FACTORIAL VALIDITY AND GROUP INVARIANCE OF THE PORTUGUESE SHORT VERSION OF THE SOCIAL PHYSIQUE ANXIETY SCALE IN ADOLESCENTS

VALIDADE FACTORIAL E INVARIÂNCIA GRUPAL DA CURTA VERSÃO PORTUGUESA DA ESCALA DE ANSIEDADE FÍSICA EM ADOLESCENTES

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Abstract: The purpose of this paper is to determine the factorial validity and group invariance of the Portuguese short-version of the Social Physique Anxiety scale (SPAS). A nationally representative sample of 3330 8th and 10th grade students (mean age = 15.07 ± 1.34 years) completed Motl and Conroy's (2000) 7-item SPAS version. Principal component analysis followed by confirmatory

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factor analysis resulted in a 6-item instrument with good internal reliability. Evidence of configural invariance and metric invariance across a variety of samples (as a function of gender, physical activity, diet behavior, perception of body and body mass index) indicate that Social Physique Anxiety construct generalizes across a variety of groups. The current short version should be tested in cross-cultural research.

Key-words: adolescent health; body image; psychosocial health; measurement invariance; social anxiety; validity.

Resumo: O objectivo deste estudo é determinar a validade factorial e a invariancia grupal da curta-versão da escala de Ansiedade Física Social (SPAS - Social Physique Anxiety scale). Uma amostra nacional representativa de 3300 alunos do 8º e 10º anos (idade média de 15.07 ± 1.34 anos) preencheram a versão do SPAS de 7 itens de Motl e Conroy (2000). A análise do componente principal foi seguida por uma análise factorial confirmatória, e resultou num instrumento de 6 itens com boa validade interna. Evidência de invariância configural e invariância métrica através de uma variedade de amostras (em função do género, actividade física, comportamento alimentar, a percepção do corpo e do índice de massa corporal) indicam que o constructo de Ansiedade Física Social se generaliza numa variedade de grupos. A curta-versão actual deve ser testada num estudo transcultural.

Palavras-chave: saúde do adolescente; imagem corporal; saúde psicossocial; medição da invariância; ansiedade social; validade.

Introduction

Social physique anxiety (SPA) is defined as a "subtype of social anxiety that occurs as a result of the prospect or presence of interpersonal evaluation involving one's physique" (Hart, Leary & Rejeski, 1989, p. 96). SPA has been associated with a range of psychosocial and health-related variables suggesting this construct represents an indicator of social-psychological adjustment (Smith, 2004). SPA has been associated with a range of psychosocial and health-related variables suggesting that this construct represents an indicator of social-psychological adjustment (Sabiston, Sedgwick, Crocker, Kowalski & Mack, 2007; Smith, 2004). For example, SPA has been positively associated with peer victimization in children and adolescents (Storch et al., 2007), the drive for thinness, and occurrence of unhealthy eating patterns (Cox, Lantz & Mayhew, 1997; Crocker et al., 2001). In addition, self-perception variables, particularly body appearance, and global self-esteem accounted for significant positive changes in SPA among female adolescents (Crocker et al., 2001; Crocker, Sabiston, Kowalski. McDonough & Kowalski, 2006).

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Health-related attitudes and behaviors are often shaped during adolescence (Crocker, Sabiston, Kowalski, McDonough & Kowalski, 2006; Smith, 2004). Smith (2004) argued that the rapid biological change observed in adolescence can dramatically impact the way adolescents assess their bodies in relation to socio-cultural standards. Biological changes associated with normal sexual development have different meaning for boys and girls (Pope, McHale & Craighead, 1988). While physical maturation during puberty results in changes in body proportions that are negatively interpreted by girls, boys that go through early maturation are likely to have an advantage in establishing interpersonal relationships. Because adolescents' body images become closely linked to physical appearance and perceptions of physical attractiveness during this stage (Pope et al., 1988), assessing social physique anxiety appears to be relevant in this age group.

