

### **Validation of the Physical Self-Perception Profile among College Students**

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#### **Abstract**

The Physical Self-Perception Profile (PSPP) is widely used to measure self-evaluations in the physical domain and its validity has been supported in a wide range of samples. The purpose of this research was to examine the factor structure of PSPP and its factorial invariance across gender. Participants were 315 (131 males, 184 females) college students. Exploratory factor analyses showed that PSPP assessed four distinct aspects of physical self-concept. However, confirmatory factor analyses provided only partial support for the male sample. Finally, factorial invariance analysis indicated that there were differences on the latent constructs of PSPP between males and females.

#### **Introduction**

The importance of self-concept as a major determinant of behavior has long been recognized throughout the history of educational and social psychology. Since the original work of James (1890), one of the first who highlighted its importance, researchers have published a significant number of studies regarding the nature of self-concept and its relation to other constructs. Self-concept has also been considered as an important factor influencing the motivation level of an individual. Thus, the status of a person's self-concept or perception of ability either enhances or diminishes the person's desire to participate or to continue participating in an activity. White (1959) proposed that self-concept is associated with a basic "mastery" of competence motive that impels the individual to engage in mastery attempts.

A great deal of research has been conducted over the past decades examining the nature and the development of self-concept. Some researchers (e.g., Coopersmith, 1981; Rosenberg, 1979) have suggested that self-concept is a unidimensional entity that reflects a general view of the self. Accordingly, Marx & Winne (1978) argued that "self-concept seems more of a unitary concept than one broken into distinct subparts or facets" (p. 900). However, self-concept researchers who have relied primarily on the single self-concept have not provided strong support for their interpretations.

During the last decades, however, there is general agreement among researchers that self-concept is a multifaceted, hierarchical, and dynamic construct (Byrne, 1988; Harter, 1988; Marsh & Redmayne, 1993; Marsh, Richards, Johnson, Roche, & Tremayne, 1994; Shavelson, Hubner, & Stanton, 1976). Shavelson et al. (1976), in an extensive review of self-concept literature, hypothesized that self-concept structure is both multidimensional and hierarchical. Specifically, they have proposed a model where general self-concept is at the apex of a hierarchy with academic self-concept, social self-concept, emotional self-concept, and physical self-concept being considered as second order factors. Academic is further subdivided into subject-specific subdomains (english, history, math, and science). Social self-concept is subdivided into peer and family self-concepts, while physical self-concept is subdivided into physical ability and physical appearance self-concepts. Shavelson and his colleagues (1976) contended that the organization of the hierarchy changes as an individual approaches adulthood. Furthermore, they proposed that the facets of self-concept at higher levels of the hierarchy would be more stable than the facets found in lower levels of the hierarchy.

Marsh and his colleagues (Marsh, 1987; Marsh & Hocevar, 1985; Marsh & Shavelson, 1985; Shavelson & Marsh, 1986) have provided the best empirical support to date for the multidimensionality of the self-concept, as proposed by Shavelson et al. (1976). The advantage of this model is that it enables the examination of the separate domains of self-perceptions within

the hierarchical framework and provides the means for explaining how each domain is structured and contributes to global self-concept.

In recent years, most investigators in the area of sport and exercise psychology have incorporated Shavelson's et al. (1976) multidimensional, hierarchical self-concept model into their research. Fox and Corbin (1989) proposed a multidimensional and hierarchical model of physical self-concept which is consistent with Shavelson et al.'s approach. The model posits that global self-esteem is at the apex of a hierarchy, followed by the physical self-worth at the domain level, and sport competence, attractive body, physical strength, and physical condition at the sub domain levels (see Figure 1). Furthermore, in association with their model, they devised the Physical Self-Perception Profile (PSPP), which assesses the four specific facets of physical self-concept as well as the global self-esteem and the physical self-worth. PSPP is a self-report instrument designed to measure multiple dimensions of physical self-esteem. It comprises of 30 items and assesses five subdomains of physical self-perceptions: sport competence, physical condition, attractive body, physical strength, and physical self-worth.

