

Original article (short paper)

Self-concept in preadolescence: A brief version of AF5 scale

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Abstract—The purpose of this study was to analyze the psychometric properties of a brief version of the AF5 questionnaire (García & Musitu, 2001) using exploratory and confirmatory techniques on a preadolescent population in the Valencian community (Spain). The sample was made up of 541 participants between 10 and 12 years old, 55.1% (298) boys and 44.9% (243) girls. After observing the results of different reliability and validity analyses (exploratory factor analysis (EFA) and confirmatory factor analysis (CFA)), it was found that the reduced scale consisting of 20 items showed a similar reliability and validity to the original scale. The factorial structure also fits that of the original model established *a priori*. According to the results of the study, the use of this diagnostic tool with Spanish children seems justified.

Keywords: self-concept, AF5, preadolescence, physical activity

Resumo—“Auto-conceito na pré-adolescência: Uma breve versão da escala AF5.” O objetivo deste estudo foi analisar as propriedades psicométricas de uma versão reduzida do questionário AF5 (García & Musitu, 2001), utilizando técnicas exploratórias e confirmatórias, em uma população pré-adolescente na comunidade Valenciana (Espanha). A amostra foi composta de 541 participantes entre 10 e 12 anos de idade, 55,1% do sexo masculino (298) e 44,9% do sexo feminino (243). Depois de observar os resultados de diferentes análises de confiabilidade e validade (análise fatorial exploratória (EFA) e análise fatorial confirmatória (CFA)), verificou-se que o questionário reduzido, composto por 20 itens, mostrou uma confiabilidade e validade semelhantes aos do questionário original. A estrutura fatorial também se encaixa no modelo original estabelecido *a priori*. De acordo com os resultados da pesquisa, o uso desta ferramenta de diagnóstico com crianças espanholas parecem justificados.

Palavras-chave: autoconceito, escala de autoconceito AF5, pré-adolescência, atividade física

Resumen—“Autoconcepto en la preadolescencia: Una versión breve de la escala AF5.” El objetivo de este estudio fue analizar las propiedades psicométricas de una versión abreviada del cuestionario AF5 (García & Musitu, 2001) utilizando técnicas exploratorias y confirmatorias en una población preadolescente en la comunidad Valenciana (España). La muestra se compone de 541 participantes entre 10 y 12 años de edad, 55.1% niños (298) y el 44,9% niñas (243). Tras observar los resultados de diferentes análisis de fiabilidad y validez (análisis factorial exploratorio (EPT) y el análisis factorial confirmatorio (CFA)), se encontró que la escala reducida consistente en 20 ítems mostró una fiabilidad y validez similar a la escala original. La estructura factorial también se ajusta a la del modelo original establecida *a priori*. De acuerdo con los resultados del estudio, el uso de esta herramienta de diagnóstico con niños españoles parece justificado.

Palabras clave: autoconcepto, AF5, preadolescencia, actividad física

Introduction

The term self-concept has been widely used in psychology, and its use has grown considerably in recent decades due primarily to findings related to the presence of protective factors in the development of psychopathologies (Garaigordobil & Durá, 2006; Garaigordobil, Durá, & Pérez, 2005). According to Harter (1999), one may define self-concept as a cognitive and social

construction that develops throughout life and is shaped by the set of characteristics that are consciously assumed by the individual. The main source of information for self-concept, i.e., the perception that a person has of him or herself, arises from relationships with others (parents, teachers and friends). This evaluation is carried out in different areas of life, such that self-concept is related to factors such as physical appearance as well as school performance.

Although self-concept is a widely used term, there remains confusion regarding its definition, and we have found that it is used indistinguishably with other concepts such as self-image, self-esteem and self-acceptance. Self-esteem refers to the positive or negative evaluation that a person has of his or her self-conception or self-image. As shown by García and Musitu (1999), self-esteem implies certain subjective and evaluative qualities arising from one's own experience that are evaluated by the individual as positive or negative. Self-concept has also been significantly related to psychosocial adjustment (Arranz, Yenes, Olabarrieta & Martín, 2001; Au, Lau, & Lee, 2009; Cava & Musitu, 2000; Dave & Rashad, 2009; Fuentes, García, Gracia, & Lila, 2011; Garaigordobil, Perez, & Mozaz, 2008; Madge et al., 2011; Musitu & García, 2004; Roberts, Shapiro, & Gamble, 1999), many reports have demonstrated its relationship to variables such as school performance (Rodríguez, Cabanach, Valle, Núñez & González-Pienda, 2004) and social adjustment (Cava, Musitu, & Murgui, 2006; Cerezo, 1997).

