Factorial Validity and Measurement Invariance of the Revised Physical Self-Perception Profile (PSPP-R) in Three Countries

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Abstract

The Revised Physical Self-Perception Profile (PSPP-R) was constructed to measure both perceived competence and importance linked to domains of the physical self. In the present study we tested the factorial validity of the PSPP-R, using confirmatory factor analytic approach, on samples of university students from three different countries: Sweden, Turkey, and the UK. Multisample covariance structure analyses was also used to test the invariance of the PSPP-R across the three national samples. First-order four-factor models, including the latent factors of Sport Competence, Physical Conditioning, Body Attractiveness and Physical Strength, demonstrated good-fit with the data both for competence and importance factors. Second-order factor models, incorporating the second order latent domain factor of Physical Self-Worth also exhibited good-fit with the data. Factor patterns and covariances were invariant across samples for both competence and importance scales. Item intercepts were also invariant for the importance scales whereas partial invariance of intercepts was supported for competence scales. The results are discussed with reference to the validity of the original Physical Self-Perception Profile and cross-cultural studies on the physical self.

Keywords: competence, confirmatory factor analysis; importance, invariance, physical self

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Physical self-concept is considered to be an important psychological outcome, correlate, and antecedent of physical activity behavior (Fox, 2000; Hagger, Ashford, & Stambulova, 1998; Lindwall & Hassmén, 2004) and factors associated with the self-regulation of physical activity such as attitudes and intention (Hagger, Wood, Stiff, & Chatzisarantis, 2009, 2010). Importantly, physical self-concept is viewed as an important contributor to overarching, global perceptions of self-worth in multidimensional, hierarchical models of self-esteem (Marsh & Sonstroem, 1995). The physical self is defined as an individual's perception of himself or herself in aspects of physical domains such as strength, endurance, sport ability, and physical appearance (Fox & Corbin, 1989). With the establishment of multidimensional models of self-concept (Shavelson, Hubner & Stanton, 1976), the physical self became systematically measurable as part of comprehensive models alongside perceived competence or adequacy in other life domains.

Research on the physical self has been facilitated by the development of multidimensional and hierarchical physical self instruments, such as the Physical Self-Perception Profile (PSPP, Fox & Corbin, 1989). Fox and Corbin (1989) emphasized the multidimensional and hierarchical model of physical self-concept, consistent with Shavelson and colleagues' (1976) approach. Physical Self-Perception Profile (PSPP) was based on the Harter's (1985) general self-concept instruments and it measures global physical self-esteem, and four subdomain physical self areas—body attractiveness adequacy, sport/athletic competence, strength competence, and physical condition adequacy. In the hypothesized hierarchical model, global self-esteem is placed as a superordinate domain above more specific but global domains—such as physical self-worth—which, in turn, are ordered hierarchically above the more differentiated subdomains (Fox, 1990).

The content and factor structure of the PSPP were originally validated with university students in United States (Fox & Corbin, 1989). However, the cross-cultural validity of PSPP has been supported among wide range of samples in other countries (see Fox, 1998). For example, PSPP was validated with young people and college students in the United Kingdom (Hagger, Biddle, & Wang, 2005; Page, Ashford, Fox, & Biddle, 1993), Turkey (Aşçı, Aşçı, & Zorba, 1999), Sweden (Hagger, Aşçı, & Lindwall, 2004), Portugal and Spain (Hagger et al., in press), Estonia (Hagger, Hein, & Chatzisarantis, in press), and Canada (Crocker, Eklund, & Kowalski, 2000). Furthermore, support for measurement invariance of factor patterns and factor co-variances and partial invariance of item intercepts across cultures has been found (Hagger et al., 2003; 2004).

However, the PSPP has also been criticized because a method effect associated with this idiosyncratic response scale used to measure responses to the instrument items (e.g., Marsh, Richards, Johnson, Roche, & Tremayne, 1994), which forces participants to make an initial choice between one of two statements and then a second decision as to the extent to which they agree with this statement. Another problematic aspect that has been raised by scholars is linked to method effects and random errors influencing the measurement of the constructs due to the negative or positive wording of the items (e.g., Hagger et al., 2007).

