TITLE	TITLE20	COUNTRY	SCIENCE	SOCIAL SCIENCE
PSYCHOLOGICAL BULLETIN	PSYCHOL BULL	UNITED STATES	TRUE	TRUE
PSYCHOLOGICAL INQUIRY	PSYCHOL INQ	UNITED STATES	FALSE	TRUE
PSYCHOLOGICAL MEDICINE	PSYCHOL MED	UNITED STATES	TRUE	TRUE
PSYCHOLOGICAL METHODS	PSYCHOL METHODS	UNITED STATES	FALSE	TRUE
PSYCHOLOGICAL RECORD	PSYCHOL REC	UNITED STATES	FALSE	TRUE
PSYCHOLOGICAL REPORTS	PSYCHOL REP	UNITED STATES	FALSE	TRUE
PSYCHOLOGICAL RE-SEARCH-PSYCHOLOGISCHE FORSCHUNG	PSYCHOL RES-PSYCH FO	GERMANY	FALSE	TRUE
PSYCHOLOGICAL REVIEW	PSYCHOL REV	UNITED STATES	TRUE	TRUE
PSYCHOLOGICAL SCIENCE	PSYCHOL SCI	UNITED STATES	FALSE	TRUE
Psychological Science in the Public Interest	PSYCHOL SCI PUBL INT	ENGLAND	FALSE	TRUE
Psychological Services	PSYCHOL SERV	UNITED STATES	FALSE	TRUE
Psychological Trauma-Theory Research Practice and Policy	PSYCHOL TRAUMA-US	UNITED STATES	FALSE	TRUE
Psychologie Francaise	PSYCHOL FR	FRANCE	FALSE	TRUE
PSYCHOLOGIE IN ERZIEHUNG UND UNTERRICHT	PSYCHOL ERZ UNTERR	GERMANY	FALSE	TRUE
PSYCHOLOGISCHE RUND-SCHAU	PSYCHOL RUNDSCH	GERMANY	FALSE	TRUE
PSYCHOLOGIST	PSYCHOLOGIST	ENGLAND	FALSE	TRUE
PSYCHOLOGY & HEALTH	PSYCHOL HEALTH	ENGLAND	FALSE	TRUE
PSYCHOLOGY & MARKETING	PSYCHOL MARKET	UNITED STATES	FALSE	TRUE
PSYCHOLOGY AND AGING	PSYCHOL AGING	UNITED STATES	FALSE	TRUE
PSYCHOLOGY AND PSYCHO-THERAPY-THEORY RESEARCH AND PRACTICE	PSYCHOL PSYCHOTH-ER-T	ENGLAND	TRUE	TRUE
PSYCHOLOGY CRIME & LAW	PSYCHOL CRIME LAW	ENGLAND	FALSE	TRUE
Psychology Health & Medicine	PSYCHOL HEALTH MED	ENGLAND	TRUE	TRUE
PSYCHOLOGY IN THE SCHOOLS	PSYCHOL SCHOOLS	UNITED STATES	FALSE	TRUE
PSYCHOLOGY OF ADDICTIVE BEHAVIORS	PSYCHOL ADDICT BEHAV	UNITED STATES	FALSE	TRUE
Psychology of Aesthetics Cre-ativity and the Arts	PSYCHOL AESTHET CREA	UNITED STATES	FALSE	TRUE
Psychology of Learning and Motivation	PSYCHOL LEARN MOTIV	UNITED STATES	FALSE	TRUE
Psychology of Men & Mascu-linity	PSYCHOL MEN MAS-CULIN	UNITED STATES	FALSE	TRUE
Psychology of Music	PSYCHOL MUSIC	UNITED STATES	FALSE	TRUE

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ISSN 0033-2941
April 2015

AmSci

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Psychological Reports: Measures & Statistics
2015, 116, 2, 422-437. © Psychological Reports 2015

PSYCHOMETRIC PROPERTIES OF THE PHYSICAL SELF-CONCEPT QUESTIONNAIRE WITH MEXICAN UNIVERSITY STUDENTS[1, 2]

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Summary.—This study analyzes, in a sample of Mexican students, the factor structure of the Physical Self-Concept Questionnaire of Goñi, Ruiz de Azúa, and Rodríguez (2006), which assesses physical ability, physical fitness, attractiveness, strength, general physical self-concept, and global self-concept. A representative sample of 1,466 Mexican university physical education students was selected (754 men, 712 women; *M* age = 20.6 yr., *SD* = 2.0). Confirmatory factor analysis showed a two-factor structure (motor competency and physical attractiveness). The two-factor structure, regarding statistical and substantive criteria, had good fit indices. Results of the factor analyses carried out with the sub-samples indicated a strong stability and evidence for the factor structure obtained. The findings support the use of this questionnaire to measure physical self-concept in Mexican university students. Future studies should replicate these findings in other populations.

