High-performance athletes' attitude towards doping: Validation of the Spanish version of the Performance Enhancement Attitude Scale for Colombia

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Recibido: 15/04/2019
Aceptado: 28/06/2019

Summary

Background: Doping is the use of substances to achieve a better performance in sports. This practice is considered to be growing worldwide. Despite regulations by the World Anti-Doping Agency, 14–39% of high-performance athletes have consumed prohibited substances at least once in their sports career. The attitudes towards this type of consumption are used as predictors of the intent of usage of prohibited substances to improve physical performance.
Objective: This study aimed to validate the Spanish Version of the Performance Enhancement Attitude Scale of high-performance athletes in the Colombian context.
Methodology: A cross-sectional study was performed with a convenience sampling of 112 athletes aged 15 and older, registered in a State Sports Institute in Medellín, Colombia in 2016. The participants self-completed Petróczi and Aidman instrument, Performance Enhancement Attitude Scale, adapted into Spanish by Morente-Sánchez, et al. in 2014. The reliability of the scale was assessed using Cronbach's Internal Consistency Coefficient and an exploratory and confirmatory factor analysis (CFA) was conducted to evaluate the scale's structure.
Results: The scale had a reliability of 0.87 and the factor analysis confirmed the unidimensionality. Of all the athletes participating in the research, the Performance Enhancement Attitude Scale average was 35.8 of 102 points, indicating a low tendency of attitudes towards doping.
Conclusion: The psychometric properties of the 17 items of the Performance Enhancement Attitude Scale are adequate and could be used when assessing attitudes towards doping of high-performance athletes in similar contexts. This information could be used for the purposes of developing educational strategies for doping prevention in our athletes.

Key words:
Sports. Doping in sports. Athletic performance.

Actitud frente al dopaje de deportistas de alto rendimiento: Validación de la versión española de la *Performance Enhancement Attitude Scale* para Colombia

Resumen

Introducción: El dopaje es el uso de sustancias para lograr un mejor desempeño en los deportes. Esta práctica parece estar creciendo en todo el mundo. A pesar de las regulaciones de la *World Anti-Doping Agency,* 14–39% de los deportistas de alto rendimiento han consumido sustancias prohibidas al menos una vez durante su carrera deportiva. las actitudes hacia este tipo de consumo se emplean como predictores de la intención de uso de sustancias prohibidas para mejorar el rendimiento físico.
Objetivo: El objetivo del estudio fue validar en deportistas de alto rendimiento en el contexto colombiano la versión española de la escala de Actitudes frente al mejoramiento del rendimiento. Diseño: Se realizó un estudio de corte transversal en 2016 con una muestra por conveniencia de 112 deportistas de 15 y más años inscritos en un instituto deportivo estatal en Medellín (Colombia).
Metodología: Los participantes autodiligenciaron el instrumento de Petróczi y Aidman *Performance Enhancement Attitude Scale* (PEAS), adaptado al español por Morente-Sánchez et al. Se evaluó la confiabilidad de la escala con el coeficiente de consistencia internal de Cronbach y se hicieron análisis factorial exploratorio y confirmatorio para evaluar la estructura de la escala.
Resultados: Los resultados indicaron que la escala tenía una confiabilidad de 0,87 y el análisis factorial confirmó la unidimensionalidad. En los deportistas participantes en la investigación el promedio de la PEAS fue de 35,8 de 102 puntos posibles, indicando baja tendencia de actitudes hacia el dopaje.
Conclusión: Las propiedades psicométricas de los 17 ítems de la PEAS son adecuadas, y podría ser utilizada en la evaluación de actitudes hacia el dopaje en deportistas de alto rendimiento en contextos similares. Esta información podría ser utilizada para el desarrollo de estrategias educativas para la prevención del dopaje en nuestros deportistas.

Palabras clave:
Deportes. *Doping* en los deportes. Rendimiento atlético.