The Perceived Importance Profile (PIP) was also developed concurrent with the PSPP to measure the importance that individuals attach to the four subdomain variables of physical condition, physical strength, body attractiveness, and sport competence (Fox, 1990). The basic assumption of the PIP was that the importance people attribute to the area of evaluation, in combination with the evaluation itself, influence how events and situations will affect self-esteem (James, 1890). The relative short PIP has however demonstrated less optimal psychometric properties with lack of internal consistency (Lindwall & Hassmén, 2004; Marsh & Sonstroem, 1995). This may be primarily attributable to the fact that the PIP includes only two items per subdomain/factor, mirroring the problem of short or single item subscales generally found in competence-importance research with regard to both the physical self and other self domains.

Based on the identified weaknesses of the previous PSPP, a revised version of the PSPP (PSPP-R) was developed (Hagger, 2007). Compared to the PSPP, the revised PSPP-R differs on three points: (a) traditional Likert type scales are used instead of the previous problematic idiosyncratic response scale; (b) only positively-worded items are used to minimize method effects; and (c) the number of items measuring perceived importance has been largely increased, resulting in the same number of total items (24) and items per factor (six) as the PSPP competence scales.

The primary purpose of this study was to test the factorial validity of the revised Physical Self-Perception Profile (PSPP-R) in samples of university students from three different national groups (Sweden, UK, and Turkey) using a rigorous hypothesis-testing confirmatory factor analytic approach. Also, using multisample covariance structure analyses, we tested the invariance of the PSPP-R across the three different samples.

Method

Participants

Convenience samples were recruited from three different countries. These countries are geographically wide-ranging from the northern Europe (Sweden), western Europe (UK), and Middle-East (Turkey), and provide cultural variability. The samples comprised university students from Sweden (156 females, *M* age = 36.26, *SD* = 14.18; 88 males, *M* age = 35.02, *SD* = 15.11), Turkey (344 females, *M* age = 20.55, *SD* = 1.85; 288 males, *M* age = 21.61, *SD* = 2.36), and the UK (283 females, *M* age = 21.38, *SD*=2.62; 212 males, *M* age = 22.04, *SD* =4.19).

Materials and Procedure

A revised version of the PSPP (PSPP-R) employing four-point Likert-type response-format scales for all items and positively worded item statements was used in this study to avoid method effects (Hagger, 2007). Also, because the original PIP featured only two items per subscale and has demonstrated poor reliability (Fox, 1990), this was increased to six items per subscale. The final PSPP-R therefore includes 30 competence or adequacy items from the subdomains of sport competence, similar to the original PSPP, in sport competence (SC), physical conditioning (PC), body attractiveness (BA), and physical strength (PS), along with physical self-worth (PSW) at the domain level. Each competence item has a matched perceived importance item making the total of 60 items. For example, a perceived sports competence and its accompanying perceived importance item are: "I do very well at all kinds of sports" and "How *important* is it to you that you do well at all kinds of sports?" Consequently, the PSPP-R also taps the five importance scales sport competence importance (SCIMP), physical conditioning importance (PCIMP), body attractiveness importance (BAIMP), physical strength importance (PSIMP), and importance of physical self-worth (PSWIMP). Language-specific versions of the PSPP-R for administration to the Swedish, Turkish, and UK samples were developed using the back-translation procedure advocated by Brislin (1986)[1].

Administration Procedure

Participants completed the PSPP-R after lectures and classes for university students and in gym contexts for gym users in quiet conditions with minimal disruptions. Participants were informed about the purpose of the study and ethical aspects linked to the voluntary nature of their involvement, and gave informed consent.