In addition, authors such as Steinberg (2002) have shown that the period of initial adolescence is when the lowest levels of self-esteem are present, as it is during this stage that the most significant changes and transformations arise, such as physical changes related to puberty and detachment from one's parents.

Taking these findings into account, we sought to analyze self-concept in preadolescents, as this group possesses the ability to form self-perceptions in different developmental contexts (school, family and sports). Furthermore, at this age, it may be possible to intervene and promote healthy adjustments and improved psychoemotional development. If a preadolescent is able to establish a good concept of him or herself, this will likely promote the development of good self-esteem.

In the evaluation of self-concept, one of the most utilized instruments in Spain is the AF-5 questionnaire (Goñi, Ruiz de Azúa, & Rodríguez, 2004) created by García and Musitu (1999, 2001), both in the clinical and experimental contexts. This tool evaluates self-concept in 5 dimensions (academic, social, emotional, family and physical) based on the theoretical model proposed by Shavelson, Hubner, and Stanton (1976) and involves a multidimensional and hierarchical model. García and Musitu (2001) proposed a hierarchical organization of self-concept based on a general dimension, whereby self-concept represents different qualities that may be differentially related to distinct areas of human behaviour.

The 5 dimensions evaluated in the AF-5 questionnaire include a) academic/work self-concept, which refers to the perception the subject has of the quality of his/her performance as a student or worker; b) social self-concept, which reflects the perception the subject has of his/her performance in social relationships; c) emotional self-concept, which analyzes the perception that a person has of his/her emotional state and his/her responses to specific situations; d) family self-concept, which relates to the perception that the subject has of his/her involvement, participation and integration in the family setting and e) physical self-concept, which consists of the subject's perception of his/her physical appearance and shape. This structure was also confirmed in different studies (e.g., Ayora, 1997; Cava, 1998; García, Musitu, & Veiga, 2006; Lila, 1995; Llinares, 1998;

Tomás & Oliver, 2004). Most of the studies which have tried to validate the tool have done so through exploratory analysis (e.g., García & Musitu, 1999; Martínez, Musitu, García, & Camino, 2003), and those that indeed used confirmatory models, have focused on either university students or adult populations (e.g. García et al., 2006).

In all these studies an instrument composed of 30 items was used, nevertheless, several investigations have emphasized the need to have short diagnostic tools, because, as Martin, Howell, Newman, and Martin (2012) indicate, fatigue experienced by the questionnaire respondents is reduced, and the probability to obtain complete answers is increased. This allows for an increase in reliability, validity and representation. It is also easier to administer, and finally, it earns higher viability and quality of results.

This situation is especially important in school context, with children and teenagers who show worse performance in tasks that require sustained attention (McAvinue et al., 2012) as is the case of fulfilling questionnaires.

As previously said, self-concept is related with several measures of personal and social adjustment, as well as with academic performance, however, in spite of its importance, there are very few instruments that are adapted to the Spanish context and validated with complex methodology, such as structural equation models (SEM), which at the same time evaluate self-concept in children and teenagers, requiring relatively short periods of time to be fulfilled, and therefore not harming the quantity and quality of the responses. The objective of this study was to develop a reduced version of the AF- 5 scale through a psychometric analysis from a preadolescent sample population.

Methods

Participants

The study included 541 preadolescent students with an age range of 10 to 12 years ($\bar{x} = 11$; $SD = .72$). The students were enrolled in the 5th and 6th grades in four public and three private schools in different towns of the Valencian community (Spain) using convenience sampling. Regarding the sex distribution of the sample, 55.1% of the participants were boys and 44.9% were girls. Twenty-three questionnaires were discarded as they were unfinished.

Instruments

Students completed a questionnaire consisting of two differentiated sections. One part contained a series of questions related to sociodemographic data on sports practice, and the other consisted of the AF5, a scale to measure self-concept.

Sports practice sociodemographic questionnaire: a 9-item questionnaire regarding student sports practice, evaluating the following components: type of school (responses: *public; private; and subsidized school*), city, extracurricular sports practice ("*Do you practice any extracurricular sport activity?*" responses: *yes / no*), type of sport ("*If so. What kind of extra-*

curricular activity?”), years of sports practice (“on a response scale from less than 1 year till 5 or more years”), motivations for beginning the practice (“Why did you start to practice sports?”, The response options were: *parents influence, friends influence; because I like it; for health and others*) and perceived benefits (“Do you think the sport has helped you to improve your body image?; Why?” The response options were: *yes, no*).