Hart et al. (1989) developed the Social Physique Anxiety Scale (SPAS) in a sample of undergraduate students. This scale consisted of a unidimensional model of 12 items assessing the degree of anxiety people experience as a consequence of perceiving one's physique as being under the scrutiny of others. However, concerns relative to the accuracy of SPA construct representation by this instrument have been expressed. For example, Eklund, Mack and Hart (1996) demonstrated that a two-factor solution ("Expectations of Negative Physique Evaluation" and "Physique Presentation Comfort") had the most adequate fit of the 12-item SPAS compared to the unidimensional model, but they questioned its conceptual validity arguing that the second factor "falls outside the purview of the construct conceptualization" (p.292). Using a sample of graduate students (age range 17-35), and a sample of athletes (age range of 17-28), Motl, Conroy and Horan (2000) demonstrated that the two-factor model was a methodological artifact caused by item wording supporting the unidimensional structure of the SPAS. In addition, shorter versions of the SPAS were also analyzed: a 9-item version was tested among female aerobics instructors (Martin, Rejeski, Leary, McAuley, & Bane, 1997) and undergraduate students (Martin et al., 1997; Motl et al., 2000) and a 7-item version was also tested among samples of undergratuade students (Isogai, Brewer, Cornelius, Komiya, Tokunaga, & Tokushima, 2000; Motl et al., 2000). These studies suggest that the shorter versions were more valid, reliable, and parsimonious measures of SPA than the original 12-item version.

Refinement of measurement instruments involves verification of factorial invariance. Factorial invariance aims at demonstrating that the observable variables measure the same latent variables in different groups allowing comparisons of theoretical constructs across these different groups (Meade, Johnson & Brady, 2006). If factorial invariance of a construct is observed one can assume that it has the same meaning for individuals of different groups. The factorial validity and gender invariance of 7-item SPAS have been established for college students (Motl & Conroy, 2000, 2001) and adolescents (Smith, 2004), although with slight different structures. Validation of SPAS into others

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languages has also resulted in scales with minor differences structures (Isogai et al., 2001) than the one proposed by Conroy and Motl (2001), or have failed to confirm the scale factorial invariance across gender (Lindwall, 2004).

The purpose of this study is twofold: (a) to determine the factorial validity of the Portuguese version of Motl and Conroy's (2000) seven-item SPAS in adolescents, and (b) to verify factorial invariance across diverse sample groups, as suggested by Motl and Conroy's (2001). Measurement invariance for gender, grade, diet status, and physical activity levels, perception of body and body mass index (BMI) will be explored. These variables were chosen for invariance testing because they have been associated with self-perceptions and body image issues (e.g., Crocker, et al., 2001; Kowalski, et al., 2006; Marsh, 1987; Marsh & Hocevar, 1985). Configural invariance and metric invariance of the questionnaire will be examined. Configural invariance warrants that the dimensionality of the construct is equivalent across groups. Configural invariance verifies the resemblance of factor loading patterns between groups such that the number of factors and the salient and non salient factor loadings are similar (Lundqvist & Kevrekidis, 2008). Metric invariance implies identical or approximately identical factor loadings between groups; therefore, metric invariance represents a stronger type of factorial invariance.

Methods

In this section, details of the sample, operational definition of variables, data collection procedures and statistical procedures are presented.

Participants

Participants are 3330 8th- (mean age = 14.15 ± 0.96 years) and 10th-grade (mean age = 16.07 ± 0.91 years) students with ages ranging from 12 to 20 years (mean age = 15.07 ± 1.34 years) included in a larger World Health Organization (WHO) collaborative cross-national survey, the Health Behaviour in School-Aged Children (HBSC) 2006 study (Currie et al., 2008). Girls comprised 53% (mean age = 15.03 ± 1.30 years) while boys comprised 47% (mean age = 15.12 ± 1.38 years) of the sample. According to grade level, 52.2 % were in the 8th grade and 47.8% were in the 10th grade.