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Introduction

Doping is the use of substances to achieve a set goal and has been recognised as a specific form of drug consumption[1]. In sports, this practice is defined as the occurrence of one or more of the 10 anti-doping rule violations. This practice, which seems to be growing worldwide, is considered a major global public health problem, which led to the establishment of the World Anti-Doping Agency (WADA) in 1999[2]. This agency stated that the number of abnormal findings in anti-doping tests has increased by more than 20% since 2012[3]. Even though the implementation of control measures has allowed to maintain a prevalence of positive tests of almost 2%, 14–39% of high-performance athletes have consumed prohibited substances at least once in their sports career, estimating that a higher percentage may have resorted to this type of practice[4-6].

In the absence of available information regarding the use of substances associated with doping, the attitudes towards this type of consumption are used as predictors of the intent of usage of prohibited substances to improve physical performance[7-13].

There are several scales implemented to assess aspects related to attitudes towards doping in high-performance athletes, such as: the *Performance Enhancement Attitude Scale* (PEAS) by Petróczi and Aidman, a unidimensional instrument composed of 17 items with six Likert-type response options that range from 1 = totally in disagreement to 6 = totally in agreement, with a reliability of 0.77[12]. This scale was translated and adapted into Spanish by Morente-Sánchez *et al*. using various samples of high-performance athletes, with an overall reliability of 0.82[14]; the *Sport Orientation Questionnaire* (SOQ), a 25 items-scale distributed in three dimensions (competitiveness, winning-orientation and goal-orientation), with Likert-type response options of five points, ranging from 'in agreement' to 'totally in disagreement'[15]. It has high internal consistency coefficients in the three dimensions (competitiveness = 0.94, winning-orientation = 0.83 and goal-orientation = 0.80); the *Doping Use Belief* (DUB) measures are four statements in relation to the use and anti-doping behaviour with three response options ('yes, without restrictions'; 'yes, with restrictions' and 'absolutely not')[15]. The internal consistency of this scale is 0.94[16]. The *Vulnerability of Elite Athletes to Doping Scale* (VEADS) is another instrument, created in Spain, for which the PEAS items were combined with the determining factors of vulnerability to turn to doping[17]. It includes 52 items distributed across four factors (personality traits, behaviour traits, competition circumstances and attitudes towards doping) with a reliability of 0.84 in the domain of attitudes[17].

Given that no information was found regarding studies that implement instruments for the assessment of attitudes towards doping in Colombian athletes, we considered conducting a research for the purposes of determining the reliability and factor validity of the Spanish version of the PEAS in a group of high-performance athletes of a state sports institution from the city of Medellín, Colombia. This scale was implemented as it could be quickly processed, and results could be easily compared with the studies performed in high-performance athlete populations across the world.

Material and method

A cross-sectional descriptive study was conducted in 2016, where high-performance athletes of a state sports institution from the city of Medellín, Colombia over the age of 15 participated. The athletes who failed to complete the survey were excluded from this study.

For data collection purposes, a form including age, sex, sports variables and the PEAS instrument by Petróczi and Aidman, adapted into Spanish by Morente-Sánchez, Femia-Marzo and Zabala was used[14,16]. This self-report scale contains 17 items with Likert-type response options scored from one to six (one = strongly in disagreement, two = in disagreement, three = slightly in disagreement, four = slightly in agreement, five = in agreement and six = strongly in agreement).

The scale's total score ranges from 17 to 102; the higher the score, the stronger the tendency towards doping behaviours. The items that make up the scale are as follows: *P01_Legalising products to improve performance would be beneficial for sports, P02_Taking drugs is necessary to be competitive, P03_The risks related to doping are exaggerated, P04_Recreational drugs encourage athletes to train and compete at the highest level, P05_Athletes should not feel guilty for violating the rules and taking drugs to improve their performance, P06_Athletes are pressured to take drugs that improve performance, P07_Health problems and injuries derived from rigorous training are as harmful as the doping effects, P08_The media exaggerate the issue of doping, P09_The media should talk less about doping, P10_Sports are the only professional alternative for athletes, P11_Athletes who take recreational drugs do so because they are helpful to overcome sports situations, P12_Recreational drugs help athletes overcome boredom during trainings, P13_Doping is an inevitable part of competitive sports, P14_Athletes usually waste time as a result of injuries and drugs can help them make up for lost time, P15_Doping does not imply cheating as everyone does it, P16_Only the quality of performance should be valued, rather than the way athletes achieve their results and P17_There is no difference between taking drugs, aerodynamic shapes or special bathing suits, as all of them serve to improve performance.*

The information was gathered when athletes attended out-patient consultations, physiotherapy or pre-participatory evaluations in the sports institution by three of the main researchers for two months in 2016. After agreeing to take part in the research, the athlete signed the informed consent and completed the self-administered questionnaire. This was a convenience sampling.

