CO	.24**											.81
3 PA	.07	.57**										.91
4 SC	.10	.73**	.69**									.92
5 BF	.09	.33**	.19**	.36**								.89
6 GPS	.17**	.58**	.42**	.63**	.63**							.88
7 AP	.13*	.43**	.27**	.44**	.43**	.65**						.88
8 ST	.18**	.58**	.54**	.63**	.19**	.50**	.50**					.86
9 FL	.17**	.75**	.52**	.65**	.32**	.43**	.54**	.60**				.86
10EN	.16**	.68**	.70**	.76**	.40**	.41**	.61**	.59**	.65**			.90
11 SE	.28**	.57**	.40**	.48**	.37**	.51**	.60**	.45**	.51**	.50**		.81

Note: HE – Health; CO = coordination; PA – physical activity; SC – Sport competence; BF – Body fat; GPS – Global physical self; AP – Appearance; ST – Strength; FL – Flexibility; EN – Endurance; SE = Self-esteem. * $p < 0.05$, ** $p < 0.01$

The results of the CFA demonstrated that the *a priori* 11-factor model of the PSDQ-S adequately fitted the data. These results corroborate previous studies, supporting the multidimensional structure of the PSDQ-S (Maïano et al., 2015; Marsh et al., 2010; Wang et al., 2015). A more detailed analysis of the parameter estimates revealed that one item (out of a total of 40 items included in the PSDQ-S) was somewhat less optimal. This item from the Coordination subscale (“*I can perform movements smoothly in most physical activities*”) can be revised and reformulated, thus enabling further increase in validity of the existing instrument. In terms of reliability, all the PSDQ-S subscales presented very good internal consistency. Overall, Cronbach alpha coefficients of the Slovenian version of PSDQ-S were consistent with those recently reported in other validation studies (Marsh et al., 2010; Maïano et al., 2015). The most of the PSDQ-S subscales were moderately correlated, indicating adequate discrimination between various physical self-concept components. The lowest correlations were found between the Health subscale and other PSDQ-S subscales. These findings are in line with previous results, indicating very low or even non-significant correlations involving the Health subscale (Marsh et al., 2010; Maïano et al., 2015). It can be assumed that adolescents’ self-perceptions of health status are somewhat more distant from the concept of physical self compared to other PSDQ-S components. High correlations were found between the PSDQ-S components referring to self-perceived physical abilities and competences (i.e., coordination, physical strength, endurance, physical activity frequency). Among all the specific PSDQ-S components self-perceived appearance was most closely correlated with self-esteem of participants. These results suggest that perceived physical attractiveness and body satisfaction are the most powerful predictors of overall self-confidence in adolescents (Roughan, Kozlowski, & Provost, 2015).

The second purpose of the study was to examine gender and age effects on physical self-concept among Slovenian primary and secondary school students. Means and standard deviations of the PSDQ-S according to gender (girls/boys) and age (early/middle/late adolescents) are presented in Table 3. Participants in the study showed a tendency toward a positive physical self-concept, as they scored above the midpoint of the rating scale in all the PSDQ-S subscales.

Table 3. Descriptive statistics for the PSDQ-S subscales

PSDQ	Girls		Boys		Early adolescents		Middle adolescents		Late adolescents	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Health	4.77	0.83	4.69	0.89	4.81	0.71	4.78	0.95	4.71	0.92
Coordination	4.01	0.97	4.34	0.91	4.29	1.02	4.17	0.90	4.10	0.98
Physical Activity	3.92	1.51	4.31	1.46	4.36	1.20	3.82	1.62	4.01	1.45
Sport Competence	3.85	1.31	4.37	1.24	4.27	1.34	3.91	1.23	4.02	1.30
Body fat	3.97	1.48	4.71	1.41	4.39	1.60	4.30	1.39	4.33	1.37
Global physical self	3.87	1.31	4.39	1.25	4.31	1.37	4.09	1.22	4.24	1.04
Appearance	3.49	1.19	3.96	1.17	3.63	1.18	3.70	1.19	4.01	1.14
Strength	3.74	1.13	4.21	1.21	4.20	1.21	3.89	1.20	3.87	1.07
Flexibility	4.02	1.26	4.28	1.12	4.19	1.20	4.04	1.22	4.10	1.13
Endurance	3.52	1.37	4.15	1.40	3.95	1.38	3.74	1.37	3.84	1.52
Self-esteem	4.33	0.82	4.45	0.75	4.53	0.84	4.28	0.77	4.41	0.63