AF5 Scale: Items of the AF5 self-concept questionnaire were taken from Tomas and Oliver (2004). The scale includes 30 items on a Likert scale whose answer modality consists of a continuous dimension that ranges from 1 (completely disagrees) to 99 points (completely agrees). This approach results in a high degree of discriminating validation. This scale evaluates 5 dimensions of self-concept, including academic/work, social, emotional, family and physical self-concept. The reliability index of the questionnaire demonstrates a high Cronbach alpha of .85 on previous studies (e.g., García *et al.*, 2006).

Procedure

The questionnaires were administered after obtaining both the parents’ and the school’s consent and were anonymous

and voluntary. Students were administered by the same person during tutoring or physical education periods, according to the availability of the center in a counterbalanced manner. The questionnaires, taking into account also the explanation of the research, took approximately 30 minutes to be completed, and no significant effects were detected as a result of this presentation. The University of Valencia ethics’ committee approved the study.

Data analysis

Statistical data analysis was performed using the SPSS (version 20) and EQS (version 6.1). First, different reliability and validity analyses were performed, showing that a reduction of the questionnaire, made up of 20 items grouped into the 5 dimensions, presents a better index of reliability and validity. Secondly, descriptive statistics were calculated for each item, followed by reliability and validity studies for the scale. Therefore, Pearson correlations between the different dimensions were calculated. Finally, the differences in the 5 dimensions of the self-concept by gender and extracurricular sports practice were studied using Student’s t-tests.

Table 1. AF5 scale items, mean (\bar{x}), standard deviation (sd), item-total correlation (r_{jx}) and Cronbach’s alpha if item deleted (α_{-x}).

(n = 541)	\bar{x}	sd	r_{jx}	α_{-x}
Academic/work self-concept: .84				
1. My schoolwork is good (1)	73.46	21.76	.47	.75
6. My teachers think I am a good student (6)	72.05	23.86	.45	.75
11. I am a good student (21)	74.77	24.76	.45	.75
16. My teachers think I am intelligent and hard-working (26)	72.02	24.47	.47	.75
Social self-concept: .75				
2. I make friends easily (2)	79.79	24.50	.38	.75
7. I am a friendly person (7)	83.25	20.38	.42	.75
12. It is hard for me to make friends* (12)	77.23	30.02	.33	.76
17. I have a lot of friends (27)	84.81	22.53	.47	.75
Emotional self-concept: .64				
3. A lot of things make me nervous* (8)	52.16	33.46	.14	.78
8. When older people say something to me, I get very nervous* (18)	62.04	34.60	.29	.76
13. I get nervous when the teacher asks me a question (superior)* (23)	56.48	35.74	.22	.77
18. I feel nervous* (28)	72.65	31.25	.29	.76
Family self-concept: .69				
4. I feel happy at home (9)	88.83	19.35	.23	.76
9. My family would help me with any kind of problem (19)	93.24	15.88	.24	.76
14. My parents give me confidence (24)	91.23	16.93	.25	.76
19. I feel loved by my parents (29)	93.89	15.40	.27	.76
Physical self-concept: .63				
5. I take care of myself physically (5)	76.98	24.93	.33	.76
10. I think I am stylish (15)	55.15	32.66	.31	.76
15. I like my physical appearance (20)	80.11	26.13	.35	.76
20. I am an attractive person (30)	67.71	28.86	.46	.75

Total alpha: .77 *= Inverted item; in parenthesis: original version item number

Results

The purpose of this study was to develop a reduced version of the AF5 questionnaire, so we investigated the validity and reliability of the original questionnaire. Afterwards, we chose the 20 items (four items per dimension as it is recommended with SEM to have three or more indicators of each latent variable, trying to respect as much as possible the original structure of the questionnaire), which showed the best results. The results showed here make reference to the psychometric measures of the aforesaid scale.

Item analysis

The 20 items of the reduced version of AF-5 were analyzed. The items of the emotional dimension were inverted. Table 1 shows the final list of the items, the means, standard deviations, item-total correlations and Cronbach's alphas if the element was removed. The item number in the original version of the scale is displayed in parentheses.

In general, all items contributed adequately to the scale set; in other words, each showed a relatively high correlation to the scale total and its reliability (.77), which did not improve if any of the items were removed.

Table 2. Eigenvalues comparison between real and dummy data.