Selection bias were controlled by inviting all athletes attending a consult at the out-patient service were data was collected. No athlete denied participating on the study, therefore there were no evident not-response bias. On the other hand, information bias were controlled by: 1) an anonymously-completed form; 2) PEAS scale being short (17 items) and easy to complete; 3) the data base being designed and completed by two people: one dictating and verifying the correct submission of the data and another one being in charge of submitting the data into the SPSS software; 4) all answer option from each variable were codified; and 5) the three main researchers that collected the data being trained on standardized data collection techniques.

The statistical analysis was conducted in the SPSS vr.23 and SPSS AMOS vr.25 programme (Chicago, U.S.A.). The following statistical analysis of data was performed: (i) *Descriptive analysis:* the average, standard

deviation, skewness, kurtosis, item-total correlation coefficient and Cronbach's Alpha Coefficient (if the item is deleted) were estimated. (ii) *Exploratory Factor Analysis* (EFA): through the analysis of the main components and Varimax orthogonal rotation. The suitability of the matrix to carry out the analysis was assessed using the Kaiser-Meyer-Olkin (KMO) statistic, considering that the model is suitable with a value ≥ 0.5 and the Bartlett's test of Sphericity that rejects the hypothesis is null if $p < 0.05$, which indicates an interrelationship between variables[18]; (iii) CFA: a structural equation model was performed for latent variables. The following indexes were assessed, with acceptance values as stated below[19]: Goodness of Fit Index (GFI) ≥ 0.85, *Adjusted Goodness of Fit Index* (AGFI) ≥ 0.80, *Square Root Mean Residual* (SRMR) ≤ 0.10, *Root Mean Square Error of Approximation* (RMSEA) ≤ 0.08, chi-square goodness of fit (CFMIN) ≤ 3, *Comparative Fit Index* (CFI) ≤ 0.95, and: (iv) *Reliability:* it was estimated using Cronbach's Alpha Coefficient, considering that a cut point of 0.7 or over was an acceptable value[20].

The research was approved by the ethics committee of the School of Health Sciences of the University the authors are affiliated to and was classified as 'minimum risk' as per resolution No. 008430 of 1993 of the Colombian Ministry of Health; the signed informed consent was obtained from every participant before providing the survey.

Results

A total of 119 athletes participated in the study, seven of which were excluded as they failed to complete the questionnaire; therefore, the results described derive from 112 people. The average age of the participants was 21.58 ± 3.46 years (15 as minimum, 33 as maximum), 60.7% were men and, among the type of sports, a higher percentage did karate, judo and practised athletics (Table 1).

Table 1. Sports practised by the 112 participants.

Sport	Frequency	Percentage
Karate	19	17.0
Judo	14	12.5
Athletics	12	10.7
Fencing	8	7.1
Rugby	8	7.1
Indoor volleyball	7	6.3
Cycling	6	5.4
Weightlifting	5	4.5
Badminton	4	3.6
Diving	4	3.6
Football	4	3.6
Archery	3	2.7
Basketball	2	1.8
Handball	2	1.8
HapKido	2	1.8
Wrestling	2	1.8
Swimming	2	1.8
Softball	2	1.8
Taekwondo	2	1.8
Other*	4	3.6

* Each sport with a participant: baseball, indoor football, triathlon and beach volleyball.