Fox and Corbin (1989) have provided adequate support for the psychometric properties of the PSPP in college students. The internal consistency reliability coefficients of the five subscales ranged from .81 to .92 and the test-retest reliability coefficients ranged from .74 to .92 for a 16-day-period of time and from .81 to .88 over a 23-day period of time. Exploratory factor analysis resulted in a four-factor structure model (the physical self-worth scale was not included in the analysis) for both males and females.

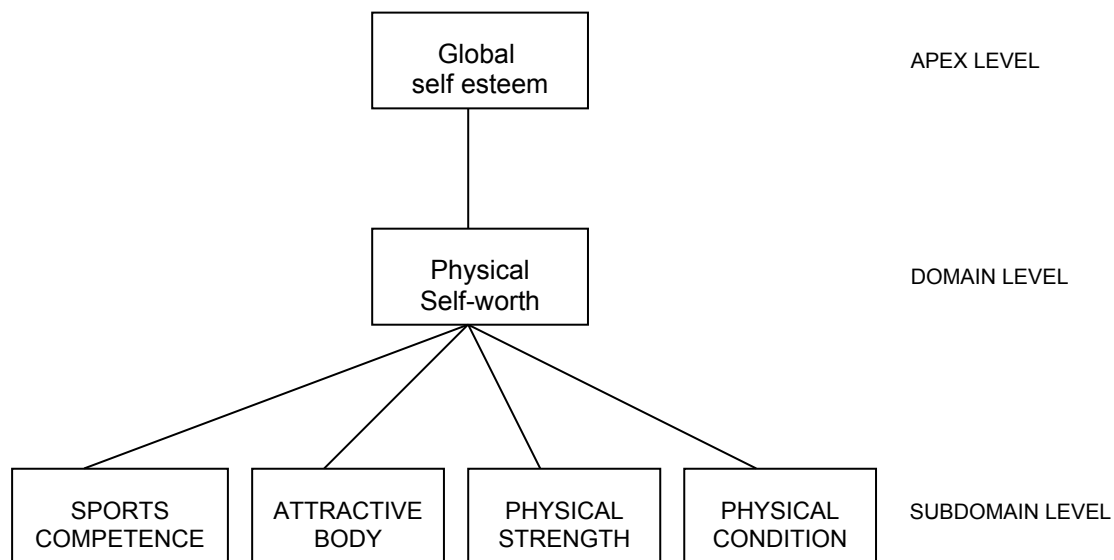


Figure 1. Hierarchical model of physical self-perceptions in the physical domain (from Fox, 1990).

In addition, confirmatory factor analysis supported the hypothesized four-factor structure of the PSPP for both males and females. Finally, evidence for the construct validity of the PSPP was obtained by successfully predicting the physically active and inactive students, as well as the low and highly active students, with 70 to 75% accuracy (Fox & Corbin, 1989).

The factorial structure of the PSPP has been confirmed in a number of other investigations with Anglo-Saxon populations such as in North America (Sonstroem, Harlow, & Josephs, 1994), Australia (Marsh, Richards, Johnson, Roche, & Tremayne, 1994), and United Kingdom (Page, Ashford, Fox, & Biddle, 1993). Furthermore, evidence for the psychometric properties of the PSPP with college students have been established in many other countries such as Belgium (Van de Vliet et al., 2001), France (Ninot, Delignieres, & Fortes, 2000), Portugal (Fonseca & Fox, 2002), Spain (Gutierrez, Moreno, & Sicilia, 1999), and Turkey (Asçi, Asçi, & Zorba, 1999). However, results from the previously cited studies have indicated some inconsistencies in how

well the original four-factor model proposed by Fox and Corbin (1989) would fit an observed covariance matrix derived from scores on the four PSPP factor subscales. For example, results supported a three-factor structure in the Flemish (Van de Vliet et al., 2001) and Portuguese (Fonseca & Fox, 2002) samples and a similar four-factor structure, but with a different item-factor distribution, in the Spanish sample. These somewhat discrepant findings raise some serious questions about the factor structure of PSPP.