Analytical and Statistical Procedures

We used the EQS computer program (Bentler, 2004) to analyse the fit between models and data. We tested two types of models, first- and second-order factor models on the competence and importance scales in each of the three samples (see Figure 1a and 1b). Thus, four models were tested in total in each sample. Specifically, we tested first-order factor models for the PSPP-R competence scales, second-order factor models for the competence scales, first-order for the PSPP-R importance scales, and second-order models for PSPP-R importance scales. We used the following recommended relative indexes to evaluate the goodness of fit of the specified models with the PSPP-R data: the comparative fit index (CFI, Bentler, 1990), the non-normed fit index (NNFI, Marsh et al., 1988), the root mean square error of approximation (RMSEA, Hu & Bentler, 1999), and the standardized root mean square residual (SRMR, Bentler, 1990). Values greater than .90 for the CFI and NNFI indexes were considered acceptable for a well-fitting model (Bentler, 1990), although values greater than .95 are preferable (Hu & Bentler, 1999). For the RMSEA and SRMR, values of .06 and .08 or less, respectively, were considered indicative of good model fit, along with lower values for the 90% confidence intervals that approached zero (Hu & Bentler, 1999). We also examined the composite reliability (ρ_c) estimates based on Bagozzi and Kimmel's (1995) formula. When conducting the multisample analyses, we used the recommended strategy of Byrne and colleagues (1989) and Byrne (2006). We therefore carried out a series of multi-sample Confirmatory Factor Analysis (CFA) models in which we constrained first and second order factor loadings and item intercepts as equal across groups and compared the fit of these models with a baseline model without constraints (configural model). Traditionally, equivalence of factor loadings has been suggested as the minimum acceptable criterion for measurement invariance (Byrne, Shavelson, & Muthén, 1989). The traditional way of comparing different nested models are to use likelihood ratio tests where the change in goodness-of-fit chi-square value is used. However, Cheung and Rensvold (2002) have recommended using incremental fit indices, such as the CFI, with differences of -.01 or less between baseline and subsequent restricted invariance models as support of the equivalence of the constrained parameters across the samples.

Results

Single Sample Confirmatory Factor Analyses

Univariate skewness and kurtosis values were within acceptable range for all items in all samples[1]. Mardia's (1970) coefficient of multivariate normality yielded values of between 25.42 and 75.18 for the competence scale and between 25.31 and 48.40 for the importance scale for the data in the three samples. According to Bentler (2005) recommendations values less than 5.00 reflect non-normality and present results were indicative of multivariate non-normality. As univariate normality is a necessary, albeit not sufficient, condition for multivariate normality, multivariate non-normality despite univariate normality may occur (DeCarlo, 1997). Multivariate non-normality violates the assumption of normality of the maximum likelihood method, potentially causing the test statistics not to adequately reflect an appropriate evaluation of the model (Byrne, 2006). Based on the finding of multivariate non-normality, we used a robust maximum likelihood method when estimating the models in order to protect the estimates being contaminated as a result of mild violations of the assumption of normality (Satorra & Bentler, 1988). This method, including a scaling correction for the χ^2 (S-B χ^2), has been found to provide the most reliable statistics in various distributions and samples (Curran, West & Finch, 1996).

The overall fit-indices for the different models and samples are shown in Table 1. We first examined first-order factor models hypothesising SC, PC, BA, and PS as first-order latent factors. Secondly, we examined a second-order factor models in accordance with the multidimensional, hierarchical model of physical self-perceptions presented by Fox and Corbin (1989). This model hypothesized a second-order latent factor, representing PSW, to account for the covariances between the original four subdomain factors of SC, PC, BA, and

PS. The fit of the first- and second-order factor models with the PSPP-R data were examined separately for the competence and importance scales.

For the competence scales, the first-order four-factor models (model 1) demonstrated acceptable fit with data based on the fit indices for all three samples. The fit of the importance scale first order model (model 3) was also acceptable, for all three samples. The fit of the second-order factor models was very similar to the first order models in terms of competence scales (model 2). For the importance scales, the second-order factor models (model 4) were also considered acceptable, although the goodness-of-fit indexes were lower the Swedish and UK samples relative to the other modelss.

As there was room for improvement in model fit for both competence and importance scales, we used the LM-test to search for misspecifications of model 1.The LM-tests signalled several significant correlated uniqueness between items hypothesized to load on the same factor for all three samples. For the competence scales, letting item uniquenesses correlate between PC items 2 and 5 and PS items 2 and 5 for the Swedish sample, between PS items 1 and 2 and PS items 2 and 5 for the Turkish sample, and between PS items 1 and 2 and SC items 1 and 2 for the British sample would improve model fit. Similarly for the importance scales, model improvement would result from correlating item uniqueness between BAIMP items 1 and 5 for the Swedish and Turkish samples and between SCIMP items 1 and 2 for the Turkish and British samples.