The descriptive statistics of the PEAS items can be observed in Table 2. The grade point average per item was 2.1 ± 0.4 (1.4 as minimum and 2.8 as maximum). The abovementioned table shows that all the grade point averages per item were lower than 3, showing the athletes' disagreement with each and every statement in the scale. Tolerance on doping was lower in the items *P02_Taking drugs is necessary to be competitive and P15_Doping does not imply cheating as everyone does it* (1.4 and 1.5, respectively). On the other hand, three items were more widely accepted: *P07_Health problems and injuries derived from rigorous training are as harmful as the doping effects,* with a score of 2.7 and 2.6 in items *P11_Athletes who take recreational drugs do so because they are helpful to overcome sports situations, P08_The media exaggerate the issue of doping* and *P14_Athletes usually waste time as a result of injuries and drugs can help them make up for lost time after an injury each.*

In the analysis of the item-total correlations, all items showed adequate values exceeding 0.25. It could also be noted that most of the skewness and kurtosis indexes are lower than 2, indicating similarities with the standard curve. The PEAS' total internal consistency, evaluated with Cronbach's alpha statistics, was 0.87 (0.88 in women and 0.86 in men). All items were relevant because if they were individually removed, the alpha of the total scale would not have changed at all.

In the EFA of the internal structure of the 17 items of PEAS, it could be seen that the model was adequate (KMO 0.827; χ^2 of the Bartlett's test of Sphericity = 672; $p < 0.001$). The EFA showed four factors with eigenvalues above 1 and the first factor itself explained the 34.10% of the variance of the test items (2º = 9.77%, 3º = 7.59% and 4º = 6.88%). Also, a significant drop was observed in the eigenvalue from the first to the second factor (5.79 to 1.66) and an inspection of the matrix of non-rotating components demonstrated that all items had high factor loads in the first factor before rotation. All of this led us to think that the test items were inclined to co-variate in a single unidimensional scale.

Moving to the CFA, the single-factor model was considered suitable as it had CFMIN= 2.21, GFI = 0.94; SRMR = 0.13 and RMSEA = 0.104; and it was very close to the acceptance values in CFI = 0,72.

The EFA and CFA results are summarised in Table 3. The factor loads of PEAS show a range from 0.34 to 0.71, while standardised errors are around 0.2. Except from items 6, 7 and 10, the *t* student values of the 14 remaining items were ≥ 1.96, indicating that they have a significance value lower than 0.05; it is worth noting that items 2, 5, 15, 16 and 17 had a t higher than 2.56 ($p < 0.01$). In the multiple correlation analysis (R^2), it could be observed that the reliability of the PEAS items for the latent factor was between 0.14 and 0.44.

The total average of the scale was 35.8 ± 11.7 of 102 possible points, indicating low tendency to doping behaviours. No statistically significant differences were found in the score by sex for the total scale (men = 36.15 ± 11.43; women = 35.16 ± 12.20. $p = 0.731$) or for individual items.

Age showed a low, although significant correlation ($p < 0.05$), with the total PEAS score ($r = 0.25$) and with items *P17_There is no difference between taking drugs and other ways to improve performance* ($r = -0.19$) and *P06_ Athletes are pressured to take drugs that improve performance.*

The items that were strongly correlated and statistically significant, ($p < 0.001$) with the total PEAS score were: *P14_ Doping helps athletes not to waste time after an injury* ($r = 0.67$; $p < 0.001$), *P09_ The media should talk less about doping* ($r = 0.66$), *P17_There is no difference between doping*

Table 2. Descriptive statistics of the 17 items of the PEAS scale in 112 high-performance athletes.