In order to determine the effects of age and gender in physical self-perceptions Pillai's Trace multivariate statistics was used because of unequal sample sizes and significant Box's M test (Box's $M=524.23$, $F=1.39$, $p<.001$). The results of the MANOVA (Table 4) showed significant multivariate main effects for gender (Pillai's Trace=.11, $F[11, 345]=4.04$, $p<.001$) and age (Pillai's Trace=.11, $F[22, 692]=1.89$, $p<.01$), whereas no significant multivariate interaction effect between gender and age was observed ($p>.05$). Significant univariate effect of gender occurred on most of the PSDQ-S subscales. Boys scored higher on Strength, Endurance ($p<.001$), Physical activity, Coordination, Sport competence, Global physical self, Appearance, Body fat ($p<.01$), and Flexibility subscales ($p<.05$) compared to girls. There were no gender differences in the Health and Self-esteem subscales ($p>.05$). Furthermore, univariate analysis of variance revealed a main effect of age in five PSDQ-S subscales. Further *post hoc* analyses revealed that significant differences occurred between early and middle adolescents in the Physical activity ($p<.01$), Sport competence, Strength and Self-esteem subscales ($p<.05$) and between early and late adolescents in the Appearance subscale ($p<.05$).

The results indicated significant gender differences in various components of physical self-concept. Boys perceived greater physical strength, endurance, coordination and sports competence than did girls. Furthermore, boys considered themselves as more physically active and showed greater levels of perceived attractiveness and body-weight satisfaction compared to girls. These results are largely consistent with previous studies in which gender

differences among adolescents were examined using long (Çağlar, 2009; Klomsten et al., 2004) and short forms of the PSDQ (Maiano et al., 2015; Marsh et al., 2010). It is very likely that these gender differences are a reflection of both biological characteristics of males and females, as well as behavior patterns acquired through gender socialization process and gender role development in a given socio-cultural context. Chalabaev and colleagues (2013) assume that stereotypes and gender roles associated with sports are highly shared in western countries, and that they are internalized early during childhood. Differences in perceived physical abilities between boys and girls can thus be a reflection of gender stereotypes according to which males participate in sports more often than females. Greater physical activity levels in boys can therefore result in improved motor skills and higher physical efficiency (Ammouri, Kaur, Neuberger, Gajewski, & Choi, 2007). The obtained differences in the perception of physical appearance can be explained by greater concerns of girls regarding society's standards of physical beauty and attractiveness. Compared to boys, girls are generally less satisfied with their bodies and much more critical of their overall appearance (Mäkinen, Puukko-Viertomies, Lindberg, Siimes, & Aalberg, 2012).

Table 4. Results of multivariate analysis of variance for the PSDQ-S subscales

PSDQ	Main effects		Interaction effects
	Gender <i>F</i>	Age <i>F</i>	Gender X Age <i>F</i>
Health	0.63	0.51	1.95
Coordination	11.43**	1.11	0.37
Physical activity	9.44**	6.15**	1.31
Body fat	10.15**	0.33	1.27
Sport competence	9.58**	4.39*	0.73
Global physical self	10.26**	3.53	0.34
Appearance	9.75*	4.78*	0.11
Strength	20.87***	4.97*	0.66
Flexibility	4.98*	0.97	0.18
Endurance	21.35***	1.65	1.46
Self-esteem	3.56	4.20*	0.11
<i>Multivariate analysis</i>			
Pillai's Trace	0.14	0.11	0.06
Multivariate <i>F</i>	4.04**	1.89***	0.89