The nature of self-concept has caused different ideas to emerge regarding its structure (Goñi, 2009). Initially, self-concept was based on the idea that perceptions around it were global (Fitts, 1972; Burns, 1979), but with the appearance of new models based on a set of partial and hierarchized perceptions of the self, a multidimensional construct of self-concept emerged. Regarding this, Shavelson, Hubner, and Stanton (1976) proposed a multidimensional structure which considers self-concept to be at the top of the hierarchy and comprises academic self-concept and non-academic self-concept. The non-academic self-concept includes the social, emotional, and physical domains of self-concept (Marsh & Shavelson, 1985). Physical self-concept is the focus of the present study.

Although the multidimensional nature of physical self-concept has been widely accepted (Goñi, Rodríguez, & Esnaola, 2010; Aróstegi, Goñi,

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[2]We thank Aliisa Hatten for the English translation of the manuscript. This study is part of a project of the international network funded by the Secretaría de Educación Pública-Subsecretaría de Educación Superior—Dirección General de Educación Superior Universitaria de México [Mexican Ministry of Education-Department of Higher Education—General Directorate of the University Education] (OF-13-6894). Additionally, the first author is supported by a grant from the National Council of Science and Technology of Mexico (Conacyt).

DOI 10.2466/03.07.PR0.116k18w2 ISSN 0033-2941

Infante, & Zubillaga, 2013), there were several proposals on which dimensions it comprises, with consequences for the construction of new scales measuring it. The first measures of physical self-concept were one-dimensional, global conceptions of self-concept and included items regarding physical abilities and physical appearance (e.g., Marsh & Shavelson, 1985). In the four-dimensional model of Fox and Corbin (1989), physical self-concept comprised sport competence, physical fitness, attractiveness, and strength, giving rise to the Physical Self-Perception Profile (PSPP). However, subsequent models (e.g., Marsh, Richards, Johnson, Roche, & Tremayne, 1994; Marsh, 1997) included up to nine factors (strength, body fat, activity, endurance/fitness, sports competence, coordination, health, appearance, and flexibility), giving rise to the Physical Self-Description Questionnaire (PSDQ). Finally, the Goñi, Ruiz de Azúa, and Rodríguez (2006) model and the Physical Self-Concept Questionnaire, which was used in this research, also utilized the four-factor structure of Fox and Corbin (1989) and redefined sport competence as a physical ability, maintaining the rest of the dimensions taken into account by Fox and Corbin's model.

Many studies have assessed the internal consistency and the temporal stability of the Fox and Corbin questionnaire (1989). On one hand, the main problem of the PSPP is discriminant validity, due to the presence of high correlations between the domains and subdomains that compose it (Marsh, *et al.*, 1994; Asci, Asci, & Zorba, 1999), mainly in studies with different cultures and ages (Atienza, Balaguer, Moreno, & Fox, 2004). On the other hand, many studies with Spanish samples in different contexts (from secondary to university students, and even with older adults) have been carried out using the Physical Self-Concept Questionnaire, which has demonstrated good reliability and validity (Goñi, 2009; Goñi & Infante, 2010; Goñi, *et al.*, 2010; Revuelta & Esnaola, 2011; Soriano, Navas, & Holgado, 2011). All these studies showed a four-factor structure for physical self-concept, but the problems of discriminant validity are persistent. Physical fitness and ability domains are highly correlated, and some items do not load clearly on their corresponding domains (e.g., Atienza, *et al.*, 2004; Navas, Soriano, & Holgado, 2013).