Factors	Eigenvalues	
	Average of random samples	Real sample
1	1.36	4.32
2	1.29	2.21
3	1.24	1.82
4	1.20	1.67
5	1.17	1.21
6	1.13	.95
7	1.10	.81
8	1.06	.76
9	1.04	.73
10	1.00	.69
11	.98	.65
12	.95	.62
13	.92	.59
14	.89	.56
15	.86	.51
16	.83	.47
17	.81	.40
18	.77	.38
19	.73	.34
20	.69	.29

Reliability analysis

The internal consistency of the instrument was examined using a Cronbach's alpha index. The values generally showed an adequate internal consistency for the scale in the evaluated context and were similar to the original version of the instrument (.85) and other adaptations on English (.88) (García, Gracia, & Zeleznova, 2013) or Portuguese (.87) (García, *et al.*, 2006).

A Cronbach's alpha of .77 was observed for the entire scale, while for the different dimensions this value ranged from .63 to .85 (academic/work self-concept: .85, social self-concept: .75, emotional self-concept: .64, family self-concept: .69, physical self-concept: .63).

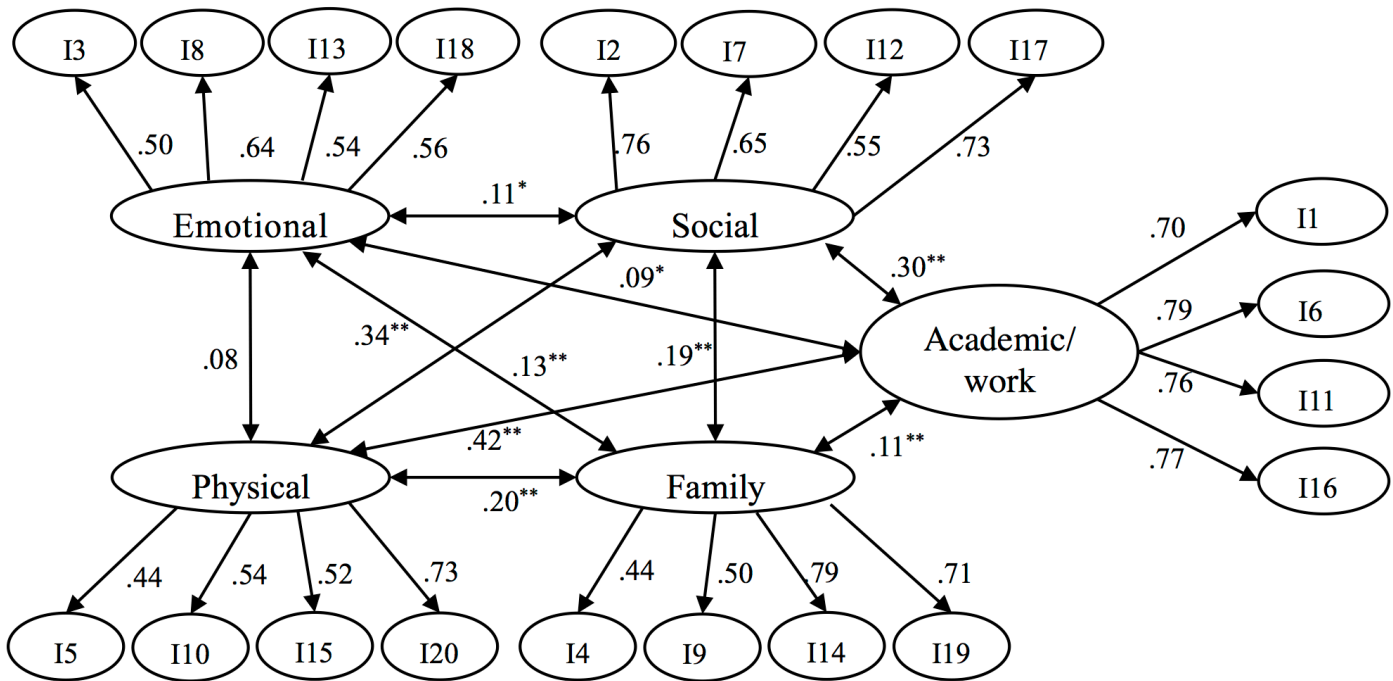
Validity analysis

After studying the reliability of the scale, its validity was examined using factorial and convergent validity. For the factorial validity study, an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) were performed. First, the adequacy of the sample was evaluated using the Kaiser-Meyer-Olkin test (KMO = .81) and Bartlett's test of sphericity ($p < .01$), the sample size seems appropriate as well ($n > 500$) (MacCallum, Widaman, Zhang, & Hong, 1999), then, an EFA was calculated using mean component analyses with direct oblimin rotation. The selection criterion was eigenvalues higher than 1. This criterion was confirmed by means of a parallel analysis, for which 51 random samples were created with the same characteristics as the original sample, both in size as in variables. We conducted a principal components analysis with Oblimin rotation in each sample and then calculated the average value for each of the eigenvalues.

