

Determining Validity and Reliability of Doping Behavior Measurement Instrument in Young Athletes Society

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ABSTRACT

The purpose of this study is to determine validity and reliability of doping behavior questionnaire. In order to do so, 20-item doping behavior level measurement questionnaire used in a similar study by Claude Goulet et al in Quebec, Canada, was made ready for distribution after being translated, assessed in terms of writing, modification of errors as well as updating on prohibited materials and removing some of the prohibited materials titles considering the specific cultural issues of the country. In this study, 373 young athletes of Pakdasht Township (197 girls and 176 boys) participated. In order to answer each question, 5 answers were considered based on Likert 5-valuation scale (from zero score with “No, I do not use” expression up to score five with “Yes, I usually use” expression) were considered which should have been answered. Cronbach’s Alpha coefficient method is used to determine the questionnaire internal stability, while confirmatory factor analysis (CFA) was applied to validate structure. The fitting indicators were used to test fitting of the model, including: 1. Wellness indicators, including AGFI, GFI, NFI and badness indicators, including X^2/df and RMSEA, were used.

KEYWORDS: Doping, performance-enhancing substance (PES), Theory of planned behavior (TPB)

INTRODUCTION

Doping means using substances belonged to prohibited, limited medicines and/or using different unauthorized methods. According to ex-IOC Chief, Juan Antonio Samaranch, doping is a kind of cheating.

Using different medicines and complementary substances to increase physical performance and develop muscle volume has been seen since thousands of years ago [1].

It appears that using PES is the main reason on several abnormal behaviors, and involving with consuming these substances depends on personal choice [2].

Data indicates that the population exposed to the risk of PES drug abuse includes certain number of athletes from different ages, who are quite more extensive than what was previously thought to be [3].

In recent years, unfortunately along with the medical and pharmaceutical knowledge progress as well as correct taking benefit from increasing discoveries of such sciences, some people promote unsuitable using these drugs in the society for the mere sake of gaining profit. One of the fields of such profit-seeking has been applying unauthorized using the drugs in sports and promotion of the same, while there are economic, social and even political purposes beyond drug abuse. Several issues of medal discharging, extensive reported harmful physical and mental effects from the athletes as well as significant number of mortality caused by committing doping show the serious extension of this anti-value in the sports scene. In 1981, a survey made among American athlete students indicated that 80% of surveyed students had at least drunk alcohol once, while 20% had records on consuming marijuana and 2% had records on using anabolic steroids.

Today, it is estimated that one out of three million American athletes use androgenic anabolic steroids [4-5].

In a study on female athletes, it has been reported that 8.3% of the gymnasts and 11.8% of ice hockey players used PES [6].

In a study conducted by Manouchehri and Tojari [7], with the participation of 160 elite Iranian athletes, two questions were used to measure the level of doping behavior. Participants faced four choices: 1. Lack of tendency to answer to question; 2. No (not using or experience); 3. Using as medicine for medical therapy, and 4. Yes (using or

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experience on using). The first question was on the one's previous experience regarding using the PES, for which the average value and STD were reported as 0.55 and 1.05, respectively. The second question was on one's doping behavior for the present time, for which average and STD (standard deviation) were obtained as 0.10 and 0.39, respectively. Cronbach's Alpha value for this questionnaire was reported as ($\alpha=0.713$).

In another study conducted by Manouchehri and Tojari [8], the average doping behavior and STD were reported as 0.32 and 0.65, respectively. Cronbach's Alpha value for this questionnaire was obtained as ($\alpha=0.713$).

In the study conducted by Gucciardi, Jalleh, and Donovan [9], by presence of 643 elite Australian elites, merely 5 people reported continuous using doping, the questionnaire used in this study was composed of a question in the part for measuring behavior (which of the following are more correct regarding you?) and 7-choice Likert scale (with answer 1 as "I have never used prohibited substances" expression up to 7 with "I regularly try to use prohibited substances" expression). The reported Cronbach's Alpha for this questionnaire was ($\alpha=0.7$).