Culture (e.g., nationality, esthetic models, alimentary and healthy habits, psychological well-being) and personal factors such as quantity and type of physical activity, among others, influence physical self-concept (Garrido, Videra, Parra, & Juárez, 2012). Therefore, verifying the physical self-concept structure of a great variety of samples is crucial in order to obtain a consistent instrument (Abalo, Lévy, Rial, & Varela, 2006; Ferrando & Anguiano-Carrasco, 2010; DeVellis, 2011). Although this instrument has been validated with other samples, e.g., Navas, *et al.* (2013) with Chilean students, there are no studies in the Mexican population. Consequently, the purpose of this study was to use instrumental procedures (Montero & León, 2005; Hernández, Fernández, & Baptista, 2010) to explore the factor structure and the possible psychometric equivalence of the physical self-concept of Goñi, *et al.*'s (2006) questionnaire in a Mexican sample of undergraduate students.

Method

Participants

The sample consisted of 1,466 Mexican university participants (712 women, 754 men) who were recruited voluntarily among the physical education students of the Autonomous University of Chihuahua. Their ages ranged from 18 to 25 years ($M = 20.6$, $SD = 2.0$). The sample was divided into two sub-samples with the goal of validating and verifying the results obtained through cross-validation. The first sub-sample was composed of 715 participants (335 women, 380 men; M age = 20.6 yr., $SD = 2.0$), and the second sub-sample was composed of 751 participants (377 women, 374 men; M age = 20.6 yr., $SD = 2.0$).

Measure

Physical Self-Concept Questionnaire (Goñi, *et al*., 2006).—This questionnaire is composed of 36 items grouped into six dimensions: (a) Physical ability ($\alpha = .84$), consisting of Items 1, 6, 17, 23, 28, and 33, expressing ideas such as "I do not have qualities for sports" or "I consider myself clumsy at sports"; (b) Physical fitness ($\alpha = .88$), composed of Items 2, 7, 11, 18, 24, and 29, expressing ideas such as "I have much physical energy" or "I can run and do exercise for a long time without experiencing fatigue"; (c) Physical attractiveness ($\alpha = .87$), consisting of Items 8, 12, 19, 25, 30, and 34, and having expressions like "It is difficult for me to have good self-image" or "I feel confidence regarding the physical image that I transmit"; (d) Strength ($\alpha = .83$), consisting of Items 3, 9, 13, 20, 31, and 35, and expressing ideas such as "I am able to realize activities that require strength" or "I am strong"; (e) General physical self-concept ($\alpha = .86$), comprising Items 4, 14, 16, 21, 26, and 36, and expressing ideas like, "I feel that I am physically worse than the others" or "Physically, I feel good with myself"; and (f) Global self-concept ($\alpha = .84$), composed of Items 5, 10, 15, 22, 27, and 32, and expressing ideas such as "I feel happy" or "I wish I was different" (Goñi, *et al*., 2006).

Procedure

The participants, all belonging to the Autonomous University of Chihuahua in the Faculty of Sciences of Physical Culture, were invited to fill out the questionnaire voluntarily. All who accepted the invitation signed a consent letter for this study. Next, the questionnaire was applied through a computerized application installed in the computer room of the aforementioned faculty. At the beginning of the session, a brief introduction on the importance of the study and the protocol of the computerized application were explained. The participants were encouraged to answer sincerely, and the confidentiality of their answers and results was guaranteed. In the first pages of the computerized application, before the first question of the questionnaire, the instructions they needed to proceed were given. The duration of the session was approximately 30 min., and at the end of it all participants were thanked for their contribution to the study. Once the instrument was administered, the data were obtained by a generator module of the Scales Editor, Version 2.0 (Blanco, Ornelas, Tristán, Cocca, Mayorga-Vega, López-Walle, *et al*., 2013).

Data Analyses

First, the mean, standard deviation, asymmetry, kurtosis, and the discriminant indices of each of the 24 items corresponding to the four specific dimensions of the Physical Self-Concept Questionnaire were calculated, as well as Bartlett's test and the Kaiser-Merye-Olkin (KMO) measure of sampling adequacy.

Then, four measurement models were compared: the first model (M1) comprising four factors of 24 items proposed by Goñi, *et al*. (2006) was compared with the second model (M2) comprising two factors of 24 items, grouping the factors of ability, physical fitness, and strength in only one factor, taking into account the high correlations between these three factors in the results of previous research regarding the factor structure of physical self-concept (e.g., Atienza, *et al*., 2004; Navas, *et al*., 2013). The third model (M3) with four factors was compared to the fourth model (M4) with two factors (with the same structure as M2), both with 18 items, because the items that did not present good discrimination indexes (6, 23, 30, and 35), and the items that presented high values of asymmetry and kurtosis (25 and 33) were eliminated.

