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Research article

Cross-Cultural Adaptation and Validation of the Spanish Version of the Performance Enhancement Attitude Scale (Petróczi, 2002)

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Abstract
The aim of the present study was to cross-culturally adapt and validate the Spanish version of the Performance Enhancement Attitude Scale (PEAS). A cross-sectional multi-sample survey with 17 independent datasets was carried out. Cross-cultural adaptation of the PEAS into Spanish was conducted through forward/backward translations, consensus panels and comparative analyses of known-groups to establish evidence for its reliability and validity. Weighted Kappa coefficients with quadratic weighting were used to assess the reliability of each item, with Cronbach's internal consistency coefficients for overall scale's reliability and Spearman's correlation coefficient for test–retest reliability over a one-week period. Confirmatory factor analysis (CFA) was performed to assess the scale's structure. Differences between self-admitted doping users and non-users were analysed to verify the PEAS' construct validity in 8 datasets. Spearman's correlation coefficient was also used to assess the relationships between the PEAS and self-esteem, self-efficacy and perceived descriptive norm to establish convergent validity. The scale showed satisfactory levels of internal consistency (α = 0.71–0.85), reliability of each item (Kappa values range 0.34-0.64) and temporal stability (r = 0.818; p < 0.001). CFA showed acceptable fit (RMSEA <0.08, mean RMSEA = 0.055; χ^2/df < 3, mean χ^2/df = 1.89) for all but one samples. As expected, self-admitted doping users showed more positive attitude toward doping than non-users. Significant and strong negative relationship was found between PEAS and self-efficacy; weak negative correlation with self-esteem and and positive correlation with perceived descriptive norm. The Spanish version of PEAS showed satisfactory psychometric properties. Considerations for application and improvement are outlined.

Key words: Doping, assessment, psychometric properties, reliability, validity.

Introduction

Doping has marked the world of competitive sport in the last years, with the Puerto case in 2006 or the Lance Armstrong case in 2012 being evident examples. The World Anti-Doping Agency (WADA) issued and periodically updates the Anti-Doping Code with the aims of protecting the athlete's fundamental right to participate in doping-free sport and thus promotes health, fairness and equality for athletes worldwide, warranting harmonized, coordinated and effective anti-doping programmes at the international and national level relating to the detection, deterrence and prevention of doping (David, 2013).

Doping in sport has been studied by medical, physiological and social science researchers for many years with the purpose of developing a better understanding and prevention (Backhouse et al., 2007; Morente-Sánchez and Zabala, 2013). According to the Theory of Planned Behaviour (Ajzen, 1991) behaviour depends on people's plans of actions towards that behaviour (intentions), which are regulated by people's perceived behavioural control, their subjective norms, and attitudes. Lucidi et al. (2008) defined "attitudes" as "positive or negative evaluative appraisals of the behaviour" and, showed that attitudes towards doping are known to influence doping use and to play an important role as predictor of intention to use banned substances (doping behaviour). In a recent study (Barkoukis et al., 2013), it was stated that distal influences (self-determination, sportpersonship orientations and achievement goals) have an indirect effect on proximal influences such as situational temptation and perceived behavioural control, descriptive and subjective norms, and attitudes, and in turn these have a direct influence on doping intentions. Thus research aiming to investigate doping attitude can generate useful information to inform the fight against doping. Through the high profile doping cases, it has become evident that controlling doping only by tests is not sufficient. A profound change in the attitudes is needed, which should be continuously monitored (Alaranta et al., 2006).

In relation to the type of measurement tools used in the scientific literature to assess attitudes towards doping, just a few studies used validated tools while the majority of researchers used ad hoc bespoke measurements without psychometric testing, and thus potentially jeopardised the validity and reliability of the obtained data (Morente-Sánchez and Zabala, 2013). Furthermore, such bespoke measurements make direct comparisons and meta-analyses of independent studies impossible. In order to address this gap, Petróczi and Aidman (2009) proposed using the Performance Enhancement Attitude Scale (PEAS), originally developed by Petróczi (2002), as a standard general doping attitude measure in doping behaviour studies.

However, the applicability of this kind of measurement should be tested in different cultural contexts and languages than the ones in the original version, in which the scale showed good psychometric properties in both English and Hungarian speaking participants (Petróczi and Aidman, 2009). Therefore, the adaptation and psychometric validation of this scale to other widely spoken

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languages is an important issue to facilitate cross-cultural comparisons.