Factor loadings (see Tables 2 and 3) were typically above .70 (median λ for competence scales = .80, 76, 78 and for importance scales = .80, 83, 81 for the Swedish and Turkish, and UK samples respectively) and thus exceeded the recommended minimum of .40 (Ford, MacCallum, & Tait, 1986). Only one factor loading, SC item 5 for the British sample, fell below this recommended value (λ = .33). The structural parameters between the different subdomains indicated that the relationship between the subdomains and the domain factor of

PSW were strong and significant (Table 4). The PC factor showed the strongest relation to the domain factor of PSW in all three samples. Composite reliability was acceptable with values above .80 for both competence and importance scales.

Multi-Sample Confirmatory Factor Analyses

The configural first-order factor models for the competence and importance scales also demonstrated acceptable fit with the PSPP-R data (see Table 5). Thus we proceeded with the next step; tests of multi-sample invariance across the three samples. When constraining the factor loadings to be equal for the first- and second-order factor competence and importance models the models demonstrated a significant decrement in fit according to the SB-χ^2 test. However, the decrement in CFI was less than .01. Hence, the models were evaluated as invariant according to Cheung and Rensvold’s (2002) criteria. The next models in the invariance routine constrained the factor covariances for the first-order factor models and the structural paths between the second-order latent factor of PSW and the PSPP subdomain first-order factors for the second-order factor model. Again, these models exhibited significant decrements in fit according to the SB-χ^2 test. However, the decline in CFI was once again less than .01 compared with the baseline models. Hence, the factor co-variances were considered invariant across samples for both the competence and importance scales. The models constraining for item intercepts displayed significant decrement in SB-χ^2 (Table 5). Given redundancy in analyses and results, we only conducted these analyses on the second-order factor models. For the competence scale, the decrement in CFI was also more than .01, indicating non-invariance of item intercepts. The LM-test demonstrated a number of non-invariant intercepts for items across the samples. The largest differences across samples were detected for SC item 1, PC item 1, BA items 4 and 6, and PS item 6. When the constraints on these five item intercepts were released across the samples, the drop in the model CFI relative to baseline was not more than .01, providing support for the partial invariance of item intercepts. Incontrast to the competence model, the invariance tests for the importance scale revealed a decrement in CFI less than .01 compared with the baseline model, supporting the hypothesis of invariance of item intercepts.

Discussion

The main purpose of this study was to evaluate the factorial validity of a revised version of the PSPP instrument, the PSPP-R, and to test the factorial invariance of this instrument across three samples from three countries representing different cultural regions. The PSPP-R included three modifications compared to the original PSPP. These modifications were carefully derived from the cumulative work of the PSPP over the years (e.g., Fox, 1998; Hagger et al., 2004; Lindwall & Hassmen, 2004). First, equal weight was placed on importance as well as competence items resulting in the same number of items (30 each). Second, to avoid previously identified problems of missing data and method effects associated with the idiosyncratic response scale, Likert-type response-format scales were used for each item. Third, to diminish method effects regarding positively- and negatively-worded items, only positively phrased items was used.

Results demonstrated that both the first- and second-order factor models for the competence and importance scales exhibited acceptable fit to the PSPP_R data in each national sample. Previous research on the PSPP (e.g., Hagger et al., 2004) has shown that models correlating error variances (uniqueness) for indicators of the same factor demonstrate better model fit. However, in light of the multiple revisions conducted compared with the original PSPP, we wanted to test the fit of the revised PSPP-R without correlated uniquenesses. Also, the procedure of correlating residuals in SEM methodology is debated (e.g., Landis, Edwards & Cortina, 2009). However, our analyses also revealed that letting the uniquenesses for selected items from the same factors correlate would further improve model fit. As some of these items are similarly phrased, and contain several similar keywords (e.g., PS items 1 and 2; see Table 3), the effect of correlating the uniqueness terms for these items on model fit is un surprising.

Given the work conducted to modify the PSPP, a relevant question is whether the revised PSPP-R is psychometrically stronger than the original? Both the first and second order models for competence scales in the present study displayed, in general, closer fit with the data compared to models with uncorrelated uniqueness in previous studies using similar samples from the same countries (Hagger et al., 2004). Also, the composite reliability values were somewhat higher in the present study. A possible explanation for these differences is that the introduction of ,positively-worded items and Likert-type scales may have resolved the psychometric problems associated with the idiosyncratic response scale observed in tests of the previous version of the PSPP (e.g., Marsh et al, 1994) and method effects related to positively and negatively worded items (e.g., Hagger, et al., 2007) observed in previous studies. However, it must be stressed that there is no means to formally evaluate these improvements and attribute them to the changes introduced in the current instrument.