In the study conducted by Barkoukis, et al. [10], with the presence of 1,075 of 9th Olympics attended athletes, almost one out of ten reported their usage of doping ($n=85$, i.e. 8%) which was a similar value to the reported values in the previous studies for this type of athletes [11-12]. The value of Cronbach's Alpha to measure the purpose and behavior in this study, which was translated from its original copy (English) [13] to Greek, was found as ($\alpha=0.97$). Specially, 39 athletes (4%) reported one time using doping, 31 (3%) athletes notified they sometimes used these materials and 15 athletes (1%) reported regular using these materials. The average doping behavior in this study and STD were obtained as 1.54 and 1.43, respectively, and confirmatory factor analysis confirmed the scale factor structure.

In the study conducted by Sazvar, et al. [14], titled the factors related to PES by high school and pre-college boys of Hamedan Province and measuring their level of awareness on effects of consuming these substances, conducted by presence of 6,000 students, for which level of doping behavior and reliability of used questionnaire were reported as 12.3% and 0.81, respectively.

In a study titled "using unauthorized drugs in clubs and the problem of unidentifiable drug abuse" Kanayama, et al. [15] reported that 511 people out of the study samples from 5 different sports clubs during the past three years, 18% 25% and 5% of men used Androstenedione, Ephedrine and Anabolic Steroid, respectively, while these figures have been 3%, 13% and 0%, respectively, among women.

In the study conducted by Zelli, Mallia, and Lucidi [16] with the presence of 900 students from 10 high schools of Italy, in the relevant two assessments, the total percentage of the participants who had used at least one doping substance was reported around 1% and 2.1%, respectively. The Cronbach's Alpha found for the used questionnaire in this study for the completed two assessments was calculated as ($\alpha=0.88$) and ($\alpha=0.9$), respectively.

In studying doping and using PES in 351 men and 82 women (both athletes and non-athletes) in Sivas, Turkey, Ozdemir, et al. [1] reported outbreak of doping and PES as 8% (71 cases out of 833 athletes). Using PES in athletes was meaningfully (145%) in comparison with athletes (18%). Consumption of ergogenic substances which were more common included: 60.5% Anabolic Steroids, 12.7% Carnitine, 5.4% Erythropoietin, 11.3% Sodium Bicarbonate, and 14.1% Creatine. Outbreak of ergogenic substances was reported as 1.6% and 2.2%, respectively.

In another study conducted by Minasian and Kashi [17], titled "studying the factors affecting prohibited substances and endogenic complementary drugs in high school students by taking benefit from a self-reporting and researcher-made on 1,180 male and female students in 8 cities and Tarhan district, Kouhdasht township". The results showed that 9.3% of the participated students in this study admitted consumption of at least on PES, of whom 3.7% and 7.1% used prohibited drugs and sports complementary substances. However, some of the people have used both. Internal validity of the questionnaire's questions used in this study was obtained as $\alpha=0.75$ in a study conducted by Kashi, et al. [18] and reliability of the same was approved by the physical education and psychology specialists.

The level of doping behavior in the study conducted by Pasharavesh, et al. [19] was reported as 38.3 for 839 bodybuilders of Kermanshah Township. In order to determine the validity of the used questionnaire, in this study the repeated testing method has been used. In order to do so, through 25 interviews with 25 male bodybuilders in two stages with 30-day time interval, the relevant questionnaire was completed and the results thereof were compared and the correlation factor of each question in the two made tests was 0.7 or more ($r \geq 0.7$).

The level of doping behavior in the study conducted by Kashi, et al. on 300 bodybuilders of 5 provinces (Tehran, Esfahan, Lorestan, Khuzestan and Ghom) was announced as 63.3. The validity of the researcher-developed questionnaire in this study was calculated as 74%.

The level of doping behavior in the study conducted on 169 female athletes of national and club teams in Tehran province was reported as 77.5%. The internal validity of the questions of questionnaire used in this study was reported $\alpha=0.74$.

In a study conducted by Goulet, et al. [2], titled “predictors of using PES” among 3,573 young athletes (avg. age 15.5 yrs.), in Quebec Province, Canada, it was indicated that knowledge on prohibited substances has a little effect on the purpose and behavior of PES consumption among young athletes. Cronbach’s Alpha for the questionnaire used in this study to measure the doping behavior level was reported as 0.9.

In the study conducted by Halabchi, et al. [20], titled “studying the level of knowledge of wrestlers of Tehran city clubs on doping and estimation of the same from the current outbreak in the country” which was made as interval-based study and among 426 people through taking benefit from questionnaire during years 2006 and 2007, it was shown that: 35.4 and 12.5% of wrestlers assessed the outbreak of drug abuse in league competitions and their club mates more than 50%, respectively. Cronbach’s Alpha for the questionnaire used in this study to measure the doping behavior level was reported as 0.72.