We then compared these eigenvalues with those obtained in the actual sample (Hayton, Allen, & Scarpello, 2004). Five were the factors to be retained, since, as suggested by the literature, we kept only those factors that have larger eigenvalues in the real sample than in the average of the eigenvalues of the random samples (Hayton *et al.*, 2004) (Table 2).

The emotional self-concept dimension was inverted, as its scoring was inverse from the rest of the scale. The result consisted of a model with 5 factors or dimensions that explained 56.13% of the variance, which accurately replicates the authors' proposal. Thus, factor 1, which explained 21.59% of the variance, likely corresponds to the academic/work self-concept. Furthermore, factor 2 corresponded to family self-concept (explaining 11.05% of the variance), factor 3 to emotional self-concept (9.10%), factor 4 to the social self-concept (8.34%) and factor 5 to physical self-concept (6.05%).

To increase the strength of the EFA results, a CFA was performed with maximum likelihood (ML) estimation. Based on the significance of $\chi^2 (< 0.01)$, we could not confirm a good fit for the model. Nevertheless, as this statistic is closely related to sample size, other indicators were analysed, including a) the ratio between χ^2 and its degrees of freedom, with values below 5 considered acceptable (Byrne, 1989; Carmines & McIver, 1981); b) the non-normed fit index (NNFI), the comparative fit index (CFI), and the incremental fit index (IFI) where values above .90 indicate a good fit (MacCallum & Austin 2000); and c) the root mean-square error



$\chi^2/df = 306.69/160 = 1.92$ ($p < .001$); NNFI = .93; CFI = .94; IFI = .95; RMSEA = .04; $\alpha = .77$
 **. $p < .01$; *. $p < .05$; the double arrow indicates correlation

Figure 1. CFA structure for the AF5-brief scale.

of approximation (RMSEA), which can be accepted as an indicator of adequate fit with values below .08 (Browne & Cudeck, 1993). The fit indexes obtained for the model were: χ^2/df (306.69/160 = 1.92); NNFI = .93; CFI = .94; IFI = .95. RMSEA = .04 (see Figure 1). The results of these different indices suggested an adequate fit for the model, and support the factorial validity of the instrument.

Continuing the scale validation process, we also studied its convergent validation as well. The convergent validity appeared to be sufficient, as the items were significant and strongly correlated with the latent variables they were intended to measure. In all cases, t values were above 3.29, and the weights of each average factor were above .70 (Anderson & Gerbing, 1988), which did not improve when new weights were added. Below is a table showing descriptors for the dimensions and their correlations (see Table 3).

Correlations

The next step in the validation of the scale was the analysis of the Pearson correlations between the instrument dimensions (Table 3).

Correlations between dimensions were low or moderate but were statistically significant, with the exception of the emotional and physical self-concept. These results were consistent with those found by Malo, Bataller, Casas, Gras, & González (2011).

Differences by gender and extracurricular sports practice

There were statistically significant differences ($t_{539} = 4.24$; $p < .001$) among men ($\bar{x} = 69.97$; $SD = 20.70$) and women ((

$\bar{x} = 76.89$; $SD = 17.25$) regarding academic self-concept, with higher values found in women. No statistically significant differences were found in the other dimensions regarding gender.

Considering the extracurricular sports practice, there were statistically significant differences among practitioners and no practitioners regarding academic self-concept ($t_{539} = 2.97$; $p < .001$; practitioners: $\bar{x} = 74.57$; $SD = 18.79$; no practitioners: $\bar{x} = 68.99$; $SD = 20.91$) physical self-concept ($t_{539} = 2.29$; $p < .001$; practitioners: $\bar{x} = 71.22$; $SD = 18.61$; no practitioners: $\bar{x} = 66.61$; $SD = 21.49$) and familiar self-concept ($t_{539} = 3.07$; $p < .001$; practitioners: $\bar{x} = 92.76$; $SD = 9.94$; no practitioners: $\bar{x} = 89.16$; $SD = 16.54$) with higher values found in practitioners of sports.