The PSPP-R, to our best knowledge, is the first instrument to include both competence ratings as well as importance ratings of the physical self and put equal weight on those in terms of number of items. In light of this, the well-fitting models for the importance scales observed in the present study is a promising advance. The importance scales further demonstrated robust factor loadings and acceptable composite reliability values. As a result, the importance scales of the PSPP-R seem to point to a valid and reliable instrument to use in alongside the competence scales. The use of these instruments in conjunction is useful when testing the multidimensional hierarchical nature of physical self with respect to other theories such as and James' (1890) theory (Lindwall, Asci, Palmeira, Fox, & Hagger, in press).

Moreover, these results generalized across three samples from different nations and cultural orientations. Support for both measurement and structural invariancefor the competence and importance scales was found (Byrne et al., 1989). Using other labels, the present study found support for weak factorial invariance and metric invariance (Vandenberg & Lance, 2000) of the PSPP-R scales. Moreover, we also found support for the scalar invariance for the importance scales and partial scalar invariance for the competence scales, that is, the equivalence, or partial equivalence, of intercepts of items across groups.

Finally, it is important to acknowledge some of the limitations of the current study and avenues for future research. First, the study was limited by the use of convenience samples of university students. Second, we only included measurements taken at one time point negating the possibility of evaluating longitudinal change in the PSPP-R constructs over time. Future studies should include several measurements of the PSSP-R competence and importance scales over time. This will provide opportunity to use cross-lagged panel designs and growth latent modelling to capture the dynamics of individual and group change trajectories of physical self-perception competence and importance over time.

Footnote

[1]The language-specific versions of the PSPP-R, along with descriptive statistics for PSPP-R items and the covariance matrices are available from the first author on request.

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Table 1

Goodness-of-Fit Statistics for Single-Sample Confirmatory Factor Analyses of the Physical Self-Perception Profile Revised

Model	[a]SB-χ^2	df	CFI	NNFI	RMSEA (90% CI)	SRMR	AIC
British (n=495)							
1. Competence, 1st order,	654.68	246	.946	.940	.058 (.053-.063)	.048	162.67
2. Competence 2nd order	684.79	247	.942	.936	.060 (.054-.065)	.053	188.79
3. Importance 1st order	734.75	246	.929	.920	.063 (.058-.069)	056	242.75
4. Importance 2nd order	791.17	247	.921	.912	.067 (.061-.072)	.064	295.18
Swedish (n=244)							
1. Competence, 1st order,	500.30	246	.951	.945	.065 (.057-.073)	.054	8.30
2. Competence 2nd order	499.85	247	.951	.946	.065 (.056-.073)	.054	3.85
3. Importance 1st order	522.75	246	.938	.930	.068(.060-.076)	.068	30.75
4. Importance 2nd order	558.12	247	.930	.922	.072 (.064-.079)	.078	62.11

Turkish (n=622)							
1. Competence, 1st order,	783.45	246	.937	.929	.059 (.055-.064)	.047	291.45
2. Competence 2nd order	782.76	247	.937	.930	.059 (.054-.063)	.047	286.76
3. Importance 1st order	760.46	246	.939	.932	.058 (.053-.063)	.047	268.46
4. Importance 2nd order	772.98	247	.938	.931	.058 (.054-.063)	.050	276.98

Note. [a]Sattora-Bentler scaled Chi-Square; df = Model degrees of freedom; CFI = Comparative fit index; NNFI = Non-normed fit index; RMSEA = Root-mean square error of approximation; SRMR = the standardized root mean square residual**;** AIC = Akaike's Information Criterion

Table 2

Standardized Factor Loadings for Items in PSPP-R Competence Scales in Each National Sample