The available reports indicate outbreak of PES consumption among high school boys of Tehran Province for 11%, girls for 4% and Iranian male students 8.4%, among Iranian male bodybuilders 63%, and among footballers of first division league of students of the country as 60%. However, several studies indicate the fact the real level of PES consumption is more than what have been reported [18].

Bryan, et al. [21] in their study, titled outbreak of food complements among US high school students, studied 548 high school boys and girls. The results of this study show that the outbreak of the major complementary substance has been keratin (10.9%), followed by Androstenedione (4%).

Epidemiologic studies conducted in European or American countries have indicated that between 3 and 5 percent of teenagers who are not athletes have used PES and 15% of German schools teenagers has used PES prohibited by WADA in the year before the study [22-26].

The results of the different studies conducted overseas indicate that between 0.7 and 5.4% of high school boys and 0 and 2.9% high school girls take PES and hazardous drugs [21; 27; 28; 29; 30]. However, the scope of outbreak of some of the complementary substances is quite higher [31-33].

Thus, the importance of problem of drugs in sport and the recent scandals of using banned drugs and doping in sport of the country, encourage researcher that along with study mental variables predictors in drug usage in sport, examined and study available instruments. So, as it may be seen from the aforesaid issued and rich scientific basis on studying doping and behavior of PES consumption in the studied societies, the doping behavior level measurement questionnaires are quite important and sensitive in performing such type of studies and examining and determination of validity and reliability of these questionnaires may help scholars in this field.

METHODOLOGY

Research Method:

The research method is a descriptive type in measuring method, where doping behavior questionnaire validity and reliability measuring has been considered.

Participants:

The studied sample of this study includes 373 high school students (197 girls and 176 boys) of 1st, 2nd, 3rd and 4th grade classes in Pakdasht Township chosen in cluster sampling method and based on the four different educational levels. The statistical society of this study included all the young athletes of Pakdasht Township.

Measurement Instruments:

The used questionnaire is a certain part of planned behavior model elements in addition to variables out of this model. The part related to doping behavior measurement in this questionnaire [2] contained 20 questions. After being prepared, the questionnaires were assessed in terms of writing and after making good the errors and updating on prohibited substances and made ready for distribution removing some of the prohibited substances titles due to special cultural issues of the country.

This questionnaire asked the level of usage of young athletes of 20 PES prohibited by WADA within the 12 months ended as at conducting this study. Validity of questionnaire by calculation of Cronbach’s Alpha value was as per the following. Cronbach’s Alpha calculated in this study was ($\alpha = 0.858$). In order to answer each question, 5 answers were considered based on Likert 5-value scale (from zero score with “No, I don’t use” up to score 5 with “yes, I usually use”), which had to be answered. Therefore, the scope of score of this questionnaire was between 0 and 100. The higher gained score in this questionnaire by the tested subjects indicated high PES consumption, and vice-versa.

Statistical Methods:

Statistical methods in this study were both descriptive and inferential statistics. Mean, standard deviation, and frequency tables for summarizing and classifying the raw data were used in descriptive; and Cronbach's alpha was used in inferential statistics for calculating validity. Confirmatory factor analysis was used to test the validity of the questionnaire; and SPSS software (version 16) was used for data analysis.

Findings

1. Distribution of respondents in terms of gender and age status

As it may be seen in table 1, from total 373 people answered this question whose information is available, 176 (47%) were males and 197 (53%) were females. From amongst the sample's people, 157 (42%), 83 (22%), 86 (23%) and 47 (13%) were 15, 16, 17, and 18 years of age, respectively.

Table 1- distribution of respondents in terms of gender and age status

Status	Frequency (ppl.)	Frequency (%)	
Gender	Male	176	47.2
	Female	197	52.8
	Total	373	100.0
age	15 yrs	157	42.1
	16 yrs	83	22.3
	17 yrs	86	23.1
	18 yrs	47	12.6
	Total	373	100.0

2. Doping behavior variable descriptive statistics

As it is seen in table 2, doping behavior score has been situated in 1.00 and 3.45 interval and the relevant average value is also equal to 1.14 which indicates the doping behavior in this study exists in a relatively low level.