Summary of the question	Average deviation	Standard	Skewness	Kurtosis	Item-total correlation*	α if the item is deleted
P01_The products' legalisation is beneficial	2.03	1.20	1.30	1.27	0.49	0.86
P02_Doping is necessary	1.38	0.69	2.42	7.81	0.58	0.86
P03_The doping risks are exaggerated	2.46	1.43	0.80	−0.21	0.52	0.86
P04_Recreational drugs are motivational	1.88	1.08	1.58	2.57	0.47	0.86
P05_Not feeling guilty for using them	1.83	0.95	1.31	1.86	0.51	0.86
P06_Athletes feel pressured to improve	2.13	1.21	1.22	1.13	0.33	0.86
P07_Health problems due to training are as harmful as them	2.73	1.48	0.44	−1.04	0.41	0.86
P08_ The media exaggerate the doping issue	2.62	1.45	0.72	−0.46	0.52	0.86
P09_ The media should talk less about doping	2.28	1.31	1.04	0.78	0.58	0.85
P10_ Sports are the only professional alternative	2.30	1.49	0.93	−0.05	0.35	0.86
P11_ Drugs help in sports situations	2.60	1.26	0.41	−0.89	0.52	0.86
P12_ Drugs help overcome boredom	1.99	1.12	1.59	3.05	0.43	0.86
P13_ Doping is inevitable	1.88	1.11	1.33	1.14	0.48	0.86
P14_ Doping helps athletes not to waste time after being injured	2.58	1.29	0.59	−0.45	0.60	0.85
P15_ Doping is not cheating, everyone does it	1.52	1.08	2.45	5.56	0.58	0.85
P16_ Valuing performance, not how athletes achieve results	1.70	1.06	1.62	2.37	0.54	0.86
P17_There is no difference between doping and other ways of improving performance	1.94	1.13	1.18	0.62	0.58	0.85

* All odds were < 0.001.

Table 3. Structure of the EFA coefficients, factor loads, squared multiple correlations (R^2) and *t* student values of the 17 items of the PEAS in the study sample (n = 112).

Item	EFA		CFA			
	PCA*	MLE**	Standardised factor loads	Standardised errors	*t*-value	R^2
P01_Legalising products	0.57	0.51	0.53	0.21	2.52	0.28
P02_Doping_required	0.67	0.62	0.63	0.14	4.50	0.40
P03_risks_exaggerated	0.59	0.56	0.55	0.28	1.96	0.30
P04_recreational_drugs	0.57	0.53	0.53	0.21	2.52	0.28
P05_ Not_feeling_guilty	0.61	0.56	0.58	0.19	3.05	0.34
P06_pressured_to improve_performance	0.41	0.34	0.37	0.21	1.76	0.14
P07_health_problems	0.46	0.41	0.42	0.27	1.56	0.18
P08_media_exaggerates	0.60	0.61	0.57	0.25	2.28	0.32
P09_media_talk_less	0.64	0.64	0.61	0.26	2.35	0.37
P10_sports_single_alternative	0.41	0.36	0.36	0.26	1.38	0.13
P11_drugs_help_sports_situations	0.58	0.52	0.52	0.24	2.17	0.27
P12_drugs_help_overcome_boredom	0.52	0.47	0.48	0.21	2.29	0.23
P13_doping_inevitable	0.56	0.48	0.52	0.21	2.48	0.27
P14_waste_time	0.67	0.61	0.63	0.26	2.42	0.40
P15_doping_is_not_cheating	0.68	0.68	0.66	0.22	3.00	0.44
P16_value_quality_performance	0.63	0.71	0.61	0.21	2.90	0.37
P17_no_difference	0.66	0.66	0.64	0.25	2.56	0.41

*Main components analysis, **maximum likelihood estimator.

and other ways of improving performance ($r = 0.65$) and *P02_Doping is necessary* ($r = 0.62$).

Discussion

This study included 112 athletes registered in a state sports institution of the city of Medellín; the average age was 21.6 years, similar to the data reported by Morente-Sánchez *et al.* who collected information from 14 Spanish studies that used PEAS to assess attitudes towards doping[14]. This age is compatible with the conclusion of the sports training process, during which our athletes reach their level of development from the biological point of view and when the highest level required to start achieving sporting performances is reached.

Regarding sex, just like in the present study, Muwonge *et al.* reported 60.7% of male population[21]. This can be understood as the practice of the most frequent sports in our studies is more common in the male population.

The KMO measure of the sampling adequacy to conduct the factor analysis was 0.82, indicating a strong partial correlation in the data of this study. Besides, the probability value of the Bartlett's test of Sphericity was statistically significant for an interrelationship between the variables that make up the scale, therefore, arising four factors from the 17 items, although the first one explained the 34% of the scale variance and, since no item-total correlation coefficient was lower than 0.20, no item was removed and the scale was handled as a single-dimension one with its total number of items. The PEAS' unidimensionality has already been reported by the authors of the scale, and, in the Spanish version, Morente-Sánchez *et al*. mention that a potential second latent dimension, although a very weak one, was found[14].