Age or gender differences in self-concept also need to be investigated in substantive research (Marsh, 1994). Gender differences is one of the most extensively examined topic among sport/exercise psychologists. Results of these investigations indicated that males have higher perceptions of physical self-worth, sport competence, and strength than females (Asçi, Eklund, Whitehead, Kirazci, & Koca, 2005; Marsh, 1998; Moreno & Cervello, 2005; Whitehead & Corbin, 1997). On the other hand, females tend to have a more favourable perception of their physical appearance (Moreno, Cervello, Vera, & Ruiz, 2007). The majority of studies, however, have relied on t-tests and multivariate analysis of variance (MANOVA) to compare the means between gender groups and the interaction effects due to gender. However, group means are not comparable if the properties of the measured variables are not equivalent in all groups (Drasgow & Kanfer, 1985; Vandenberg & Lance, 2000). A few researchers have employed separate exploratory factor analyses and compared the psychometric properties of the measured constructs across groups. However, Alwin and Jackson (1981) argued that "the issues of factorial invariance are not adequately addressed using exploratory factor analysis" p. 250).

Welk and Eklund (2005) employing confirmatory factor analysis techniques supported the factorial validity of the Youth Physical Self-Perception Profile and revealed factorial invariance between boys and girls. Similarly, Hager, Biddle, and Wang (2005) examined the factorial invariance of PSPP across gender and grade in 2969 high school students. They provided support for the pattern and structure of the Fox and Corbin (1989) model of physical self-perceptions across gender and grade level in seventh-, eighth-, and ninth-grade children. While these investigations provide evidence of factorial invariance between boys and girls, Fox's (1990) recommendations to conduct PSPP analyses separately by gender need to be continuously reinforced.

The purpose of this research is to examine the proposed four-factor structure of PSPP and to assess any potential differences in its factorial structure across gender. The factorial invariance of the PSPP was analyzed with confirmatory factor analysis by testing a series of hypotheses involving the equivalence constraints of one or all parameters in males and females.

## **Methodology**

### **Participants**

Participants in the present study were 315 (131 males, 184 females) undergraduate students enrolled in similar fitness and wellness courses at two US midwestern universities. Students of both schools selected this course as an elective to fulfil one of their general requirements. The length of the course was 15 weeks in both universities. During the course, the students were introduced to topics that dealt with the components of physical fitness, the effects of exercise on well being, weight management, eating disorders, and the effects of alcohol and drugs, among others. The course was designed so as students had to attend a 50-minute lecture and a 50-minute lab per week.

### **Instrumentation**

The Physical Self-Perception Profile (PSPP; Fox & Corbin, 1989) contains 30 items which are written using Harter's (1982) structured alternative format designed to minimize the tendency towards socially desirable responses. This instrument consists of four subscales (sport competence, physical condition, attractive body, and physical strength) and one general scale (physical self-worth). Each subscale consists of 6 items in which participants are presented with two contrasting descriptions (e.g., those with unattractive bodies and those with attractive bodies) and are asked which description is most like themselves and whether the description they select is "sort of true" or "really true" for them. Item scores can range from 1 to 4; since each scale is

composed of 6 items, subscale scores can range from 6 to 24 (Fox, 1990). Only the 24 items of the PSPP were included in this study. The fifth dimension of the scale measuring the physical self worth was not included in the analysis as this dimension is considered as a superordinate construct made up of weighted contributions from the other four dimensions of the PSPP (Fox & Corbin, 1989).