Table 2. Descriptive statistics in doping behavior variable

Variable	Summary	Min.	Max.	Avg.	STD
Doping behavior	BEH	1.00	3.45	1.1458	3.337

3. Studying doping behavior variable status

In order to examine the study variables status, statistical presumption test of the average of a society, or in other words, single-sample T test has been used, which in fast tested the difference between the studied sample averages with an expected value. It should be mentioned that whereas no certain guess may be made relating to study variables status, question and further double-sided average test have been used. For instance, it may be said how us the doping behavior status? The null hypothesis in behavior variable considering Likert 5-scale range is as per the following:

Hypotheses test:

H0 (null hypothesis) = 2.5μ

H1 (opposite hypothesis) ≠ 2.5 μ

Table 3 indicates the results interpretation and the last column shows the total status of variable in the present statistical society

Table 3- studying the behavior variable status in the present statistical sample (test value: avg.=3)

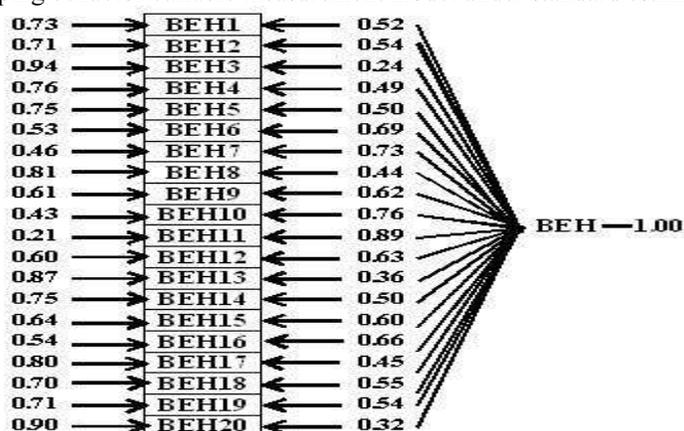
Study variable	SIG	T statistic	Average	Status
Doping behavior	0.00	-118.040	1.1458	Very low

4. Doping behavior confirmatory factor analysis

Figure 1 shows the doping behavior variables measuring model under standard estimation state. The model factor loads under such state show the level of effect of each of the variables and/or items in explanation and clarification of variable or main factor scores variance.

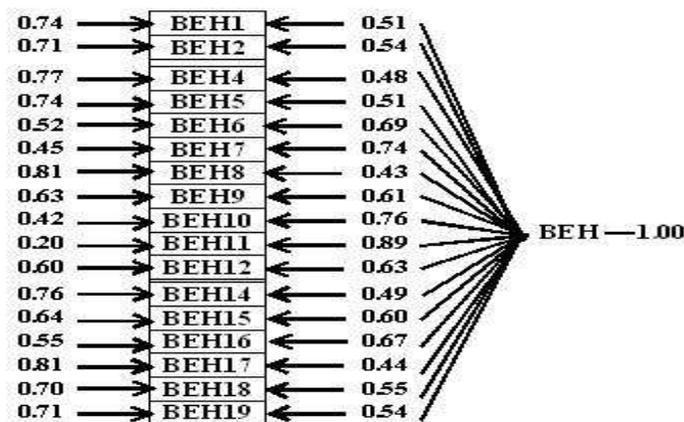
Considering figure 1, the factor loads of each of the study questions may be observed. For instance, first question factor load in terms of beliefs is 0.52. In other words, first question clarifies almost 27% of the variance in terms of beliefs. Also 0.73 is error value.

Fig. 1. doping behavior variable measurement model under standard estimation state



Considering the fact that the factor loads of BEH3, BEH13, BEH20 are less than 0.4, they were removed from the total questions and the measurement model has again been reported after removing the questions (fig. 2.)

Fig. 2. Attitude to doping variable measurement model under standard estimation state after removing questions



Confirmatory factor analysis indicators used in study:

The fitting indicators of the model for study variable were found as per table 4.

Table 4. Model fitting indicators of other study variables

Indicator	Found value
X ² / df	1.97
RMSEA	0.056
AGFI	0.89
GFI	0.92
NFI	0.93

5. Analysis and description of study variable in terms of demographic variables:

In order to study the role of study variables, the two societies' average tests and variance analysis have been used. In variance analysis, in case there is a meaningful different between the two groups, Tukey test has been used; otherwise, merely the groups' average has been presented.