Subsequently, with the aim of improving M4, model 5 (M5) was obtained, which is a two-factor model composed of the physical attractiveness factor with two of the items from general physical self-concept, and a second factor "motor competency" that comes from the union of the items of ability, physical fitness, and strength factors that were well explained enough by the model.

A confirmatory factor analysis was conducted for the first sub-sample using the software AMOS 21 (Arbuckle, 2012). The error variances were specified as free parameters. In each latent variable (factor), one of the structural coefficients associated was fixed to the value of one in order to make its scale equal to one of the observed variables (items). The maximum likelihood estimation method, following Thompson's (2004) recommendations, was conducted to compare the fit indices of several alternative models to select the best one.

In the fit model assessment, the chi-squared test, the adjusted goodness of fit index (GFI), and the root mean square error of approximation (RMSEA) were used as absolute fit indices. The adjusted goodness-of-fit index (AGFI), the Tucker-Lewis index (TLI), and the comparative fit index (CFI) were used as incremental fit indices. Chi-squared divided by degrees of freedom (CMIN/*df*) and the Akaike information criterion (AIC) were used as parsimony fit indices (Byrne, 2010; Gelabert, García-Esteve, Martín-Santos, Gutiérrez, Torres, & Subirà, 2011). In order to verify the factor structure of the physical self-concept scale obtained from the first sub-sample (confirmatory factor analysis, first factor solution), a second confirmatory factor analysis was conducted in the second sub-sample (MacCallum, 2003).

Lastly, a factor invariance analysis of the better model obtained was conducted, following the recommendations of Abalo, *et al*. (2006), the reliability of each of the dimensions was calculated using Cronbach's alpha and the omega coefficient (Revelle & Zinbarg, 2009; Sijtsma, 2009).

Results

The results of the descriptive analyses and the discrimination indices of each of the 24 items corresponding to the four specific dimensions of the Physical Self-Concept Questionnaire are shown in Table 1 with corrected item-total correlations. All the items had mean ratings between 1.81 and 4.34. Except for Items 25 ("I don't like my body image") and 33 ("I consider myself clumsy at sports"), all values of asymmetry and kurtosis were in a range between ± 1.5, and therefore a normal distribution of the variables was inferred. Regarding the discrimination indices, the majority of the items were satisfactory; only Items 6 ("I don't have the qualities necessary for sports"), 23 ("I'm one of those people that has a hard time learning a new sport"), 30 ("I'm attractive"), and 35 ("I don't see myself belonging to the group of people who have a lot of physical strength") had a discrimination index under 0.35 (Brzoska & Razum, 2010).

The Bartlett's test of significance in the first (8,835.40, $p < .001$) and second sub-samples (9,277.67, $p < .001$) and the average of the measure of sampling adequacy KMO in the first (0.93) and second sub-samples (0.93) supported factorability and a high sampling adequacy, respectively.

Confirmatory Factor Analysis and Cross-validation 24-item Models

The global results of the confirmatory factor analysis of the first (GFI = 0.79; RMSEA = 0.09; CFI = 0.83) and second sub-samples (GFI = 0.80; RMSEA = 0.09; CFI = 0.82) for the model M1 showed that the measurement model was not optimal (Table 5). The model M1 factors explained approx-

TABLE 1

Descriptive Analyses and Discrimination Indices of the Items Belonging to the Four Specific Factors of the Physical Self-Concept Questionnaire (First and Second Sub-samples)