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The observed age differences were smaller compared with those regarding gender and only partially confirmed the results from previous studies showing that physical self-perceptions decrease during adolescence (Çağlar, 2009) and that early adolescents have higher levels of physical self-concept in most components (Marsh, 1998; Maïano et al., 2004) compared to older adolescents. From the developmental perspective, self-concept becomes increasingly complex and differentiated with age (Harter, 1999). Advances in social cognition and formal operational thinking skills enable older adolescents to make much more realistic and accurate self-evaluations compared to younger adolescents. In our study, early adolescents reported higher levels of physical activity and greater perceived sports competence and physical strength than middle adolescents. They also exhibited higher self-esteem compared to middle adolescents. These discrepancies among participants can be largely explained by numerous research findings, indicating that participation in physical activity and sports decrease during the transition from primary to secondary school (De Meester, Van Dyck, De Bourdeaudhuij, Deforche, & Cardon, 2014; Inchley, Kirby, & Currie, 2008). Moving to secondary school is usually characterized by multiple changes and challenges among youth (i.e., higher academic expectation, personal and social concerns, wider range of interests) which may coincide with changes in physical activity patterns. The only significant difference between early and late adolescents was found in the perceived appearance. Early adolescents considered themselves as being less attractive and less satisfied with their body compared to the group of late adolescents. These findings were quite expected, since the period of early adolescence is marked by rapid physical growth and pubertal changes. Younger adolescents are therefore usually very sensitive to their changing body, increasingly concerned about their physical appearance and often compare their physical appearance and skills to idealized images (Tiggemann, 2011). By late adolescence, the physical changes of puberty are generally completed. Probably, late adolescents have already adapted to all the physical changes showing less concerns about their body and greater acceptance of their physical appearance.

Conclusions

Physical self-concept plays a crucial role in health and well-being during adolescence when multiple developmental changes occur. Given its importance, the availability of coherent and comprehensive instruments for determining self-evaluations in the physical domain is very useful. The current findings suggest that Slovenian version of the PSDQ-S is suitable and psychometrically sound measure for the assessment of physical self-concept among Slovenian youth. The questionnaire can be confidently used in research and practice, particularly in the physical education setting. The PSDQ-S questionnaire should allow teachers to examine multidimensional physical self-concept in students, enabling a better understanding of the effects of physical activity in physical education classes and other organized sports activities in schools. It should be noted that this study is not without limitations. The present study did not assess the test-retest reliability of the PSDQ-S. Further examination including additional reliability data would be necessary to provide a fuller picture of the psychometric properties of the instrument. Another limitation of the study is linked to the characteristics of the research sample, which comprised mainly primary and secondary school students living in urban areas. Therefore, there is a need for cross-validation of the present results to additional and more diversified samples of Slovenian adolescents. The present study can encourage the validation and adaptation of the PSDQ-S for use in various languages and cultural environments thus allowing greater opportunity for cross-cultural comparison studies in the field of physical self-concept in adolescents.

References

- Ammouri, A. A., Kaur, H., Neuberger, G. B., Gajewski, B., & Choi, W. S. (2007). Correlates of exercise participation in adolescents. *Public Health Nursing, 24*(2), 111-120.
- Babic, M. J., Morgan, P. J., Plotnikoff, R. C., Lonsdale, C., White, R. L., & Lubans, D. R. (2014). Physical activity and physical self-concept in youth: systematic review and meta-analysis. *Sports Medicine, 44*(11), 1589-1601. doi: 10.1007/s40279-014-0229-z.