Comparison of doping behavior variable in terms of gender and age:

Based on the conducted t-test of the two independent samples, it may be said that doping behavior variable has meaningful difference in terms of females and males. Meanwhile, based on the performed variance analysis, it may be said that doping behavior variable has meaningful difference in terms of age groups (table 5).

As variable average is shown in terms of gender and age status in table 5, the doping behavior variable average in 15-year people is more than other age groups.

Table 5- meaningful results and variable average of the study in terms of gender and age

Status	Sig	Study variable	Doping behavior
Age(yrs)	0.00	15	1.2322
		16	1.0705
		17	1.0948
		18	1.0840
Gender	0.00	Male	1.2188
		Female	1.0807

Discussion on the Present and Past Findings

Based on the study findings, PES consumption behavior measurement questionnaire has proper internal stability ($\alpha=0.858$). This finding was in conformity to studies conducted by Goulet, et al. [2], Barkoukis, et al. [10], Gucciardi, et al. [9], Manouchehri and Tojari [7], Minasian and Sarlak [17], Kashi, et al. [18], Halabchi, et al. [20], and Zelli, et al. [16], in the two assessments performed thereof, which the Cronbach's Alpha was reported as 0.9, 0.97, 0.7, 0.713, 0.74, 0.74, 0.72, 0.88 and 0.9, respectively.

Through comparing the questionnaires used in the studies, the doping behavior questionnaires may be classified into two general groups. The first group includes certain issues which question the participants doping behavior level are mainly questioned without mentioning the name of prohibited materials in general and the second group measure of the questionnaires measure the athletes' usage of each materials with a more detailed vision. The questionnaire used in this study was of the second type.

The test n determination the relationship between the items and doping behavior also indicated: there is a meaningful relationship among all items and variable (except for three cases of questions 2, 4, and 7) with doping behavior. Additionally, the results related to the fitting wellness test indicated that the indicators are under well status and in standard range, in a way that the values calculated for the AGFI, GFI and NFI wellness indicators are situated in standard values scope. Meanwhile, the calculated values for the badness indicators, X^2/df and RMSEA are also situated in standard values scope, which confirm the model suitability. Additionally, behavior questionnaire is sensitive to gender differences, in a way that doping behavior in young male and female athletes has meaningful differences. The total average behavior score in boys and girls were obtained as 1.22 and 1.08, respectively, while such issue are in conformity with the results of other studies; i.e. also in most of the other studies, the doping behavior of boys have been higher in comparison to girls. From amongst these studies, the one conducted by Minasian and Sarlak [17] may be mentioned.

The doping behavior among young athletes studied in difference age groups here (15~18 yrs) have meaningful differences with each other, while such issue is in conformity to the results of different studies, as through this comparison in Mata-Analysis method, the direct relationship of doping relation with age may be understood.

Conclusions

Doping has a quite long history, in a way that using different drugs and complementary substances to increase the physical performance and development of muscle volume have been observed and reported thousands years ago [1]. It seems that using PES is the reason of several abnormal behaviors and involvement with consumption of these materials depends on personal choice [2]. The data indicates that the population exposed to PES abuse risk include some of the athletes of various ages, and are quite more extensive than believable ratio in the past [3].

The findings of this study on doping behavior questionnaire validity and reliability have been obtained in an acceptable level, as in comparison with the reported values for the questionnaires used in other studies, not only lower values have not been obtained, but the same is exposed to considerable increase, for instance concerning Cronbach's Alpha. Examining the confirmatory factor analysis and the indicators related to the same, inter alia wellness and badness indicators, all show the standard nature of the values. Concerning the doping behavior and its relation with the age and gender conditions of young athletes also the obtained results were in conformity with the results reported for most the studied studies, i.e. there was a direct relationship between doping behavior level of age of young athletes; meanwhile, the behavior level in boys was meaningfully higher than the same in girls.

Therefore, it seems considering the results, first of all this questionnaire may be used in similar issues. Secondly, it is recommended considering the significant level of doping behavior in this age level, the authorities' attentions are attracted to more planning to render basis training to the students in younger ages through schools or families, and thirdly, it is suggested that the study is conducted in the this age group or even younger (secondary

school) and in different societies, so that by applying the relevant result we may observe decrease or even removal of this unwanted phenomenon from the field of sports.

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