The CFIN indicator of the CFA was 2.2 and it was considered adequate, being a bit higher than the value of 1.8 reported by Petróczi and Aidman and by Morente-Sánchez *et al*.[12,14]. The PEAS in our study had a high internal consistency, with a Cronbach's alpha of 0.87, being slightly lower in men than in women (0.86 *vs*. 0.88). These values exceed the range from 0.71 to 0.85 reported by Morente-Sánchez *et al.* and the value of 0.77 of the scale's authors, in studies in which the same instrument had been implemented[12,14].

The average of the PEAS scale for our participants was 35.8, which is within the range from 28.8 to 39.9 found by Morente-Sánchez and Zabala in Spanish athletes and is lower than the value of 39.8 estimated by Muwonge *et al*. in Ugandan athletes[21,22]. All these studies indicate that high-performance athletes show low tendency to doping behaviours. For its part, Allen et al. reported that high-performance athletes are against this practice to improve their performance[23]. Another study, showed that the athletes that had resorted to doping at some point in their careers tend to be more tolerant towards this behaviour and that athletes that take forbidden drugs mainly do this to improve their performance, although they recognise this is an unethical practice that may result in health problems and put them at risk of being sanctioned for their use[1,22].

This research showed no statistically significant differences in the PEAS score as regards sex, a finding that coincides with those reported by Ugandan, Spanish and Danish athletes, whereas Poland and Greek male athletes had more permissive on doping attitudes than women[13,14,21,24,25].

In the case of our participants, age was significantly related to the total PEAS score, a result similar to that obtained in the study conducted by Morente-Sánchez *et al.* in which younger athletes showed greater scores concerning their attitudes towards doping[14]. This could be associated with the need to be more competitive with regard to older athletes.

This study concludes that the psychometric properties of the 17 items of PEAS were adequate and that they could be used when assessing the attitudes of high-performance athletes towards doping in similar contexts. This information could be used for the purposes of developing educational strategies for doping prevention in our athletes. These educational approaches could be specially aimed to younger and more competitive athletes with greater PEAS scores in order to warn them about the risks of doping and to encourage fair play among all groups of athletes.

The major limitation of this study has to do with the fact that the answers provided by the participants to the questions of this questionnaire were self-reported and not subsequently verified, which could imply a margin of error that is present in all subjective answers and can be conditioned by factors that are not within the scope of the researchers. Nevertheless, the anonymity of questionnaires encouraged honesty at the moment of answering questions.

This study's strength is being the first research on Latin-American athletes' attitudes towards doping, whereby it also aims to expand scientific knowledge on said subject that affects athletes' image around the globe.

Acknowledgements

We would like to express our particular gratitude to Dr. Luis Eduardo Contreras for his readiness and support.

Conflict of interests

The authors declare to have no conflicts of interest whatsoever.

Bibliography

1. Petroczi A, Aidman E. Psychological drivers in doping: The life-cycle model of performance enhancement. *Subst Abuse Treat Prev Policy*. 2008;3:7.
2. Pitsch W, Emrich E. The frequency of doping in elite sport: results of a replication study. *Int Rev Sociol Sport*. 2012;2:559-80.
3. 2015 anti-doping testing figures report. (November 2016). World Anti-doping Agency. Retrieved January 18, 2019, from: https://www.wada-ama.org/sites/default/files/resources/files/2015_wada_anti-doping_testing_figures_report_0.pdf
4. Kim T, Kim YH. Korean national athletes' knowledge, practices, and attitudes of doping: a cross-sectional study. *Subst Abuse Treat Prev Policy*. 2017;12:7.
5. de Hon O, Kuipers H, van Bottenburg M. Prevalence of doping use in elite sports: a review of numbers and methods. *Sports Med*. 2015;45:57-69.
6. Zucchetti G, Candela F, Villosio C. Psychological and social correlates of doping attitudes among Italian athletes. *Int J Drug Policy*. 2015;26:162-8.
7. Collins R W. Lowering restrictions on performance enhancing drugs in elite Sports. *Inquiries J.* 2017 [cited 17 June 2019]; 9. Available from: http://www.inquiriesjournal.com/a?id=1590
8. Creado S, Reardon C. The sports psychiatrist and performance-enhancing drugs. *Int Rev Psychiatry*. 2016;28:564-71.
9. Halliburton AE, Fritz MS. Health beliefs as a key determinant of intent to use anabolic-androgenic steroids (AAS) among high-school football players: implications for prevention. *Int J Adolesc Youth*. 2018;23:269-80.