Item	First Sub-sample					Second Sub-sample				
	M	*SD*	SK	KU	$r_{\text{i-total}}$	*M*	*SD*	SK	KU	$r_{\text{i-total}}$
1	3.67	1.05	−0.65	−0.01	.67	3.68	1.00	−0.62	0.10	.65
2	3.22	1.07	−0.20	−0.44	.69	3.24	1.03	−0.24	−0.33	.71
3	2.89	1.09	−0.05	−0.57	.57	2.90	1.08	0.04	−0.47	.57
6	1.81	1.14	1.23	0.44	−.36	1.90	1.18	1.07	0.03	−.36
7	3.93	1.11	−0.71	−0.50	.46	3.91	1.13	−0.81	−0.18	.52
8	4.01	1.17	−0.91	−0.27	.39	3.96	1.18	−0.89	−0.20	.53
9	3.80	1.13	−0.55	−0.61	.40	3.87	1.06	−0.56	−0.47	.41
11	3.59	1.08	−0.43	−0.32	.73	3.60	1.10	−0.54	−0.30	.71
12	3.87	1.11	−0.80	−0.06	.54	3.86	1.19	−0.85	−0.19	.57
13	3.93	1.06	−0.75	−0.17	.66	3.94	1.04	−0.84	0.17	.65
17	2.91	1.23	−0.12	−0.90	.59	2.94	1.17	−0.06	−0.70	.60
18	2.85	1.25	0.01	−0.98	.72	2.87	1.23	−0.05	−0.95	.67
19	3.81	1.15	−0.77	−0.21	.61	3.78	1.17	−0.74	−0.26	.58
20	2.97	1.31	−0.10	−1.05	.69	2.95	1.24	−0.08	−0.94	.67
23	4.16	1.13	−1.22	0.55	.20	4.22	1.09	−1.30	0.80	.29
24	3.79	1.20	−0.63	−0.64	.49	3.84	1.19	−0.72	−0.48	.53
25	4.34	1.09	−1.60	1.60	.46	4.32	1.13	−1.56	1.30	.49
28	3.65	1.19	−0.65	−0.39	.71	3.69	1.15	−0.67	−0.23	.72
29	3.60	1.10	−0.57	−0.23	.76	3.61	1.06	−0.42	−0.36	.72
30	4.18	1.00	−1.09	0.71	.33	4.14	1.04	−1.08	0.57	.37
31	3.70	1.02	−0.43	−0.31	.65	3.70	1.02	−0.45	−0.21	.64
33	4.43	1.00	−1.62	2.00	.49	4.41	1.00	−1.57	1.77	.51
34	4.08	1.16	−1.21	0.62	.42	4.11	1.06	−1.12	0.56	.47
35	3.66	1.25	−0.44	−0.87	.34	3.65	1.23	−0.46	−0.77	.30

Note.—*M* = mean; *SD* = standard deviation; SK = skewness; KU = kurtosis; $r_{\text{i-total}}$ = corrected item-total correlation.

imately 60% of the variance. Table 2 shows, in both sub-samples, that nine of the 24 items did not properly saturate on their expected dimensions: Items 6 and 23 in the ability dimension, Items 7 and 24 in the physical fitness dimension, Items 8, 25, and 30 in the physical attractiveness factor, and Items 9 and 35 in the strength factor. Moreover, high inter-correlations between ability, physical fitness, and strength factors were observed, which indicates poor discriminant validity.

The global results of the confirmatory factor analysis of the second tested model (M2) in the first (GFI = 0.83; RMSEA = 0.08; CFI = 0.85) and second sub-samples (GFI = 0.84; RMSEA = 0.09; CFI = 0.85) showed that the

TABLE 2
STANDARDIZED SOLUTIONS FROM THE CONFIRMATORY FACTOR ANALYSIS FOR THE M1 MODEL IN FIRST AND SECOND SUB-SAMPLES

Item	Factor Loading							
	PAB		PFI		PAT		STR	
	SS1	SS2	SS1	SS2	SS1	SS2	SS1	SS2
1	.84	.84						
28	.80	.84						
17	.78	.78						
33	.71	.71						
23	**.33**	**.41**						
6	**−.40**	**−.42**						
18			.83	.79				
2			.81	.82				
11			.76	.72				
29			.75	.71				
24			**.57**	**.61**				
7			**.53**	**.59**				
19					.86	.83		
12					.85	.84		
34					.76	.79		
25					**.66**	**.69**		
30					**.59**	**.58**		
8					**.57**	**.62**		
20							.86	.84
13							.79	.76
31							.77	.72
3							.73	.75
35							**.56**	**.54**
9							**.49**	**.51**
Factor Correlation Matrix								
PAB								
PFI	.90	.88						
PAT	.48	.53	.61	.62				
STR	.83	.81	.85	.86	.55	.53		

Note.—PAB = physical ability; PFI = physical fitness; PAT = physical attractiveness; STR = strength; SS1 = first sub-sample; SS2 = second sub-sample. Boldface indicates items with saturations under .70.