Table 3. Pearson correlations and descriptors for dimensions of the AF5 scale.

	1	2	3	4	5
1 Emotional	59.83 (23.46)				
2 Physical	.08	69.99 (19.51)			
3 Social	.11*	.34**	81.27 (18.61)		
4 Academic	.09*	.42**	.30**	73.08 (19.52)	
5 Familiar	.13**	.20**	.19**	.11**	91.80 (12.16)

** $p < .01$; * $p < .05$; Mean and standard deviation (sd) on the diagonal (sd in brackets)

Discussion

Given the importance of self-concept in relation with the individual's personal and social adjustment, as well as with the performance, and the advantage of having short measurement tools available, which increase the probability of obtaining reliable and valid measurements, the aim of this study has been to validate a shorter version of the AF-5 self-concept questionnaire, which was originally created by García and Musitu (1999, 2001), in a pre-adolescent sample (10-12 years of age). Considering the results obtained, it seems that a reduced version of the original 30-item questionnaire (containing just 20 items) retained good psychometric properties that were similar to those of the original scale, and took 18 minutes to be completed.

The abbreviated AF-5 scale containing 20 items maintained the penta-factorial structure of the original instrument, each of the 5 subscales consisted of 4 items. Following the numbering of the original instrument, academic self-concept contained items 1, 6, 21 and 26; social self-concept contained items 2, 7, 12 and 27; emotional self-concept contained items 8, 18, 23 and 28; family self-concept contained items 9, 19, 24 and 29, and physical self-concept included items 5, 15, 20 and 30.

With the reduced structure, the reliability analyses showed good results, with a Cronbach's alpha of .77 for the entire scale, while the different dimensions demonstrated a range from .63 to .85 (academic/work self-concept: .85; social self-concept: .75; emotional self-concept: .64; family self-concept: .69; physical self-concept: .63). For the factorial validity study, an EFA and a CFA were performed.

Based on our results, the resulting model replicated the factorial structure of the original questionnaire and shows good index of reliability and validity. Thus, the reduced version of the instrument possesses adequate psychometric properties.

As we have already said, short questionnaires may be useful tools, as scientific literature has pointed out, and better than larger one's, in studies in which the interest is not focused on analysing only a primary trait but rather a broader array of diverse variables related to the study (Morales, Urosa, & Blanco, 2003). They may also be more effective in certain contexts such as the school environment, or considering specific ages such as preadolescence or childhood. Furthermore, this instrument offers greater agility in gathering data, reducing the time for completion by sample subjects and ultimately making it possible to add items or questionnaires that could enable the investigation of one or more additional factors not originally considered.

Although it is a widely validated instrument, the AF5 scale continues to be used in studies for concrete samples and populations. In Spain, the validity of its multidimensional structure has been confirmed (Bernal, 2006; García et al., 2006; Núñez, 2006), and these results were again confirmed for a Catalanian version of the scale (Malo, et al., 2011). Furthermore, in other countries such as, Brazil (Martínez & García, 2008; Martínez, García, & Yubero, 2007), Portugal (García et al., 2006) and Chile (Riquelme & Riquelme, 2011), researchers have confirmed the psychometric properties of the scale for their populations as well as the penta-factorial structure of the test.

Considering the differences regarding genre and extracurricular

sports practice consistent with the results of Cerrato et al (2011) significant differences in the component of academic self-concept were found between the genders although no statistical differences were found considering social and physical dimensions. On the other hand, regarding extracurricular sports practice on physical, familiar, and academic self-concept there were statistically significant differences in which the practitioners present higher values

There are nevertheless a few limitations to the study: the sample comes from a collection of convenient samples, subjects from the Valencian community, and it is therefore necessary to replicate these results with samples from other communities and/or other Spanish speaking countries, and it could be also interesting to perform a multigroup analysis using SEM comparing different countries to test the stability of the model using this brief questionnaire. Future research may also consider the temporal stability of the data in the actual population from a longitudinal perspective. As well as this, it could be interesting to test criterion validity of the questionnaire with other constructs. Further investigations may address all these topics.

To conclude, our results indicate that the AF5-brief scale offers similar reliability and validity as the original scale, showing a factorial structure that coincides with the original model. Therefore, this questionnaire can be considered as a useful, practical tool with which to evaluate self-concept in preadolescence, especially when we need to measure other constructs, where questionnaire extension as well as application time are important elements to consider.

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