Factor, item number and item description	Britain	Sweden	Turkey
F_1 Sports Competence			
1. I do very well at all kinds of sports.	.80	.84	.73
2. I am generally a lot better than average at sports	.87	.88	.86
3 I am confident in taking part in sports activities, compared to other people	.79	.86	.76
4 I think that I am one of the best when it comes to joining in sports activities	.80	.85	.95
5. I am quicker than most when it comes to picking up new skills in a sports situation	.33	.82	.75
6. I tend to be among the first to join in sports activities	.83	.86	.85
F_2 Physical Conditioning			
1. I am very confident about my level of physical conditioning and fitness compared to other people	.77	.81	.78
2. I make certain I take part in some form of regular vigorous physical exercise	.67	.74	.75
3. I usually have a high level of stamina and fitness	.77	.89	.83
4. I am at ease when it comes to fitness and exercise settings	.72	.76	.79
5. I feel really confident about my ability to maintain regular exercise and physical condition	.81	.81	.80
6. I feel that, compared to most, I always maintain a high level of physical conditioning	.85	.82	.94
F_3 Body Attractiveness			
1 . I have an attractive body compared to other people	.75	.84	.77
2. I find it easy to maintain an attractive body	.82	.82	.63
3. I think that my body looks alright in swimwear	.78	.83	.64
4. I think I am often admired for my attractive physique or figure	.75	.72	.69
5. Compared to others, I think that my body looks in excellent shape physically	.80	.85	.78
6. I am very happy with the appearance of my body	.77	.73	.59
F_4 Physical Strength			
1. I am physically stronger than most other people of my sex	.80	.85	.69
2. I feel my muscles are much stronger than most others of my sex.	.82	.83	.83
3. When it comes to situations requiring strength, I am one of the first people to step forward	.76	.75	.73
4. I am confident when it comes to my physical strength	.77	.77	.83
5. I think that I am strong, and have well-developed muscles compared to other people	.80	.83	.82
6. I am better than others of my sex at dealing with situations requiring physical strength	.81	.86	.82

Table 3.

Standardized Factor Loadings for PSPP Importance Items in Each National Sample

Factor, item number and item description	Britain	Sweden	Turkey
F_1 Sports Competence Importance			
1. How *important* is it to you that you do well at all kinds of sports?	.74	.79	.72
2. How *important* is that you are generally a lot better than average at sports	.87	.85	.86
3. How *important* is it to you to feel confident, compared to other people, in taking part in sports activities?	.82	.74	.83
4. How *important* is it that you are one of the best when it comes to joining in sports activities?	.87	.84	.92
5. How *important* is it that you are quicker than most when it comes to picking up new skills in a sports situation?	.78	.80	.87
6. How *important* is it to you that you are one of the first to join in sports activities?	.86	.84	.86
F_2 Physical Conditioning Importance			
1. How *important* is it for you to be physically fit and conditioned compared to other people?	.80	.63	.69
2. How *important* is it to you that take part in regular vigorous physical exercise?	.67	.83	.76
3. How *important* is it to you to have a high level of stamina and fitness?	.79	.86	.86
4. How *important* is it that you feel at ease when it comes to fitness and exercise settings?	.80	.66	.92
5. How *important* is it to you that you feel confident about your ability to maintain regular exercise and physical condition?	.77	.84	.88
6. How *important* is it to you that you always maintain a high level of physical conditioning?	.88	.83	.93
F_3 Body Attractiveness Importance			
1. How *important* is it that you have an attractive body compared to other people?	.76	.77	.69
2. How *important* is it that you find maintaining an attractive body easy?	.83	.80	.74
3, How *important* would it be that your body looks alright in swimwear?	.64	.84	.65
4. How *important* is it that you are admired for your attractive physique or figure?	.71	.84	.72
5. How *important* is it that your body looks in excellent shape physically compared to others?	.88	.85	.79
6. How *important* is it to you that you are very happy with the appearance of your body?	.68	.83	.74
F_4 Physical Strength Importance			
1. How *important* is it to you that you are physically stronger than most other people of your sex?	.80	.81	.76
2. How *important* is it to you that you have stronger muscles than most others of your sex?	.80	.83	.80
3. How *important* is it to you that in situations requiring strength, you are one of the first people to step forward?	.72	.68	.74
4. How *important* is it that you are confident when it comes to your physical strength?	.82	.72	.78
5. How *important* is it to you that you are strong and have well developed muscles compared to other people?	.83	.81	.81
6. How *important* is it to you that you are better than others of your sex in situations requiring physical strength?	.87	.78	.84

Table 4.