According to Lewis (2009), Spanish, also called-Castilian, is the second most spoken language worldwide, with 406 million of first-language speakers in 31 countries. In addition, regarding sport, Spanish is considered as an important and common language due to the fact that Spain is one the most main references in the sporting world in recent years, along with other Spanish speaking countries (e.g. in South-America). From this point of view, the cross-cultural adaptation of the PEAS for Spanish is an essential step in doping behaviour research, anti-doping prevention and intervention and related decision-making. Although the PEAS has been already used in studies with samples comprised of Spanish participants (Morente-Sánchez et al., 2013), psychometric validation and cross-cultural adaptation of its Spanish version is not yet available in the scientific literature. Therefore, taking everything into account and considering the international view about the phenomenon of doping in Spanish sport, the aim of this study was to cross-culturally adapt and validate the Spanish version of the original Performance Enhancement Attitude Scale (Petrꝏczi, 2002).

Methods

In this study, expressions such as “doping” and use of “prohibited performance enhancements”, or “banned substances and/or methods” are used interchangeably and they refer to using any substance or method prohibited by the World Anti-Doping Agency (David, 2013). The data used in this paper with the purpose of validating the questionnaire is part of a larger project, that will be published with more complementary data but with the purpose of being focused in the specific content (attitudes towards doping, not the questionnaire and its validation, in each sport or sample).

The instrument

The PEAS is a 17-item one-dimensional self-report instrument measuring general attitude toward doping (Petrꝏczi, 2002). The final response format is a 6-point Likert-type scale, with points anchored as strongly disagree (1), disagree (2), slightly disagree (3), slightly agree (4), agree (5) and strongly agree (6). No neutral response option is offered and all 17 items are scored in the same direction (Table 1). Thus the overall PEAS score ranges from 17 to 102.

Table 1. Translation of the items of the Performance Enhancement Attitude Scale (PEAS).

1. Legalizing performance enhancements would be beneficial for sports. **1.** Legalizar productos para mejorar el rendimiento sería beneficioso para el deporte.
***2.** Doping is necessary to be competitive.* **2.** Doparse es necesario para ser competitivo.
***3.** The risks related to doping are exaggerated.* **3.** Se exageran los riesgos relacionados con el dopaje.
***4.** Recreational drugs give the motivation to train and compete at the highest level.* **4.** Las drogas recreacionales motivan para entrenar y competir al más alto nivel.
***5.** Athletes should not feel guilty about breaking the rules and taking performance enhancing drugs.* **5.** Los deportistas no deberían sentirse culpables por saltarse las reglas y tomar fármacos para mejorar el rendimiento.
***6.** Athletes are pressured to take performance-enhancing drugs.* **6.** Los deportistas son presionados para tomar fármacos que mejoran el rendimiento.
7. Health problems related to rigorous training and injuries are just as bad as from doping. **7.** Los problemas de salud y las lesiones derivados del entrenamiento riguroso son tan perjudiciales como las repercusiones del dopa je
***8.** The media blows the doping issue out of proportion.* **8.** Los medios de comunicación exageran el asunto del dopaje.
***9.** Media should talk less about doping.* **9.** Los medios de comunicación deberían hablar menos de dopaje.
***10.** Athletes have no alternative career choices, but sport.* **10.** El deporte es la única alternativa profesional de los deportistas.
***11.** Athletes who take recreational drugs, use them because they help them in sport situations.* **11.** Los deportistas que toman drogas recreacionales lo hacen porque les ayudan en situaciones deportivas.
***12.** Recreational drugs help to overcome boredom during training.* **12.** Las drogas recreacionales ayudan a superar el aburrimiento durante los entrenamientos.
***13.** Doping is an unavoidable part of the competitive sport.* **13.** El dopaje es una parte inevitable del deporte competitivo.
***14.** Athletes often lose time due to injuries and drugs can help to make up the lost time.* **14.** Los deportistas suelen perder tiempo debido a lesiones y los fármacos pueden ayudarles a recuperar el tiempo perdido.
***15.** Doping is not cheating since everyone does it.* **15.** Doparse no es hacer trampas ya que todo el mundo lo hace.
***16.** Only the quality of performance should matter, not the way athletes achieve it.* **16.** Sólo debería valorarse la calidad del rendimiento, no la manera en que los deportistas lo logren.
17. There is no difference between drugs, fiberglass poles, and speedy swimsuits that are all used to enhance performance. **17.** No hay diferencia entre utilizar fármacos, formas aerodinámicas o bañadores especiales, ya que todos sirven para mejorar el rendimiento.