- Bracken, B. A., Bunch, S., Keith, T. Z., & Keith, P. B. (2000). Child and adolescent multidimensional self-concept. A five-instrument factor analysis. *Psychology in the Schools, 37*, 483-493.
- Broderick, P. C., & Blewitt, P. (2006). *The life span: Human development for helping professionals*. Upper Saddle River, NJ: Pearson Education.
- Çağlar, E. (2009). Similarities and differences in physical self-concept of males and females during late adolescence and early adulthood. *Adolescence, 44*(174), 407-419.
- Chalabaev, A., Fontayne, P., Boiché, J., & Clément-Guillot, C. (2013). The influence of sex stereotypes and gender roles on participation and performance in sport and exercise: Review and future directions. *Psychology of Sport and Exercise, 14*(2), 136-144.
- De Meester, F., Van Dyck, D., De Bourdeaudhuij, I., Deforche, B., & Cardon, G. (2014). Changes in physical activity during the transition from primary to secondary school in Belgian children: what is the role of the school environment? *BMC Public Health, 14*, 261. Retrieved 23/07/2016, from <http://dx.doi.org/10.1186/1471-2458-14-261>
- Dolenc, P. (2014). Psychometric properties of the Physical self-description questionnaire (PSDQ) in a sample of Slovenian adolescents. *Anthropos, 46*(3/4), 35-55.
- Fox, K. R. (1990). *The physical self perception profi le manual*. DeKalb, IL: Office for Health Promotion, Northern Illinois.
- Garaigordobil, M., & Durá, A. (2006). Relaciones del autoconcepto y la autoestima con la sociabilidad, estabilidad emocional y responsabilidad en adolescentes de 14-17 años [Self-concept and self-esteem in relation with sociability, emotional stability and responsibility in adolescents aged between 14 and 17 years]. *Análisis y modificación de conducta, 32*, 37-64.
- García, P., Marcos, L., Guillamón, A., García-Cantó, E., Pérez-Soto, J., Casas, A., & Lopez, P. (2014). Physical fitness level and its relationship with self-concept in school children. *Psychology, 5*, 2009-2017. doi: 10.4236/psych.2014.518204.
- Gehris, J., Kress, J., & Swalm, R. (2010). Students' views on physical development and physical self-concept in adventure-physical education. *Journal of Teaching in Physical Education, 29*, 146-166.

- Guay, F., Marsh, H., & Boivin, M. (2003). Academic self-concept and academic achievement: developmental perspectives on their causal ordering. *Journal of Educational Psychology, 95*(1), 124-136.
- Harter, S. (1999). *The construction of the self. A developmental perspective*. New York: Guilford Press.
- Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modeling: Guidelines for determining model fit. *The Electronic Journal of Business Research Methods, 6*(1), 53-60. Retrieved 6/6/2016, from <http://arrow.dit.ie/cgi/viewcontent.cgi?article=1001&context=buschmanart>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1-55.
- Inchley, J. C., Kirby, J. L. M., & Currie, C. (2008). *Physical activity in Scottish schoolchildren (PASS) project: physical activity among adolescents in Scotland: final report of the PASS study*. Edinburgh: Child and Adolescent Health Research Unit.
- Jackson, L., Gillaspay, J. A., & Pure-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14*, 6-23.
- Jöreskog, K.G., & Sörbom, D. (2015). *LISREL 9.20 for Windows* [Computer software]. Skokie, IL: Scientific Software International, Inc.
- Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling*. New York: Guilford Press.
- Klomsten, A. T., Skaalvik, E. M. in Espnes, G. A. (2004). Physical self-concept and sports: do gender differences still exist? *Sex Roles, 50*, 119-127.
- Maïano, C., Ninot, G., & Bilard, J. (2004). Age and gender effects on global self-esteem and physical self-perception in adolescents. *European Physical Education Review, 10*(1), 53-69. doi:10.1177/1356336X04040621.
- Maïano, C., Morin, A. J., & Mascret, N. (2015). Psychometric properties of the short form of the physical self-description questionnaire in a French adolescent sample. *Body Image, 12*, 89-97.
- Mäkinen, M., Puukko-Viertomies, L.-R., Lindberg, N., Siimes, M. A., & Aalberg, V. (2012). Body dissatisfaction and body mass in girls and boys transitioning from early to mid-adolescence: additional role of self-esteem and eating habits. *BMC Psychiatry, 12*, 35. Retrieved 23/07/2016, from <http://doi.org/10.1186/1471-244X-12-35>