## **Analysis**

First, an exploratory factor analysis was applied in order to identify the common factors of variation among the variables of the PSPP. A principal components analysis was performed using oblique rotation. In the second phase of the analysis, a confirmatory factor analysis was conducted to test the hypothesized four-factor structure of the PSPP separately for both males and females. Finally, the factorial invariance of the PSPP was tested with the multiple group option of the LISREL program (Jöreskog & Sörbom, 2003). The procedures for testing the factorial invariance across groups were identical to those applied in single model fitting. Specifically, a restricted model which has some of its parameter matrices constrained to be equal across groups was compared with a model in which the values of the same parameters are free or need to be estimated (Byrne, Shavelson, & Muthen, 1989). To assess the model fit and the tenability of the invariance constraints, the chi-square difference test was employed. A nonsignificant change in chi-square from a less to a more restrictive model suggests invariance of the model.

## **Results**

### **Exploratory Factor Analysis**

As a prerequisite to the application of factor analysis, the index of goodness of fit (Kaiser-Meyer-Olkin's test) was calculated; a coefficient of .82 was elicited, establishing that the data matrix is suitable for factor analysis. Principal components analyses with oblique rotation extracted four interpretable factors, accounting for 67.90% and 70.00% of the total variance in the male and female items, respectively. The number of factors was estimated using the following criteria: (a) Kaiser's (1961) criterion to retain factors with unrotated eigenvalues of approximately 1.0 or greater, (b) a scree test (Cattell, 1966), and (c) the interpretability of resulting factors (Gorsuch, 1983). These analyses were conducted separately for males and females.

No complex factors were found in the male sample. In the female sample, however, the items 19 and 20 loaded on more than one factor. Specifically, the item 19 loaded more highly on "Physical Strength" than on "Attractive Body" and the item 20 loaded more on "Physical Condition" than on "Attractive Body." Finally, the item 24 did not load on any of the four factors on the basis of the minimum specified criterion (.30).

The next step in the analyses was to use confirmatory factor analysis to substantiate the four-factor model identified in the exploratory factor analysis. The LISREL program was used to analyze the variance-covariance matrices for each sample. A maximum likelihood procedure was used. The summary statistics for the confirmatory factor analyses is presented in Table 1. As can be seen, all the items of the PSPP have statistically significant standardized factor loadings (t-values greater than 2,  $p < .05$ ). However, some standardized factor loadings, mainly in the male sample, did not load very well on the hypothesized latent factors (less than .50). In addition, the estimated standardized factor loading of the item 20 in the female sample was only .29 (t-value = 9.03).

### **Confirmatory Factor Analysis**

Furthermore, as it can be seen in Table 1, the majority of the goodness-of-fit indices in these analyses did not fully support the proposed four-factor structure for both males and females. The chi-square goodness-of-fit test was statistically significant in both groups, indicating that there were some discrepancies between the obtained data and Fox's model. However, since the chi-square statistic is sensitive to sample size, the relative likelihood ratio between the chi-square and its degrees of freedom was considered as a more appropriate index for evaluating the fit of a model. The  $\chi^2/df$  ratio tests in this study were 1.82 for the males and 2.37 for the females,

indicating acceptable fit of the proposed model. On the other hand, the goodness of fit index (GFI) (Joreskog & Sorbom, 1981), the normed fit index (NFI) (Bentler & Bonett, 1980), and nonnormed fit index (NNFI) (Tucker & Lewis, 1973), as well as the standardized root mean square of residuals (SRMSR) (Bentler, 1995), indicated possible misspecifications of the model for both males and females. Values for the GFI, NFI, and TLI of .90 or greater are indicative of a relatively well-fitting model. Values close to 0 for the SRMSR are considered as good fit to the data. As shown in Table 1, all of the goodness-of-fit measures did not provide support for the hypothesized four-factor structure of the PSPP in either the males or the females.