Table 2. Sample characteristics and PEAS score distribution statistics and reliability estimates

Sample	n	Gender (M/F)	Age M (±SD)	PEAS						Raw Data		Horn's PA
				Data collection	Score M (±SD)	K-S Test	Cronbach α	SEM	Velicer's dim	L1	L2	L1
SSUS Granada 2013 pre test-retest	519	406/99	21.5 (2.6)	Pen&Pap	33.5 (8.3)	.076 ***	.73	4.323	1	2.63	1.04	1.32
SSUS Granada 2013 post test-retest	519	406/99	21.5 (2.6)	Pen&Pap	32.6 (9.2)	.081 ***	.80	4.112	1	3.62	.94	1.33
Sport Sciences Students Granada 2009	273	222/51	22.2 (3.4)	ElVer	33.4 (9.1)	.073 ***	.76	4.406	1	2.96	.93	1.45
Elite Female Cycling	80	0/80	28.9 (9.6)	Pen&Pap	35.0 (13.5)	.163 ***	.85	5.236	1	5.56	1.58	1.90
Elite Female Triathletes	126	0/126	30.1 (8.1)	Pen&Pap	31.0 (11.0)	.148 ***	.78	5.197	1	3.31	1.17	1.45
Spanish Cycling National Team Elite	74	53/21	18.4 (3.0)	Pen&Pap	34.8 (9.0)	.094	.71	4.872	1	2.98	1.40	1.94
Football Coaches Sport Sciences Students	167	129/38	23.4 (5.5)	ElVer	33.2 (10.3)	.124 ***	.82	4.386	1	4.21	1.07	1.60
High Level Cycling Coaches	113	109/4	33.7 (7.2)	Pen&Pap	38.8 (10.6)	.109 **	.75	5.267	1	3.47	1.13	1.74
Elite Female Footballers	35	0/35	24.8 (6.3)	Pen&Pap	28.8 (10.1)	.127	.82	4.282	1	5.27	1.73	2.46
Elite Footballers	263	263/0	25.9 (4.4)	Pen&Pap	29.4 (8.5)	.075 **	.73	4.457	1	2.62	.91	1.47
Professional Footballers	286	286/0	24.0 (5.5)	Pen&Pap	32.8 (9.7)	.063 *	.78	4.546	1	3.58	.97	1.44
Amateur Footballers	294	294/0	24.3 (4.8)	Pen&Pap	34.4 (8.9)	.058 *	.72	4.674	1	2.72	.85	1.44
Elite U18-U16 Footballers	282	282/0	16.8 (1.3)	Pen&Pap	34.4 (10.5)	.104 ***	.80	4.665	1	3.79	1.10	1.45
Football Coaches From 1st Division-U16	98	98/0	37.0 (9.1)	Pen&Pap	31.0 (9.7)	.114 **	.76	4.742	1	3.54	1.32	1.80
SSUS Granada 2013 Postest	625	501/123	21.6 (2.9)	Pen&Pap	32.8 (9.5)	.081 ***	.81	4.158	1	3.87	1.08	1.21
SSUS Granada 2013 Pretest	705	563/142	21.6 (2.8)	Pen&Pap	34.3 (8.6)	.076 ***	.73	4.484	1	2.61	.98	1.29
Ciclotourists QH Challenge 2011	2022	1977/45	41.0 (9.4)	ElVer	39.9 (11.9)	.059 ***	.78	5.586	1	3.14	1.01	1.16
Ciclotourists QH Challenge 2012	382	372/10	41.3 (8.8)	ElVer	38.0 (12.4)	.095 ***	.81	5.383	1	3.79	.99	1.33
Environment OF Footballer (Physiother, Doctor…) From 1st Div to-U16	65	63/2	34.1 (8.1)	Pen&Pap	30.9 (10.9)	.113	.84	4.376	1	5.21	1.68	2.02

SSUS: Sport Sciences University Students. K-S normality=Kolmogorov-Smirnov Test. Z (P) *=non-normality; Velicer's dim=Factor dimensions obtained by the method of Velicer; L1=maximum eigenvalue of the correlation matrix; L2=second eigenvalue of the correlation matrix; LH=maximum eigenvalue by Horn's parallel analysis. Pen&Pap: pencil and paper, ElVer: electronic version. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Cross-cultural adaptation

The sequential methodological approach proposed by Guillemin et al., (1993) and Beaton et al., (2000) was used for guiding the cross-cultural adaptation process of the PEAS. First, the 17 items were translated into Spanish by two independent native Spanish translators. A synthesis of the two was performed by an expert committee composed of a panel of experts (including the authors of this work). Then the resulting Spanish questionnaire was back-translated into English by two independent English-native translators and the two questionnaires obtained were reviewed by the expert committee. Finally, the Spanish-translated questionnaire (Table 1) was tested with 30 participants (pilot study) to ensure that the questionnaire was perfectly clear and understandable like they confirmed immediately after by means of an interview one by one.