TABLE 3
STANDARDIZED SOLUTIONS FROM THE CONFIRMATORY FACTOR ANALYSIS FOR THE M3 MODEL IN FIRST AND SECOND SUB-SAMPLES

Item	Factor Loading							
	PAB		PFI		PAT		STR	
	SS1	SS2	SS1	SS2	SS1	SS2	SS1	SS2
1	.80	.81						
28	.78	.80						
17	.75	.75						
18			.81	.76				
2			.79	.79				
29			.75	.72				
11			.72	.70				
24			**.52**	**.55**				
7			**.48**	**.53**				
19					.84	.82		
12					.83	.83		
34					**.62**	**.67**		
8					**.52**	**.58**		
20							.85	.83
13							.75	.73
3							.70	.72
31							**.67**	**.66**
9							**.50**	**.51**
Factor Correlation Matrix								
PAB								
PFI	.90	.87						
PAT	.41	.47	.58	.59				
STR	.83	.81	.82	.84	.48	.45		

Note.—PAB = physical ability; PFI = physical fitness; PAT = physical attractiveness; STR = strength; SS1 = first sub-sample; SS2 = second sub-sample; Boldface indicates items with saturations under 0.70.

measurement model, although better than M1, was not acceptable either (Table 5). The two factors of M2 explained 50% of the variance.

Confirmatory Factor Analysis and Cross-validation 18-item Models

The global results of the confirmatory factor analysis of the third tested model (M3) in the first (GFI = 0.85; RMSEA = 0.10; CFI = 0.87) and second sub-samples (GFI = 0.86; RMSEA = 0.10; CFI = 0.88) showed that the measurement model was not acceptable either (Table 5). The four factors of M3 explained 50% of the variance. As shown in Table 3, in both sub-

TABLE 4

STANDARDIZED SOLUTIONS FROM THE CONFIRMATORY FACTOR ANALYSIS FOR THE M5 MODEL IN FIRST AND SECOND SUB-SAMPLES

Item	Factor Loading			
	Motor Competency		Physical Attractiveness	
	SS1	SS2	SS1	SS2
28 Practicando deportes soy una persona hábil	.81	.84		
18 Puedo correr y hacer ejercicio durante mucho tiempo sin cansarme	.80	.75		
29 Tengo mucha energía física	.80	.80		
2 Tengo mucha resistencia física	.80	.78		
1 Soy bueno en los deportes	.78	.78		
20 Destaco en actividades en las que se precisa fuerza física	.76	.74		
17 Tengo más habilidad que la gente de mi edad practicando deportes	.73	.73		
19 Siento confianza en cuanto a la imagen física que transmito			.86	.82
14 En lo físico me siento satisfecho conmigo mismo			.85	.82
12 Me siento contento con mi imagen corporal			.83	.85
21 Mi cuerpo me transmite sensaciones positivas			.77	.77
34 Me gusta mi cara y mi cuerpo			**.62**	**.68**
Factor Correlation Matrix				
PAB				
PFI	.55	.56		

Note.—PAB = physical ability; PFI = physical fitness; SS1 = first sub-sample; SS2 = second sub-sample; Boldface indicates items with saturations under 0.70.

samples six of the 19 analyzed items did not properly saturate on their expected dimensions: Items 7 and 24 in the physical fitness dimension, Items 8 and 34 in the physical attractiveness dimension, and Items 9 and 31 in the strength factor. Moreover, high inter-correlations were again observed between ability, physical fitness, and strength factors, which indicates poor discriminant validity.

The global results of the confirmatory factor analysis of the third tested model (M4) in the first (GFI = 0.88; RMSEA = 0.09; CFI = 0.90) and second sub-samples (GFI = 0.88; RMSEA = 0.08; CFI = 0.90) showed that the

TABLE 5

ABSOLUTE FIT MEASUREMENTS FOR THE GENERATED MODELS: FIRST AND SECOND CONFIRMATORY FACTOR ANALYSES IN FIRST AND SECOND SUB-SAMPLES