Measures

Social Physique Anxiety Scale (SPAS) - short version. SPAS is a self-report measure designed to assess the degree to which people feel anxious when they believe others are evaluating their physiques. Motl and Conroy's (2000) 7-item version was utilized. This version included items 3, 4, 6, 7, 8, 9, and 10

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of the original 12-item version, and it was translated into Portuguese using a translation-back translation method (Brislin, 1980). Examples of items include "I wish I was not so uptight about my physique/figure," or "unattractive features of my physique/figure make me nervous in certain social settings." Respondents indicate whether an item was "characteristic or true of you" on a 5-point Likert scale (1 = not at all; 5 = extremely). Item 8 ("I am comfortable with how my body appears to others") is reverse-scored.

School grade level. Students responded on a dichotomized scale, whether they studied in the 8th grade or in the 10th grade.

Satisfaction with weight. Participants answered the following question: "At present are you on a diet or doing something else to lose weight?" (1 = no, my weight is fine, 2 = no, but I should lose some weight, 3 = no, because I need to put on weight, 4 = yes). Categories 2, 3 and 4 were collapsed to represent respondents who were not happy with their weight.

Physical activity. Participants answered the following question: "On how many days, during the last seven days, were you physically active at least 60 minutes?" Answers ranged from 0 = zero days, to 7 = seven days. Categories 0 through 3 were collapsed to account for adolescents who did not achieve physical activity recommendations (i.e., active everyday or on most days of the week; Cavill, Biddle & Sallis, 2001); categories 4 through 7 were collapsed to represent participants who achieved such recommendations.

Perception of body. Participants were asked the following question: "What do you think about your body?" (1 = much too thin; 2 = thin; 3 = normal; 4 = fat; 5 = much too fat). Adolescents who reported their body to be fat or much too fat were collapsed into one group. Factorial invariance was tested between this collapsed group and adolescents who reported their body as normal.

Body mass index (BMI). Based on self-reported weight and height, body mass index was calculated (Kg/m2). In accordance with Cole, Bellizzi, Flegal and Dietz (2000), participants were categorized into 1 = underweight, 2 = normal, 3 = overweight and 4 = obese. Factorial invariance was tested between respondents with a normal BMI and those with higher BMI (categories 3 and 4).

Data collection procedures

This survey was based on participants' responses to self-completed questionnaire. The surveys were administered in schools by teachers. The larger national Portuguese sample consisted of 4877 students from 136 schools, representing the entire country. Details regarding the survey procedures are fully described in Currie et al. (2008) and Currie, Smith, Boyce and Smith (2001). The schools in the sample were randomly selected from a national list of schools, stratified by the five Education Regional Divisions. In each school classes were randomly selected in order to meet the required number of students for each grade, which was proportional to the number of same grade mates for each

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specific region according to the figures provided by the Ministry of Education. The process of distribution and collection of questionnaires in the entire country, by mail, was co-ordinated by the national team. Teachers received a standardized set of instructions and administered the questionnaires in the classroom. Participants' completion of the questionnaires was voluntary and anonymity was assured. Once informed consent was obtained, participants completed the questionnaires on their own and teachers were only allowed to help with administrative procedures. Participants left their anonymous questionnaires in an envelope, which was sealed by the last student. Response rate at school level was 92%, at class level was 87%, and at student level was 87%.

Statistical procedures

Descriptive statistics were run for all items of SPAS. A principal component analysis (PCA) based on sub-sample of 1000 subjects was run to explore the factor structure of the Portuguese version. A confirmatory factor analysis (CFA) was run with the remaining 2330 to confirm the results of the EFA. Factorial invariance across gender (males-females), school grade level (8th grade-10th grade), diet status (happy with weight-unhappy with weight), physical activity (recommendations for PA not achieved-recommendations for PA achieved), perception of body (normal body-overweight) and BMI (normal-overweight/obese) was analyzed. In addition to chi-square, alternative fit indexes such as the comparative fit index (CFI; Arbuckle & Wothke, 1999), non-normed fit index (NNFI; Bentler & Bonnet, 1980), root mean square error of approximation (RMSEA; Steiger, 1989), standardized root mean squared residual (SRMR; Kline, 2005) are also presented.