Samples

This paper summarizes a series of studies that used the PEAS as a measure of doping attitudes. Eighteen independent datasets collected from different sporting contexts, mainly cycling and football, were considered for this study. Specifically, six samples from individual sports such as cycling and triathlon were assessed: high level cycling team managers, elite female cyclists and triathletes, elite male cyclists from Spanish national team, amateur cyclists or ciclotourists who participated in a long-distance (205 km) Spanish road cyclist event called "Quebrantahuesos" (2011 and 2012 editions). Similarly, seven samples related to a team sport such as football were evaluated: male players (under16, amateur, professionals and elite), female players (elite), coaches from different categories and a sample comprised of the so-called environment of footballers (doctor, physiotherapist, etc.). In addition, five sets of student samples were composed of undergraduates from different years of the Faculty of Sport Sciences of Granada (Spain). Details on different samples such as sample sizes, age (mean - standard deviation), gender distribution (expressed as ratio) and data collection, are given in Table 2.

Other measures

In order to establish evidence for convergent validity, the questionnaire for amateur cyclists samples (2011 and 2012 editions) also included measures of variables expected to be related to doping attitudes (measured by PEAS) such as self-esteem, self-efficacy and projected use.

Self-esteem was assessed by the Rosenberg Self-Esteem Scale (RSES), which is made up of 10 items that refer to self-respect and self-acceptance rated on a 4-point Likert-type scale, ranging from 1 (totally disagree) to 4 (totally agree) (Rosenberg, 1965). Martín-Albo et al., (2007) cross-culturally adapted and validated the Spanish version of this scale (Cronbach $\alpha = 0.8$-0.85) was used.

Following Bandura's guide for constructing self-efficacy scales (Bandura, 2006), self-efficacy beliefs were also measured with three statements rated on a 10-point scale ranging from "not certain at all" to "totally certain". The items were: a) You can achieve your best results without doping; b) You do not need doping to be a good cyclist, and c) You can succeed (win, beat records) without doping.

Descriptive norms were measured by asking participants to give a projected percentage of those using of doping is their respective sports.

Data collection

Of the 18 datasets in total, 14 used paper-and-pencil instruments, whereas in 4 samples, an electronic version of PEAS was completed via an online link emailed to the potential participants. The paper and pencil questionnaires were handed out at the beginning of the training sessions and/or lectures and non-participation was permitted.

For assessing the test-retest reliability, a sample of Sport Sciences students (n = 519) repeated this questionnaire 7 days later (retest response rate: 99.8%; 518/519). In this case, participants were chose a "nickname" during the first administration and they were asked to use the same "nickname" again for the second administration.

Participation was completely voluntary and anonymous in all studies. The questionnaires were self-completed. Respondents received a detailed explanation of the purpose and implications of the research and gave their implied consent by completing and returning the questionnaires. The study was approved by the Ethics Committee of the University of Granada.

Data analysis

Reliability

Cronbach's α values were calculated for each time the scale was used as a measure of internal consistency, considering the cut-off value of 0.7 (Nunnally, 2010) to determine acceptable scale reliability. Weighted Kappa coefficients with quadratic weighting were used to assess the reliability of each item as well as Spearman's correlation coefficient for test–retest reliability.

Validity

Number of factors was determined using the exploratory factor analysis by Velicer's method and by Horn's parallel analysis (O'connor, 2000). We evaluated construct validity by confirmatory factor analysis (CFA) and the goodness of model fit was expressed as the ratio between the chi-square statistics and the degrees of freedom, with the highest acceptable level set to the recommended 3:1 range (Kline, 2011). It was also used the root mean square error of approximation (RMSEA), which indicates that the model based on the sample employed represents the population if its value is equal to or lower than 0.05, and considers the fit acceptable when it is lower than 0.08 (Jöreskog and Sörbom, 1993).