Factor Solution	Model	Absolute Fit Indices			Incremental Fit Indices			Parsimony Fit Indices	
		χ^2	GFI	RMSEA	AGFI	TLI	CFI	CMIN/*df*	AIC
First					24 Items				
	M1	1,748.78†	0.79	0.09	0.75	0.81	0.83	6.99	1848.78
	M2	1533.32†	0.83	0.08	0.79	0.83	0.85	6.23	1641.32
					18 Items				
	M3	1,040.25†	0.85	0.10	0.80	0.85	0.87	7.88	1118.25
	M4	878.49†	0.88	0.09	0.84	0.88	0.90	6.75	960.49
					Best Model				
	M5	306.01†	0.93	0.08	0.90	0.94	0.95	5.77	495.31
Second					24 Items				
	M1	1,861.62†	0.80	0.09	0.76	0.80	0.82	7.45	1916.62
	M2	1602.30†	0.84	0.09	0.80	0.83	0.85	6.51	1710.30
					18 Items				
	M3	1,046.58†	0.86	0.10	0.82	0.86	0.88	7.93	1124.58
	M4	901.67†	0.88	0.08	0.84	0.88	0.90	6.93	983.67
					Best Model				
	M5	360.39†	0.93	0.08	0.89	0.93	0.95	6.80	550.92

Note.—GFI = goodness-of-fit index; RMSEA = root mean square error of approximation; AGFI = adjusted goodness-of-fit index; TLI = Tucker-Lewis index; CFI = comparative fit index; CMIN/*df* = chi-squared fit index divided by degrees of freedom; AIC = Akaike information criterion. †$p < .01$.

measurement model, although better than M3, was not acceptable either (Table 5). The two factors of M4 explained 55% of the variance.

Confirmatory Factor Analysis and Cross-validation Best Model

The global results of the confirmatory factor analyses of the fifth and last tested model (M5), which had a bidimensional structure of the Physical Self-Concept Questionnaire, in the first (GFI = 0.93; RMSEA = 0.08; CFI = 0.95) and second sub-samples (GFI = 0.93; RMSEA = 0.08; CFI = 0.95) showed that this model is better than the four previous models analyzed. Thus, M5 had an acceptable fit (Table 5) and explained approximately 68% of the variance.

Table 4 shows, in both sub-samples, that only Item 34 did not properly saturate on its expected dimension (physical attractiveness). In this case, the discriminant validity was adequate due to the moderate inter-correlations observed between the two factors that composed the model M5.

Invariance of the Factor Structure

The fit indices obtained (Table 6) allow for the equivalence of the basic measurement models between both sub-samples. Although the chi-squared value exceeded the required value for accepting the hypothesis of invariance, the rest of the indices met acceptable criteria (GFI = 0.93; CFI = 0.95; RMSEA = 0.06; AIC = 766.40) and supported the base model of invariance (model without restrictions).

Measurement invariance was characterized by adding restrictions to the base model. The values presented in Table 6 allow for the acceptance of the level of invariance. The adjusted goodness-of-fit index (GFI = 0.93) and the root mean square error of approximation (RMSEA = 0.06) also contributed to invariance acceptance. Moreover, the Akaike information criterion (AIC = 756.67) and Bentler's comparative fit index (CFI = 0.95) did not increase from the base model. The recommendations for the embedded models of Cheung and Rensvold (2002) were taken into account. These authors suggested that the evaluation criterion of the difference of the CFIs of both embedded models should decrease 0.01 or less, and that the restricted model should be accepted, indicating factor invariance. The difference of CFIs obtained in this study allow for the acceptance of the measurement invariance model. Consequently, it is concluded that the factor loadings are equivalent in both sub-samples.

Once the measurement invariance between sub-samples was demonstrated, the equivalence between intercepts was analyzed (“strong invariance”). The indices presented in Table 6 showed a good adjustment of this model, evaluated independently as well as analyzing it in regards to its embedding with the measurement invariance model. The difference between the comparative fit indices was below 0.01, the AGFI was 0.95, and the RMSEA was 0.06. Since strong invariance can be accepted, the equivalence of the two models evaluated regarding factor coefficients and intercepts is demonstrated.

TABLE 6

ADJUSTED GOODNESS-OF-FIT INDICES OF EACH OF THE MODELS ANALYZED FROM THE FACTOR INVARIANCE TEST

Model	Fit Indices						
	χ^2	*df*	GFI	NFI	CFI	RMSEA	AIC
Model without restrictions	666.40†	106	0.93	0.94	0.95	0.06	766.40
Metric invariance	676.67†	116	0.93	0.94	0.95	0.06	756.67
Strong factor invariance	678.72†	119	0.93	0.94	0.95	0.06	752.72

Note.—AIC = Akaike information criterion; CFI = comparative fit index; GFI = goodness-of-fit index; NFI = normed fit index; RMSEA = root mean square error of approximation. †$p < .01$.