Factor Correlations/Standardized Structural Parameter Estimates Between PSPP-R Competence and Importance Latent Factors in the Three Samples

	F_1	F_2	F_3	F_4
F_1 Sports Competence	(.88, 88)			
	(.80, 87)			
	(.88, 89)			
F_2 Physical Condition	.84, .81	(.85, 86)		
	.73, .67	(.86, 83)		
	.87, .95	(.88, 89)		
F_3 Body Attractiveness	.49, .46	.66, .64	(.84, 84)	
	.67, .66	.69, .73	(.82, 87)	
	.48, .58	.55, .63	(.80, 82)	
F_4 Physical Strength	.74, .83	.70, .70	.45, .56	(.85, 87)
	.72, .85	.78, .60	.71, .70	(.85, 88)
	.68, .77	.74, .81	.42, .60	(.86, 86)
F_5 Physical Self-Worth	.83, .86	.88, .84	.67, .61	.72, .82
	.87, .91	.91, .74	.79, .78	.83, .90
	.83, .85	.85, .84	.59, .67	.77, .80

Note. Line 1 = British Sample; Line 2 = Swedish Sample; Line 3 = Turkish Sample; Intercorrelations for the latent subdomain as well as relationships between the PSPP subdomains and Physical Self-Worth factor are structural parameter estimates from the second-order CFA model. The first value on each line for each factor corresponds to competence scale and the second value to importance factors.

Table 5

Invariance Analyses Across Samples for Competence and Importance First and Second Order Models

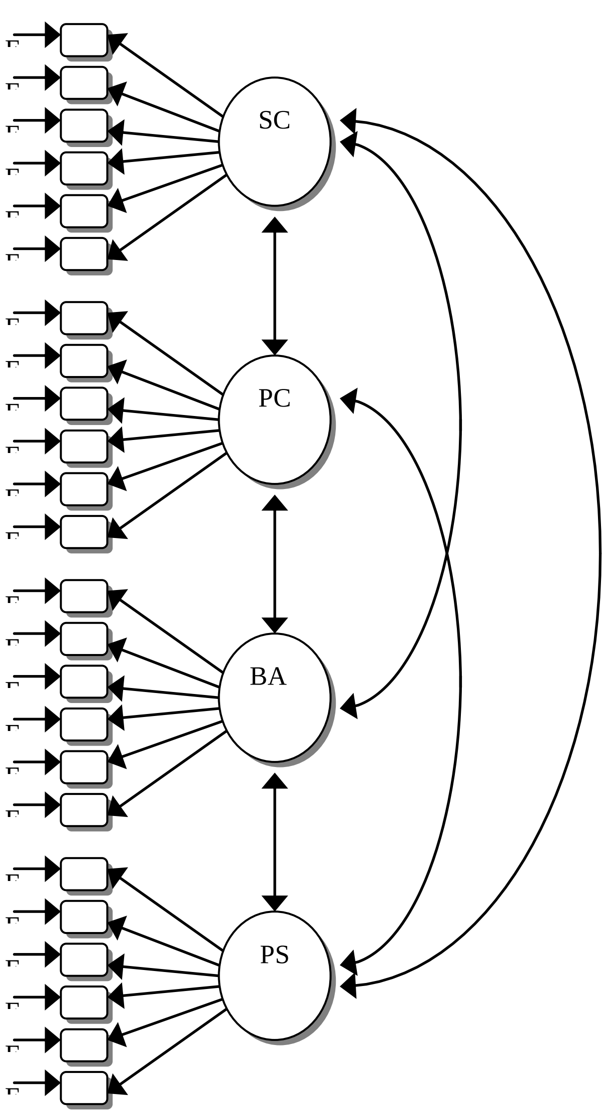
Model	[a]SB-χ^2	df	[b]Δ SB-χ^2	CFI	NNFI	RMSEA (90% CI)
Competence first order						
Configural, no constraints	1940.03	738		.944	.937	.060 (.057-.063)
Factor loadings invariant	2178.98	778	222.74*	.935	.935	.063 (.060-.066)
Factor loadings and factor co-variances invariant	2212.11	790	259.43*	.934	.931	.063 (.060-.066)
Competence second order						
Configural, no constraints	1969.05	744		.943	.937	.060 (.057-.063)
First-order factor loadings invariant	2208.54	784	299.70*	.934	.930	.063 (.060-.066)
First and second order factor loadings invariant	2230.51	792	314.62*	.933	.930	.063 (.060-.066)
Item intercepts invariant	3278.56	828	4459.34*	.928	.927	.067 (.064-.070)
Factor means invariant	3339.08	836	4465.46*	.927	.925	068 (.065-.071)
Importance first order						
Configural, no constraints	2031.51	738		.935	.927	.062 (.059-.065)
Factor loadings invariant	2144.49	778	111.11*	.932	.938	.062 (.059-.065)
Factor loadings and factor co-variances invariant	2211.82	790	158.49*	.929	.925	.063 (.060-.066)
Importance second order						
Configural, no constraints	2135.34	744		.930	.922	.064 (.061-.067)
First-order factor loadings invariant	2250.18	784	114.94*	.927	.922	.064 (.061-.067)
First and second-order factor loadings invariant	2269.06	792	132.13*	.926	.923	.064 (.061-.067)
Item intercepts invariant	2980.96	828	1589.77*	.926	.922	.067 (.064-.070)
Factor means invariant	3340.25	836	3721.45*	.921	.919	.070 (.066-.072)