Comparison tests

Kolmogorov-Smirnov test was used to assess the normality of the distribution of the PEAS scores. Mann-Whitney statistical procedure was used to test differences between groups and repeated measures t-test to contrast difference between measures. Standard error of measurement was calculated by multiplying the scale's standard deviation by the square root of 1 minus Cronbach α (Kline, 2000).

Correlations

Spearman's correlation coefficient was also used to assess the relationships between PEAS and others analysed variables. Statistical analyses were carried out using IBM SPSS version 20.0 and AMOS 20.0.

Results

Reliability

Temporal stability of the total PEAS score was assessed with a sample of Sport Sciences university students (n = 519) over a 7 days interval. The one-week test-retest reliability of the PEAS was evidenced by the correlation coefficient of $r = 0.818$ ($p < 0.001$). Interestingly, a small but statistically significant difference was found between the two measures taken 7 days after [$t(518) = 3.837$, $p < 0.001$], suggesting a relatively dynamic nature of doping attitudes. Respondents obtained a higher score (PEAS score = 35.02 ± 8.7) on the first administration of the survey compared to the second administration (PEAS score= 33.97 ± 9.56). Cronbach's α values, means and standard deviations of PEAS scores and Kolmogorov–Smirnov test statistics for each sample are displayed in Table 2. Cronbach's α values for the PEAS scale were

Table 3. EFA structure coefficients, CFA factor loadings and squared multiple correlations (R^2) and t-values of the 17 items of the PEAS in the developmental sample (N=519).

	EFA		CFA			
Items of the PEAS*	**PCA***	**ML****	**Sfl**	**SE**	**t-values**	**R^2**
1	.429	.368	.276	.0519	5.319	.076
2	.445	.388	.134	.0549	2.441	.018
3	.434	.375	.452	.0816	5.541	.204
4	.545	.485	.285	.0579	4.922	.081
5	.434	.371	.218	.0527	4.135	.048
6	.423	.361	.234	.0495	4.725	.055
7	.377	.314	.241	.0482	5.001	.058
8	.497	.427	.961	.1709	5.623	.924
9	.423	.364	.580	.1041	5.574	.336
10	.306	.255	.148	.0498	2.972	.022
11	.345	.293	.112	.0450	2.487	.013
12	.471	.414	.082	.0414	1.982	.007
13	.480	.421	.277	.0721	3.841	.077
14	.502	.440	.156	.0442	3.527	.024
15	.553	.495	.075	.0450	1.668	.006
16	.459	.397	.300	.0565	5.309	.090
17	.381	.325	.113	.0436	2.594	.013
R^2*	.947	.957				

* Seventeen items of the PEAS (Table 1). ** Coefficient of determination of the sum of scores and the factor. EFA = Exploratory Factor Analysis; PCA = Principal component analysis; ML = Maximum Likelihood Factor Analysis; CFA = Confirmatory factor Analysis; Sfl = Standarized factor loadings

assessed for each sample and ranged between 0.71 and 0.85 indicating a good internal consistency for the scale. Weighted Kappa coefficients with quadratic weighting were considered in order to assess the reliability of each item. Acceptable Kappa values were obtained ranging from 0.34 to 0.64 (standards errors were around 0.044).

Validity

Structural validity: Results of the exploratory and confirmatory factor analyses are summarised in Table 3. Factor loadings on the 17 items of the PEAS ranged between 0.08 and 0.96 and standard errors between 0.04 and 0.17. The t-values were calculated by dividing the factor loading by the corresponding standard error. As the t-value has an underlying z distribution, t >1.96 (equates to 2 standard deviation) are considered statistically significant (Byrne, 2009). For all 17 items of the PEAS (but item 15, t = 1.67) t-values ranged between 1.9 and 5.6, hence were significant. The overall squared multiple correlation, which symbolizes the proportion of the variance explained by the predictors of the latent variable in question (Byrne, 2009), was 0.96 showing a good overall proportion of explained variance of the PEAS measurement model.

Confirmatory factor analysis was performed on all datasets. Model fit of the measurement model was addressed by the RMSEA and the ratio of the goodness of fit index (χ^2) and its corresponding degree of freedom (df). The mean RMSEA value for the independent samples was 0.055 which was an acceptable value using criteria RMSEA <0.08 (Jöreskog and Sörbom, 1993). The mean $\chi 2/df$ ratio was 1.89 (ranging from 0.9 to 3.8), similar data (mean χ^2/df =1.85) was obtained by Petróczi and Aidman (2009), showing both an acceptable measurement model fit using criteria χ^2/df <3 (Kline, 2000).