10. Moston S, Engelberg T. Part I. Anti-Doping Investigations. In: *Detecting Doping in Sport*. 1st Ed. London: Routledge; 2017. p 1-45.
11. Ntoumanis N, Ng JY, Barkoukis V, Backhouse S. Personal and psychosocial predictors of doping use in physical activity settings: a meta-analysis. *Sports Med*. 2014;44:1603-24.
12. Petroczi A, Aidman E. Measuring explicit attitude towards doping: review of the psychometric properties of the performance enhancement attitude scale. *Psychol Sport Exerc.* 2009;10:390-6.
13. Psouni S, Zourbanos N, Theodorakis Y. Attitudes and intentions of Greek athletes and coaches regarding doping. *Health*. 2015;7:1224-33.
14. Morente-Sánchez J, Femia-Marzo P, Zabala M. Cross-cultural adaptation and validation of the Spanish version of the performance enhancement attitude scale (Petróczi 2002). *J Sports Sci Med.* 2014;13:430-8.
15. Gill DL, Deeter TE. Development of the Sport Orientation Questionnaire. *Res Q Exerc Sport*. 1988;59:191-202.
16. Petroczi A. Attitudes and doping: a structural equation analysis of the relationship between athletes' attitudes, sport orientation and doping behaviour. *Subst Abuse Treat Prev Policy.* 2007;2:34.
17. Gutiérrez J, Viuda-Serrano A. Creación y validación de la 'Escala de Vulnerabilidad de Atletas de Élite ante el Dopaje' (EVAED). In: Pardo R, González T, Irureta-Goyena P. *El fenómeno del Dopaje desde la perspectiva de las Ciencias Sociales*. Madrid: Universidad Politécnica de Madrid; 2015. p. 102-20.
18. Che MS, Tasmin R, Takala J, Norazlin H. Factor retention decisions in exploratory factor analysis results: a study type of knowledge management process at Malaysian university libraries. *Asian Soc Sci.* 2013;9(15):227-40.
19. Gallagher MW, Brown TA. Introduction to confirmatory factor analysis and structural equation modelling. In: Teo T. *Handbook of quantitative methods for educational research*. Rotterdam: Springer; 2013. p. 289-314.
20. Vaske JJ, Beaman J, Sponarski CC. Rethinking internal consistency in Cronbach's Alpha. *Leisure Sci*. 2017;39:163-73.
21. Muwonge H, Zavuga R, Kabenge PA. Doping knowledge, attitudes, and practices of Ugandan athletes': a cross-sectional study. *Subst Abuse Treat Prev Policy*. 2015;22:37.
22. Morente-Sánchez J, Zabala M. Doping in sport: a review of elite athletes' attitudes, beliefs, and knowledge. *Sports Med.* 2013;43:395-411.
23. Allen J, Taylor J, Dimeo P, Dixon SR, L. Predicting elite Scottish athletes' attitudes towards doping: examining the contribution of achievement goals and motivational climate. *J Sports Sci*. 2015;33:1-8.
24. Kim T, Kim YH. Korean national athletes' knowledge, practices, and attitudes of doping: a cross-sectional study. *Subst Abuse Treat Prev Policy*. 2017;12:7.
25. Sas-nowosielski K, Budzisz A. Attitudes Toward Doping Among Polish Athletes Measured with the Polish Version of Petroczi's Performance Enhancement Attitude Scale. *Pol J Sport Tourism*. 2018;25:10-3.