The procedures used to determine factorial invariance included: (1) verification of configural invariance, in which the equivalence of the specified structure of factor loading is tested for each paired-groups (unconstrained model), (2) verification of metric invariance, in which the model is also tested in combination for each paired-group, but free or estimated[1] factor loadings are restricted to test the equivalence of the two samples (constrained model[2]). Simulation studies show that the difference in CFI between the model with and without restrictions is among the most adequate measures to assume factorial invariance (Cheung & Rensvold, 2002; Meade et al., 2006). Therefore, a difference equal or lower than .01 in CFI represents a good indicator of factorial invariance (Cheung & Rensvold, 2000).

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[1] Due to model identification (see Byrne, 1994), in each of the factors, one of the factor loadings of one of the factor indicators is fixed (=1). As such, it is impossible to test this parameter's equivalence between two groups; therefore, this equivalence is only tested for the free or estimated factor loadings of each of the model factors.

[2] In the present study, only the factorial invariance of the factor loadings is tested. Nevertheless, it is possible to test the invariance of other free or estimated parameters, such as correlation between factors, variances or covariances between error measurements, and residuals (disturbances).

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Results

The purpose of this paper was to determine the factorial structure of the Portuguese version of Motl and Conroy's (2000) seven-item SPAS in adolescents, and to verify factorial invariance across diverse sample groups. In this section, results for the principal component analysis (PCA), followed by the CFA will be presented. Finally, results of the factorial invariance for gender, grade, diet status, and physical activity levels, perception of body and BMI will be presented.

Principal Component Analysis

Univariate normality was assessed for all items. Skewness and kurtosis were acceptable. Fourteen multivariate outliers with Mahalanobis distances higher than 24.32, p < .001 were identified and deleted. To determine the underlying structure of SPAS, a principal component analysis (PCA) was performed using SPSS, version 14.0. The initial analysis retained only one component with eigenvalues > 1.0, which explained 52.7% of the variance. All items loaded significantly on the factor, with the exception of item 8 with a factor loading of .11 (see Table 1). This item was removed from further analysis. A second PCA with the remaining six items was conducted and the final unifactorial solution explained 61.3% of the variance. These items were aggregated into a single scale with appropriate internal consistency (α-Cronbach = .87), representing an overall Social Physique Anxiety score (N = 873, mean = 16.09 ± 5.65, min = 6, max = 30, skewness = .26, kurtosis = -.23).

Confirmatory Factor Analysis

To confirm the results obtained from PCA, a confirmatory factor analysis (CFA) was conducted with the remaining 2330 participants. One hundred and eighty eight cases with missing values and 43 multivariate outliers with Mahalanobis distances higher than 24.32, p < .001 were deleted. Because multivariate kurtosis was high for this subsample (Mardia's Coefficient = 10.75; Normalized Estimate = 21.57), the goodness-of-fit estimates reported correspond to the robust solution (except for SRMR). In addition, the Satorra-Bentler Chi-square (Hu & Bentler, 1999) and fit indexes that control for non-normality were utilized. Despite the significant chi-square, overall, which is often observed with large sample sizes (Schumacker & Lomax, 1996; Cheung & Rensvold, 2002), the 6-item model showed appropriate fit to the data. Satorra-Bentler $c2$ = 128.62, df = 9, p<.001; CFI = .977; NNFI = .962; RMSEA = .081 (90% C.I.:.069 - .093); SRMR = .039. Nevertheless, the introduction of a covariance between error measurements of items 9 and 10 decreased the Chi-square and improved the goodness of fit indexes: Satorra-Bentler $c2$ = 30.85, df = 8, p<.01; $c2$ / df = 3.86; CFI = .996; NNFI = .992; RMSEA = .038 (90% C.I.: .024 - .052); SRMR = .010. Wald tests confirmed

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that all parameters included in the initial model are significant and, therefore, were maintained. Table 1 presents the factor loadings of the final model.