Results for the independent samples are presented in Table 4. In order to interpret results from different tests and samples, it must be considered the limitations of chi square test (Hooper et al., 2008) since this always assumes multivariate normality (this sample follows non-normal distribution) and nearly always rejects the model when large samples are used. Notably, the initial CFA showed a poor absolute model fit (χ^2/df = 8.61) for one sample with large number of participants (n = 2022). Further investigation using Modification Indices revealed that the error terms between certain items were correlated, and thus caused a poor model fit in a restricted model. Allowing for correlations between three pairs of measurement errors (items 4, 11 and 12); the model fit improved dramatically (Table 4). On the other hand, the correlations between errors terms fit for all samples suggests that is likely to have a latent factor lurking in the background (one that that the PEAS scale does not intend to measure). The most correlated items (4, 11 and 12) are related to recreational drugs; this latent background factor is not strong enough to come up in the factor analysis but because the sample size is large, it became more visible (see additional material).

Construct validity: Using known-group method, differences between self-admitted users and non-users of doping were investigated to support the previously established construct validity of the PEAS. It was expected that users and potential users would show higher scores and, consequently, a more lenient attitude toward doping.

Participants of 8 studies were requested to report if they had ever used doping. Overall scores of PEAS were compared between self-admitted doping users and non-users. As expected, those who admitted current use or have used doping scored higher on the attitude tests in all samples, reaching statistical significance in 5 datasets. Means, standard deviations, test results and corresponding p-values are summarised in Table 5.

Convergent validity: Spearman's correlations among PEAS score and, self-efficacy, self-esteem and descriptive norms taken in two samples of amateur cyclists in two consecutive years showed evidence for

Table 4. Confirmatory factor analysis results (chi-square goodness of fit statistics, chi-square/degrees of freedom ratio, significance and root mean square error of approximation) from subsequent use of PEAS.

Samples	n (*)	Chi-squared (df=98)	χ2/df ratio	Discrepancy Estimation (**)	p	RMSEA	Low	High
SSUS Granada 2013 pre test-retest***	519	180.0	1.84	ADF	.000	.040	.031	.049
SSUS Granada 2013post test-retest	519	208.3	2.13	ADF	.000	.047	.038	.055
SSUS Granada 2009	273	257.2	2.62	ADF	.000	.077	.066	.089
Elite Female Cycling	80	150.9	1.52	GLS	.001	.078	.066	.090
Elite Female Triathletes	126	118.4	1.20	GLS	.089	.040	.000	.064
Spanish Cycling National Team Elite	74	143.9	1.47	GLS	.002	.080	.050	.107
Football Coaches Sport Sciences Students	167	150.8	1.54	GLS	.000	.057	.038	.074
High Level Cycling Coaches	113	166.8	1.70	GLS	.000	.079	.058	.099
Elite Female Footballers	35	88.3	0.90	GLS	.748	.000	.000	.068
Elite Footballers	263	165.4	1.69	ADF	.000	.051	.037	.065
Professional Footballers	286	281.2	2.87	ADF	.000	.081	.070	.092
Amateur Footballers	294	249.9	2.55	ADF	.000	.073	.062	.084
Elite U18-U16 Footballers	282	256.1	2.61	ADF	.000	.076	.064	.087
Football Coaches From 1st Division-U16	98	135.0	1.38	GLS	.008	.032	.033	.087
SSUS Granada 2013 Postest	625	218.6	2.23	ADF	.000	.032	.027	.038
SSUS Granada 2013 Pretest	705	209.0	2.13	ADF	.000	.033	.027	.040
Ciclotourists QH Challenge 2011	2022	282.7#	3.80	ADF	.000	.038	.034	.043
Ciclotourists QH Challenge 2012	382	226.7	2.31	ADF	.000	.052	.043	.061
Environment of Footballer (Physiother., Doctors 1st Div-U16	65	137.8	1.41	GLS	.005	.080	.045	.109

SSUS: Sport Sciences University Students. *Missing values were imputed with the average. ** Discrepancy estimation method:ADF = Asymptotically distribution-free estimation; GLS = Generalized Least Squares. *** Test-retest design. # Degrees of freedom (df)=74

convergent validity in the expected direction. Correlation coefficients are shown in Table 6.