- Marsh, H. W. (2002). A multidimensional physical self-concept: A construct validity approach to theory, measurement, and research. *Psychology, 9*, 459-493.
- Marsh, H. W., Chanal, J., & Sarrazin, P. (2006). Self-belief does make a difference: A reciprocal effects model of the causal ordering of physical self-concept and gymnastics performance. *Journal of Sports Sciences, 24*(1), 101-111.
- Marsh, H. W., Martin, A. J., & Jackson, S. (2010). Introducing a short version of the Physical self-description questionnaire: New strategies, short-form evaluative criteria, and applications of factor analyses. *Journal of Sport & Exercise Psychology, 32*, 438-482.
- Marsh, H. W., Richards, G., Johnson, S., Roche, L., & Tremayne, P. (1994). Physical self-description questionnaire: Psychometric properties and a multitrait-multimethod analysis of relations to existing instruments. *Journal of Sport and Exercise Psychology, 16*, 270-305.
- Moreno, D., Estévez, E., Murgui, S., & Musitu, G. (2009). Reputación social y violencia relacional en adolescentes: el rol de la soledad, la autoestima y la satisfacción vital [Social reputation, relational violence in adolescents: the role of loneliness, self-esteem, and life satisfaction]. *Psicothema, 21*, 537-542.
- Musitu, G., López, E., & Emler, N. (2007). Adjustment problems in the family and school contexts, attitude towards authority, and violent behaviour at school in adolescence. *Adolescence, 42*, 779-794.
- Peart, N. D., Marsh, H. W., & Richards, G. E. (2005). The physical self-description questionnaire: Furthering research linking physical self-concept, physical activity and physical education. Retrieved 23/07/2016, from <http://www.aare.edu.au/05pap/abs05.htm#P>
- Roughan, K., Kozlowski, D., & Provost, S. (2015). Self-esteem, personality, and gender self-perception. *Frontiers in Psychology. Conference Abstract: 12th Annual Psychology Research Conference, 2015*. doi: 10.3389/conf.fpsyg.2015.66.00021.
- Shapka, J., & Keating, D. P. (2005). Structure and change in self-concept during adolescence. *Canadian Journal of Behavioural Science, 37*(2), 83-96.

- Shavelson, R. J., Hubner, J. J., & Stanton, J. C. (1976). Self Concept: validation of construct interpretations. *Review of Educational Research*, 46, 407-441. Retrieved 5/07/2016 from <http://dx.doi.org/10.3102/00346543046003407>
- Shipke, D., & Freund, P. A. (2012). A meta-analytic reliability generalization of the Physical self-description questionnaire (PDSQ). *Psychology of Sport and Exercise*, 13, 789-797. doi: 10.1016/j.psychsport.2012.04.012.
- Statistics Solutions. (2013). *Confirmatory Factor Analysis*. Retrieved 5/07/2016, from <http://www.statisticssolutions.com/academic-solutions/resources/directory-of-statistical-analyses/confirmatory-factor-analysis/>
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston: Pearson education.
- Tiggemann, M. (2011). Sociocultural perspectives on human appearance and body image. In T. F. Cash, & L. Smolak (Eds.), *Body image: A handbook of science, practice, and prevention* (pp. 12-19). New York: Guilford Press.
- Wang, C. K. J., Sun, Y., Liu, W. C., Yao, J., & Pyun, D. Y. (2015). Latent profile analysis of the physical self-description among Chinese adolescents. *Current Psychology*, 34, 282-293. doi:10.1007/s12144-014-9257-y.

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