Table 1. Standardized Structural Parameter Estimates Among PSPP Latent Factors for Males and Females

Items	Males		Females	
	Factor loadings	T-values	Factor loadings	T-values
<b>Sport Competence</b>				
1	.51	9.29	.69	12.47
5	.52	8.80	.63	13.36
9	.68	12.32	.83	15.15
13	.64	12.11	.67	14.76
17	.48	8.75	.62	12.30
21	.49	8.74	.77	14.43
<b>Physical Condition</b>				
2	.57	9.61	.57	12.06
6	.56	8.56	.58	11.96
10	.43	7.54	.56	12.21
14	.52	9.13	.59	12.82
18	.50	9.58	.46	14.49
22	.63	12.03	.58	14.52
<b>Attractive Body</b>				
3	.49	10.03	.59	11.81
7	.54	8.77	.71	11.05
11	.63	10.60	.60	11.94
15	.56	9.99	.64	10.94
19	.52	10.30	.67	5.93
23	.66	12.12	.64	13.80
<b>Physical Strength</b>				
4	.57	11.48	.60	12.17
8	.63	11.85	.57	11.10
12	.50	9.06	.69	10.61
16	.51	10.08	.53	13.01
20	.65	12.96	.29	9.03
24	.48	9.03	.63	10.99
Sample size		131		184
Chi-square (df = 276)		447.73		583.58
Ratio, chi-square/df		1.82		2.37
Goodness of fit index (GFI)		.784		.781
Normed fit index (NFI)		.810		.752
Nonnormed fit index (TLI)		.891		.882
Standardized root mean square residual (SRMSR)		.037		.055

### Multiple Group Analysis

In order to examine the factorial invariance of the PSPP across both samples several formulations of the model were examined for purposes of comparison and assessment. More specifically, five different formulations were compared in this analysis. Results of these

comparisons in goodness-of-fit information for models  $M_0$  through  $M_4$  are presented in Table 2. The initial baseline model ( $M_0$ ) represents a no-factor or null model. According to Bentler and Bonett (1980), a null model is the most restricted model in which the measured variables are assumed to be uncorrelated. As shown in Table 2, this model produces a  $\chi^2(552) = 5708.82$ ,  $p < .001$ , which fits the data very poorly. Tests of invariance followed, with the examination of the model  $M_1$  which is the most meaningful and best fitting model to the data. Specifically, this model examines whether the number of factors of the PSPP are invariant across gender. This model yielded a  $\chi^2(492) = 1031.30$ ,  $p < .001$  that equals the sum of the separate analyses for males ( $\chi^2(246) = 447.73$ ) and females ( $\chi^2(246) = 583.58$ ). Although  $M_1$  does a better job of fitting the model to the data, the fit of this model can be further improved. This improvement can be seen in all of goodness-of-fit indices presented in Table 2 (GFI = .781, NFI = .819, TLI = .882, and SRMSR = .055).

Table 2. Goodness-of-Fit Statistics for Multisample PSPP Models Testing for Invariance Across Gender<sup>a</sup>

Model	$\chi^2$	df	$\chi^2/df$	GFI <sup>b</sup>	NFI <sup>c</sup>	TLI <sup>d</sup>	SRMSR <sup>e</sup>
Null model ( $M_0$ )	5708.00	552	10.34	.190	---	---	.262
No invariance ( $M_1$ )	1031.30	492	2.10	.781	.819	.882	.055
Factor loadings (FL) invariant ( $M_2$ )	1095.69	516	2.12	.766	.809	.880	.063
FL, factor variance (FV) invariant ( $M_3$ )	1129.89	522	2.16	.757	.802	.875	.067
FL, measurement errors (ME) invariance ( $M_4$ )	1180.22	540	2.19	.747	.793	.873	.064