It was expected that those with high anti-doping self-efficacy (i.e. confidence in not needing doping) have a less lenient view of doping used and vice versa. This hypothesis was supported by the results showing significant negative correlations. Self-admitted doping users also reported a lower avoiding doping self-efficacy than non-users (8.41 ± 2.20 and 7.13 ± 3.03, respectively) and this difference was statistically significant (U = 314028; p < 0.001).

Furthermore, small but statistically significant negative correlation was found between PEAS and self-esteem, suggesting a weak inversed connection between general self-esteem and the explicit evaluation of using additional means (doping) to achieve sport success.

Positive correlations were expected and found between doping attitude and perceived descriptive norms regarding doping. Participants who perceived doping at a higher prevalence rate in their sports showed more positive attitude toward doping. Self-admitted doping users estimated doping prevalence at a higher level compared to non-users (58.25 ± 33.36 and 46.56 ± 33.32 respectively; U = 79853.5; p < 0.001).

Gender and age differences: In order to see if age has any effect on doping attitude, the sample of 2022

Table 5. Self-reported use of doping and PEAS score means (M), standard deviations (±SD), test statistics and corresponding p-values by doping user groups.

Samples	n	User M (±SD)	Non-user M (±SD)	U Mann Whitney	p
Ciclotourists QH Challenge 2011	2022	48.87 (15.98) (n=164)	40.98 (11.95) (n=1858)	108775.500	.000
Ciclotourists QH Challenge 2012	382	46.18 (17.11) (n=33)	38.88 (12.27) (n=349)	4368.500	.022
Footballers	1120	38.48 (12.48) (n=48)	33.71 (10.33) (n=1072)	19911.500	.008
Professionals Footballers	273	40.18 (16.54) (n=11)	34.10 (10.11) (n=262)	1177.000	.303
Amateur Footballers	280	42.13 (10.45) (n=16)	35.24 (9.52) (n=264)	1321.500	.012
Elite U18 - U16 Footballers	272	49.75 (10.77) (n=4)	35.19 (11.35) (n=268)	171.000	.019
Elite Female Footballers	35	34.33 (4.89) (n=6)	29.24 (10.77) (n=29)	43.500	.055
Football Coaches Sport Sciences Students	167	38.28 (15.65) (n=18)	34.23 (10.28) (n=149)	1152.000	.329

Table 6. Spearman correlations among PEAS score and other variables (self-esteem, self-efficacy, projected use, age).

Spearman correlations between PEAS and	Sample = 2022			Sample = 382		
	Total sample	users (n=164)	non-users (n=1858)	Total sample	Users (n=33)	non-users (n=349)
Projected use	.259 **	.380 **	.232 **	.235 **	.277	.224 **
Self esteem	-.148 **	.007	-.167 **	.168 **	-,382 *	-.124 *
Self-efficacy	-.376 **	-..580 **	-.324 **	-.442 **	-,639 **	-.409 **
Age	-.046 *	-.196 *	-.023	-.055	.021	-.047

* p < 0.05, ** p < 0.001

amateur cyclists was divided in two groups of 35 and younger and over 35. The age of 35 years old was selected as midpoint because most athletes end their sport competitive career at this age. Thirty-five-years and younger participants scored significantly higher in PEAS than others (42.61 ± 12.87 and 41.18 ± 12.318; $p < 0.031$) and lower in self-efficacy (8.05 ± 2.47 and 8.42 ± 2.21; $p < 0.001$). Contrary to literature precedence, no significant differences were found between males and females.

Discussion

This cross-cultural adaptation study provided sufficient evidence for the validity and reliability of the Spanish version of the PEAS (PEAS-ESP), which can be recommended with confidence for future doping studies among Spanish speaking athletes and their entourage.

Internal consistency values, ranging between acceptable to very good, indicated good reliability of the PEAS-ESP across several samples. The one-week test-retest reliability suggested that PEAS-ESP measures a relatively stable construct. However, the significant difference between the first and the second administration of the PEAS-ESP was in line with Petróczi and Aidman (2009) who justified this using the theory of dynamics attitudes (Eiser, 1994) and the attitudes priming model (Fazio, 1995). Taking everything into account, it is reasonable that in the second administration participants gave more socially desirable responses because it is possible that the first administration of the questionnaire may have sensitized the participants.