Table 1. Descriptive statistics, correlation coefficients, and factor loadings of SPAS items.

Item	3	4	6	7	8	9	10	Factor Loadings
3. I wish I wasn't so uptight about my physique/figure	---							.78
4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively	.66	---						.86
6. Unattractive features of my physique/figure make me nervous in certain social settings	.60	.71	---					.86
7. In the presence of others, I feel apprehensive about my physique/figure	.60	.71	.75	---				.86
8. I am comfortable with how fit my body appears to others	-.10	-.07	-.05	-.09	---			-.11
9. It would make me uncomfortable to know others were evaluating my physique/figure	.38	.45	.45	.45	-.08	---		.66
10. When it comes to displaying my physique/figure to others, I am a shy person	.38	.44	.44	.42	-.09	.47	---	.64
Mean	2.72	2.64	2.50	2.52	3.13	2.78	2.93	
Standard deviation	1.23	1.19	1.14	1.17	1.06	1.25	1.31	
Skewness	0.18	0.29	0.38	0.37	-0.09	0.16	0.09	
Kurtosis	-0.83	-0.77	-0.50	-0.62	-0.30	-0.94	-1.04	

Note: Person product-moment r values appear below the diagonal of the matrix; all r ≥ .38 are significant at the $p < .001$ level (N = 873). Item 8 was reverse-scored.

Factorial Invariance

To determine the factorial invariance of the 6-item SPAS, comparisons across groups were conducted. The variables in study were: (1) gender – male

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(n = 1558) vs. Females (n = 1724); (2) grade – 8th grade (n = 1709) vs. 10th grade (n = 1573); (3) "satisfaction with weight" - adolescents who report being satisfied with their weight (n = 1787) vs. adolescents who report that they are or believe they should be on a diet to change their weight (n = 1463); (4) adolescents who do not achieve WHO recommendations for physical activity (n = 1954) vs. adolescents who achieve WHO recommendations for physical activity (n = 838), (5) adolescents who report that their body is normal (n = 1554) vs. those who believe are overweight (n = 1149), and (6) those who have a normal body mass index (n = 2284) vs. those whose BMI indicate overweight or obesity (n = 495).

Table 2. Factorial invariance with fit statistics for unconstrained and constrained models.

	CFIa	X^2 (df)b	X^2 /df	RMSEA (90% CI)a
Males - Females				
unconstrained	.998	6.71* (16)	3.86	.044 (.033-.056)
constrained	.994	107.58* (21)	5.12	.053 (.043-.053)
8th-10th grade				
unconstrained	.993	66.22* (16)	4.14	.047 (.036-.059)
constrained	.992	72.28* (21)	3.44	.04 (.034-.054)
Satisfied with weight- Unsatisfied with weight				
unconstrained	.994	57.31* (16)	3.58	.044 (.032-.056)
constrained	.993	67.73* (21)	3.23	.040 (.030-.051)
Inactive - active				
unconstrained	.991	66.27* (16)	4.14	.054 (.041-.058)
constrained	.990	75.58* (21)	3.60	.049 (.037-.061)
Perception of normal body-fat body				
unconstrained	.992	60.19* (16)	3.76	.048 (.045-.061)
constrained	.991	69.75* (21)	3.32	.044 (.033-.055)
Normal BMI- High BMI				
unconstrained	.996	34.13* (16)	2.13	.035 (.018-.051)
constrained	.996	37.53* (21)	1.78	.029(.031-.044)

a – Robust; b - Scaled Chi-Square (Yuan-Bentler); * p<.001.