Note. [a]Sattora-Bentler scaled Chi-Square; df = Model degrees of freedom; CFI = Comparative fit index; NNFI = Non-normed fit index; SRMSR = Standardized root-mean squared residuals; [b] Because the Δ SB-χ^2 value is not -χ^2 – distributed, this value was corrected according to Satorra and Bentler (2001) so it could be used for statistical significance testing. * $p<.001$

Figure Caption

Figure 1a. First-order four-factor confirmatory factor analysis model hypothesising a structure of physical self-perceptions with correlated subdomain factors. SC = sports competence; PC = physical conditioning; BA = body attractiveness; and PS = physical strength

Figure 1b. Second-order confirmatory factor analysis model hypothesising a higher order physical self-worth factor to explain the covariances between the subdomains. SC = sports competence; PC = physical conditioning; BA = body attractiveness; and PS = physical strength, PSW = general physical self-worth



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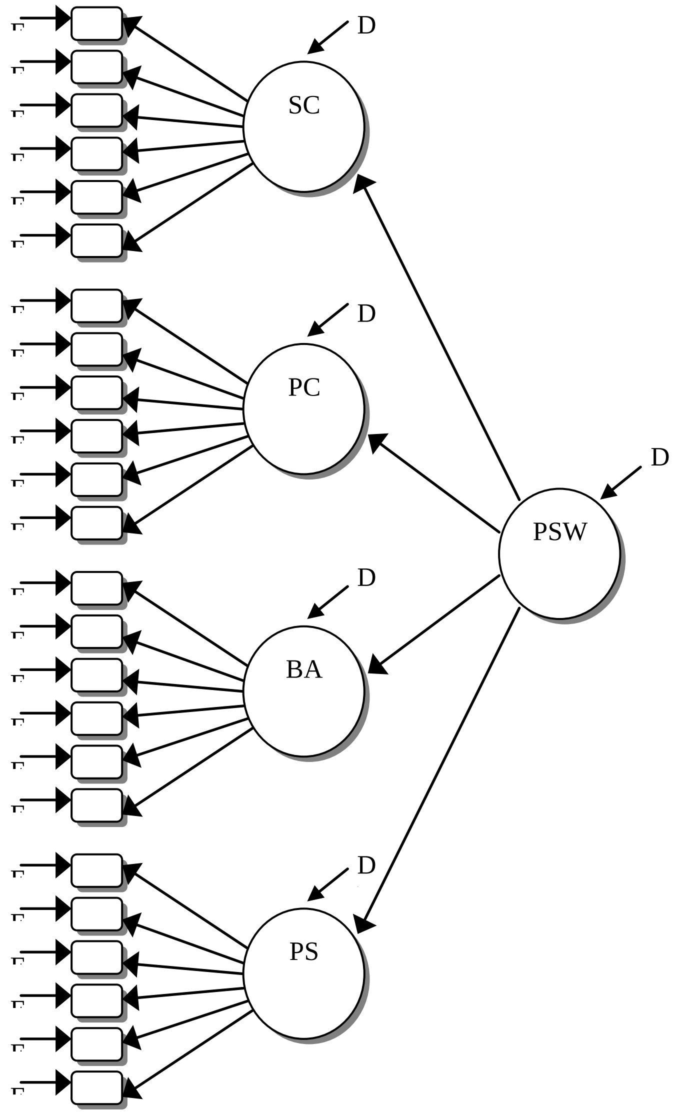

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