CFA results confirmed the factorial structure similar to the original version in all but one sample. The correlations between the errors terms of items 4, 11 and 12 suggested the possible presence of an additional, albeit weak, latent factor. Upon closer investigation of these items, it became apparent that all three items refer to recreational drug use in sport context. Thus it is conceivable that the large sample size in this particular study afforded the emergence of an additional latent factor related to recreational drugs in general or in sport that was not intended to be measured by the PEAS but potentially confounded the measures taken by these particular items on doping. This latent factor could have remained hidden previously as most studies utilised a considerably small samples and in any case, relatively non-significant as neither Velicer's or Horns' tests indicated the presence of more than one factor. Further research is required to fully explore the potential confounding effect of an attitude toward recreational drugs in doping context.

In addition, according to Hooper et al., (2008), we suggest that limitations of chi square test must be taken into account when interpreting results from this particularly large sample of over 2000 participants. Firstly, this test assumes multivariate normality whereas in our study, most samples are non-normal. Severe deviations from normality may result in model rejections even when the model is properly specified; secondly, because the chi-square statistic is in essence a statistical significance test it is sensitive to sample size leading to the model nearly always being rejected when large samples are used. In addition to its apparent validity, it was also found evidence favorable to construct and convergent validity. It was expected that self-admitted doping users would show higher PEAS scores and, consequently, a more lenient attitude toward doping. In 5 of the 8 analysed samples significant differences were found between confessed users and non-users ($p < 0.05$). In the other 3 samples in which statistical difference was not reached, the small sample size of users could be the reason. We suggest that "practical differences" (Atkinson, 2003) were observed in all comparisons (always higher scores for users), despite not always reaching statistical differences. This is in line with other studies, where confessed doping users, as expected, scored significantly higher on the PEAS when compared with those who reported no use of banned drugs (Petróczi and Aidman, 2009; Uvacsek et al., 2011)

Regarding relationship between self-esteem and attitude towards doping, we found a significant negative correlation in both samples. Consequently, although this relationship is weak, the fact that similar data were obtained one year later with a smaller sample size could reinforce the idea that this relationship exists and is consistent. The relationship between self-esteem and attitudes toward doping could be the function of the driving forces behind doping use (i.e. aesthetic vs. performance). We suggested that this relationship may be relatively weak because the sample characteristics. Amateur cyclists most likely looked for other aims such as performance improvement instead of appearance. Moreover, Spearman's correlations from users in relation to anti-doping self-efficacy and doping attitude could support the hypothesis that, at least in part, participants' self-esteem and self-efficacy are related to attitudes towards doping. Doping behaviour research would benefit from further research in this under-researched aspect in doping.

In relation to perceived descriptive norms, it seems participants who admitted using prohibited performance-enhancing substances believe that a higher percentage of the others are taking banned substances; and exhibited a more positive attitude toward doping on the PEAS-ESP scale. This phenomenon, called "false consensus effect"

(Ross, Greene, & House, 1977) has been shown in doping before (Petróczi, Mazanov, Nepusz, Backhouse, & Naughton, 2008). Similarly, in the study of Uvacsek et al. (2011), domain specificity of this effect was evidenced.

Contrary to previous research, gender did not have an effect on doping attitudes, but age did. Participants under 35 years of age (younger than limit age to be competitive in sport which we established) showed more permissive attitudes towards doping in the analysed sample what could be because they are supposed to be more competitive and more focused on performance in comparison to the oldest.

From a doping prevention point of view, PEAS could be used as a standard measurement instrument to assess attitudes towards doping so that data were reliable and valid, and practical applications could be developed efficiently (Mandic et al., 2013). In addition, PEAS could be complemented with other tools such as interviews (Lentillon-Kaestner et al., 2012), implicit association tests (James et al., 2010) or ideally biomedical tests (Morente-Sanchez and Zabala, 2013). We suggested that Sport sciences researchers could play an important role in the fight against doping applying these researching methods to assess the current situation deeply in order to design, consequently, specific programs and other activities for doping prevention (Kisaalita and Robinson, 2014).

Conclusion

This study has showed that the Spanish version of the Performance Enhancement Attitude Scale has satisfactory psychometric properties. Internal consistency and test-retest correlation were good, supporting the reliability of the scale. Moreover, it was demonstrated acceptable measurement model fit and we suggest that there is sufficient evidence to sustain the construct validity of the scale. Therefore, the results provide justification for the use of the PEAS in its Spanish version.

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Key points

- First study that crosses culturally adapted the PEAS to the Spanish language.
- The Spanish version of PEAS has satisfactory psychometric properties.
- Users scored higher than non-users indicating a satisfactory construct validity. Significant positive correlation was found between PEAS and projected use.
- Significant negative correlation between PEAS and self-esteem and self-efficacy.

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