Factor Reliability

The obtained factors from the confirmatory factor analyses of the first and second sub-samples had a reliability value above 0.80, that supposes an adequate internal consistency for these kinds of sub-samples, particularly if the reduced number of items is considered (Table 7).

TABLE 7
OMEGA AND ALPHA COEFFICIENTS OF EACH OF THE OBTAINED FACTORS FROM THE CONFIRMATORY FACTOR ANALYSES OF FIRST AND SECOND SUB-SAMPLES

Factor	First Sub-sample		Second Sub-sample	
	Ω	α	Ω	α
1. Motor competency	.85	.92	.84	.91
2. Physical attractiveness	.89	.89	.89	.89

DISCUSSION

The goal of this study was to analyze the psychometric properties of the four specific dimensions of the Physical Self-Concept Questionnaire in a sample of Mexican university students. Five measurement models were tested: M1, with a four-factor structure proposed by Goñi, *et al*. (2006); M2, composed of two factors of 24 items also, grouping the factors of ability, physical fitness, and strength in only one factor; M3, a tetra-dimensional model of physical self-concept also from Goñi and colleagues, except for four items that did not present good discrimination indexes and two items that presented high values of asymmetry and kurtosis; M4, of two factors composed of the same items as M3; and M5, the best-fitted model, which had a bi-dimensional structure composed of physical attractiveness and two items from global physical self-concept, as well as a second factor called "motor competency" that emerged from the items of the ability, physical fitness, and strength factors. The fact that the group of items belonging to the ability, physical fitness, and strength factors are now included in the "motor competency" factor was based on the results of previous studies regarding the factor structure of physical self-concept, where high correlations between those factors were observed (e.g., Atienza, *et al*., 2004; Navas, *et al*., 2013). Motor competency refers to motor ability expertise and movement patterns that provide the individual with the capacity to solve motor situations in multiple contexts, which comprise ability, physical fitness, and strength indicators (Pacheco, 2011).

The elimination of 14 of the items from the original version of the questionnaire proposed by Goñi, *et al*. (2006), three from the physical attractiveness factor, five from the strength, three from the physical fitness, and three from the physical ability factors, were based on their saturations being under 0.70, which meant that they were not good indicators of their correspondent factors (Rial, Varela, Abalo, & Lévy, 2006). These results were supported by some previous research (Goñi, *et al*., 2006; Holgado, Soriano, & Navas, 2009; Goñi, *et al*., 2010; Navas, *et al*., 2013), in which those items also obtained saturations under 0.70.

In a similar way, the union of the items of the physical attractiveness and global physical self-concept is based on the results of previous studies that reported high correlations between these two factors (e.g., Goñi, *et al*., 2010; Navas, *et al*., 2013). The inclusion of Items 14 ("Physically, I feel good about myself") and 21 ("I have positive feelings about my body") in the physical attractiveness factor that belonged in the original version of the questionnaire on global physical self-concept is theoretically justified by their possible interpretation as a characteristic of physical attractiveness.

Lastly, the differences observed between the model proposed by Goñi, *et al*. (2006) and the one proposed in this study could be attributed to the social and cultural differences of participants, who were Mexican university students. The validation of a questionnaire is a slow and continuous process, and consequently future investigations should verify these findings within wider samples (Holgado, *et al*., 2009).

Limitations and Conclusions

Regarding the limitations of the study, the participants were volunteers, Mexican university students studying for physical education degrees, which limits the generalizability of the results. Therefore, repeating the process with broader samples (adding young adults who are not students) is a good future challenge. A second limitation might come from the measuring instrument that is based on self-report and could have biases related to the social desirability.

The confirmatory factor analysis conducted demonstrated a two-factor structure of physical self-concept, including physical ability and physical attractiveness. In both sub-samples there was adequate reliability and also a high congruence between pairs of factors, particularly when the reduced items in each factor were considered. This means that the results of the model are fully confirmatory. However, the obtained model did not coincide with the one presented by Goñi, *et al*. (2006) because of the 14 omitted items and the changed saturation of some items from the original factors, based on their modification indices and theoretical justification.

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Accepted January 15, 2015.