<sup>a</sup>Sample size = 315

<sup>b</sup>GFI = Goodness of fit index

<sup>c</sup>NFI = Normed fit index

<sup>d</sup>TLI = Nonnormed fit index

<sup>e</sup>SRMSR = Standardized root mean square residual

The third model ( $M_2$ ) examines whether the factor loadings are invariant across the two samples. In order to examine this hypothesis, the factor loadings for every factor were constrained invariant across groups. The fit of the constrained model yielded a  $\chi^2(516) = 1095.69$ ,  $p < .001$ . The  $\chi^2(24)$  value of 64.39 between Model 2 and Model 1 was statistically significant at  $p < .05$ , indicating that the factor loadings were not constant in the two groups. Inspection of the fit indices for models  $M_3$  and  $M_4$  indicate that the variances/covariances as well as the measurement errors of the hypothesized structure were not the same for males and females.

## Discussion

The purpose of this study was (a) to examine the factorial structure of the PSPP as a multidimensional measure of physical self-esteem and (b) to examine the factorial invariance of PSPP across gender. The results indicated some differences in the structure of the hypothesized model for the measurement of physical self-perceptions when compared to previous studies (Fox & Corbin, 1989; Page et al., 1993; Welk, Corbin, & Lewis, 1995). First, results from exploratory factor analyses revealed an acceptable and logical four-factor structure for male and female college students. However, results from confirmatory factor analyses provided partial support for the hypothesized four-factor structure. More specifically, the single sample analyses showed that goodness-of-fit indices were not satisfactory for the female sample.

There are two possible explanations for the inconsistent results regarding the hypothesized four-factor structure of the PSPP in males and females. First, it is possible that the results of the present study are affected by physical activity participation. In previous studies it has been reported that most of the individuals participated regularly in physical activity programs (Fox & Corbin, 1989; Sonstroem, Speliotis, & Fava, 1992). In the present study, however, there was no evidence that participants were involved in regular physical activity. Actually, they did not participate in an exercise/physical activity program and they were not given any individual instruction or feedback. Rather, they only attended fitness classes twice a week where the benefits of regular physical activity on the cardiovascular system, as well as some other health related topics were discussed.

Another possible explanation for the inconsistent results is that students recruited from two different universities participated in the study. Since a number of different fitness instructors administered the instrument, this may have influenced the standardization of the administration procedures. As a result, some of the students may have misinterpreted the items of the PSPP (some students thought that the format of the scale was complicated). It would be worthwhile for other researchers to try to replicate this study with a larger sample taken from a more homogeneous population with individuals participating regularly in physical activity programs. Further, due to the complicated format of this scale, clear instructions from trained staff need to be given to the subjects during the administration process.

The results of the factorial invariance, based on a confirmatory factor-analysis, indicated that the factor structure of the PSPP is gender sensitive. Fox and Corbin (1989) have found evidence for the proposed four-factor structure of the PSPP across males and females, but their findings were primarily based on traditional exploratory factor analytic techniques. However, such analyses are not entirely appropriate for the comparison of the factor structures across different groups. Although the results of this study do not confirm the proposed four-factor structure, they do not disprove Fox's previous work with the PSPP. Given these results, researchers need to pay more attention to the PSPP factorial structure and also to determine whether these differences can be replicated in male and female samples, as well as in other population groups such as athletes and nonathletes.

One limitation of the present study is that the small size of the each sample (131 males and 184 females) is below the recommended minimum sample size of 200 to 300 for confirmatory factor analytic studies (Comrey & Lee, 1992). However, the findings from the male sample are consistent with previously cited research and point out a need for further research to determine whether the different factor structures for males and females presented here can be replicated with larger existing data sets that involving a broader sample of the population.

In conclusion, the results from this investigation indicate the need for additional research in order to establish valid instruments for assessing the physical self-perceptions more accurately. Continued research is needed by using this instrument in order to determine the factorial as well as the convergent and divergent validity of the proposed four-factor structure and to examine its factorial invariance across different groups. If further studies replicate these results, then the items of the instrument may need to be revised in order to hold the same meaning for males and females.

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