Results for factorial invariance are summarized in table 2 where adjustment indexes for both unconstrained and constrained models are shown. The factorial structure of the questionnaire was confirmed for the unconstrained models have adequate fit indexes (CFI and RMSEA) in each of the paired groups (except for two borderline values in the upper bound of the 90% C.I. of the RMSEA for the constrained and unconstrained models respectively for pairs normal body-fat body perceptions and inactive-active). Metric invariance was also observed as

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CFI between unconstrained and constrained models for being lower than .01 in all paired groups. Table 3 represents factor loadings and explained variances of each item for all groups.

Table 3. Invariance testing: factor loadings (λ) and explained variance (R^2) for all SPAS items.

Factor	Gender				Grade				Satisfaction with weight			
	boys		Girls		8th		10th		Satisfied		Unsatisfied	
Items	λ	R^2	λ	R^2	λ	R^2	λ	R^2	λ	R^2	λ	R^2
3	.728	.530	.703	.494	.732	.535	.713	.508	.715	.512	.698	.448
4	.868	.757	.844	.712	.850	.722	.858	.737	.846	.716	.847	.682
6	.873	.762	.874	.764	.880	.774	.870	.757	.863	.745	.874	.731
7	.864	.747	.850	.722	.878	.770	.835	.697	.840	.705	.867	.723
9	.606	.367	.420	.177	.542	.293	.510	.260	.501	.251	.519	.267
10	.576	.332	.390	.152	.485	.236	.500	.250	.455	.207	.503	.247

Table 3. Invariance testing: factor loadings (λ) and explained variance (R^2) for all SPAS items (continued).

Factor	Physical activity				Perception of body				BMI			
	Inactive		Active		Normal		Too fat		Normal		High	
Items	λ	R^2	λ	R^2	λ	R^2	λ	R^2	λ	R^2	λ	R^2
3	.740	.548	.686	.471	.679	.462	.705	.497	.705	.497	.723	.522
4	.848	.720	.851	.725	.823	.677	.871	.758	.843	.710	.885	.783
6	.872	.761	.889	.790	.876	.768	.858	.737	.870	.757	.884	.781
7	.850	.722	.891	.794	.846	.715	.857	.735	.858	.736	.860	.740
9	.524	.274	.562	.316	.504	.254	.525	.275	.504	.254	.517	.268
10	.490	.240	.574	.330	.478	.184	.512	.263	.467	.219	.495	.245

Discussion

Consistent with the original SPAS, the principle component analysis yielded a one-factor solution that explained 61.3% of the SPA variance. However, the final solution resulted in a 6-item version as item 8 ("I am comfortable with how fit my body appears to others") factor loading was low. Although with developmentally different samples from the one reported in the present paper, previous studies have resulted in questionnaires with different factor structures. While Isogai et al.'s (2000) study with Asian samples yielded a factor structure

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with items 3, 4, 6, 7, 9, 10 and 12, Lindwall (2004) found that, consistent with Motl and Conroy (2000, 2001), replacing item 12 with item 8, yielded a stronger fit to the data. More recently, subtle variations in the factor structure of the SPAS were found amongst five European countries (Hagger et al., 2007). While the British, Estonian and Swedish samples yielded an 8-item structure, the Spanish and Turkey samples yielded a 7-item structure.

Smith's (2004) verification of SPAS factorial validity among adolescents also yielded a different factor structure than Motl and Conroy's (2000, 2004), in which item 7 ("In the presence of others, I feel apprehensive about my physique/figure") was removed instead of item 12 ("When in a bathing suite, I often feel nervous about the shape of my body"). Therefore, the 6-item factor structure obtained for the Portuguese sample is likely to represent cultural variability in item interpretation.

Confirmatory factor analysis appears to support the 6-item one-factor structure. Even though Satorra-Bentler X^2 was significant, and the ratio X^2/df was higher than the recommended value between 2 and 3 for indication of good fit (Carmines & McIver, 1981), these results are not surprising as it has been shown that fit indexes based on chi-square are over sensitive to sample size (Schumacker & Lomax, 1996; Cheung & Rensvold, 2002). In addition, this index is sensitive to assumptions of violation of multivariate normality (Byrne, 2001). Therefore, a less conservative ratio X^2/df of 5 has also been recommended (Wheaton, Muthen, Alwin, & Summers, 1977; Kline, 2005).

Chosen fit indexes indicate good fit to the data. Specifically, the RMSEA was lower than .05 (.032) and the upper limit of 90% confidence interval was lower than .06, which shows "a good degree of precision" (Byrne, 2001, p.85). However, to improve the goodness-of-fit of the tested model it was necessary to add a covariance between error measurements of items 9 and 10. This covariance resulted in reduction of the X^2 from 128.62 to 30.85.

Results indicate that the current 6-item structure is invariant across gender. Even though X^2 was significant while comparing unconstrained and constrained models and the X^2/df ratio is higher than the cut off value, this can be attributed to the large sample size (Schumacker & Lomax, 1996). As a consequence of the inflation of chi-square measures due to sample size, Meade et al. (2006) recommended that researchers should rely more heavily on alternative fit indexes to analyze measurement invariance. The CFI for both models were very high (above .99) and changes were lesser than .01 (Cheung & Rensvold, 2002) which suggests that differences between the constrained and unconstrained models are minimal.

Inconsistent results have been found in studies of factorial invariance conducted mainly across male and female young adults (Motl & Conroy, 2001) in different cultures (Isogai et al., 2000; Lindwall, 2004). While Motl and Conroy found support for the factorial invariance of the 7-item SPAS, Lindwall's study with a Swedish sample suggested the need for the development of gender-specific scales. Smith's (2004) study with adolescents confirmed the gender invariance of

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the final factor structure. This pattern of results led Lindwall (2004) to suggest that researchers should "carefully test the factor structure on indigenous samples instead of taking the fit of a-priori model for granted" (p.497). Therefore, although studies have consistently shown that shorter versions of SPAS provide better fit to the data, it appears that the final structure that best fits the data differ slightly across studies in adults and adolescents. These differences are likely to represent cultural, demographic, linguistic or developmental differences between samples (Lindwall, 2004; Smith, 2004). According to Duda & Hayashi (2000) variability in cross-cultural measurement of the same instrument can have several sources, ranging from language, translation and interpretation of the words, use of colloquial speech terminology and socialization experiences. In the present study, authors adopted a back-translation method as suggested by Brislin (1980) to minimize some of these issues. Nevertheless, individuals' experiences and meanings are socially construed; Cromby and Nightingale (1999) argue, the "world we experience and the people we find ourselves to be are first and foremost the product of social processes" (p. 4). To address this issue a direct comparison of similar samples across countries is recommended. Therefore, developmental stage associated with cultural differences may account for different factor structure in the Portuguese version when compared to other adult and adolescent studies.

Motl and Conroy (2001) suggested that SPAS factorial invariance should be further tested across diverse samples of individuals. Therefore, in addition to gender, the present paper tested configural and metric invariances across school grade (8th and 10th grades), diet status (adolescents are not on a diet and those who are or believe they should be on a diet), physical activity status (adolescents who achieve WHO's physical activity recommendations and those who do not), perception of body (adolescents who believe their body is normal and those who believe are overweight) and body mass index (those who are "normal weight" and those who are overweight or obese). The results of the present study suggest that the measurement construct generalizes across groups and that SPA was measured and interpreted similarly across groups. Differences between participants are somewhat due to the specific meaning of this construct to participants, representing actual differences in SPA, rather than measurement issues (Motl & Conroy, 2001).

Because the factor structure was consistent across a variety of samples, it is thought that the present version can be used by researchers in analyzing and interpreting scores of SPA across a variety of samples in Portuguese adolescents. It is recommended to further test this instrument in cross-cultural research.

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