



Development of Reference Point of Doping Attitude and Dispositions for Anti-Doping Education Notification of Athletes: Application of Reference Group Model

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Abstract

Background: We developed a reference point by applying a doping attitude and propensity tool to prevent doping in sports athletes.

Methods: Performance Enhancement Attitude Scale (PEAS) was investigated on 768 registered athletes with the Korea Sports Association. Independent sample *t*-test and ANOVA were applied to confirm the doping attitude and propensity according to anti-doping education and event type. To establish the criteria for PEAS, the intersection was confirmed through the group comparison method, and EasyOZ by Excel was applied at this time. In addition, accuracy, sensitivity, and specificity were calculated to confirm the validity of the reference point.

Results: First, in the case of anti-doping education, it was confirmed that more than 90% of the anti-doping education was completed in all sports. Second, there was no statistically significant difference in PEAS according to the type of sport, and there was only a difference in the PEAS according to whether or not anti-doping education was provided and whether or not there was anti-doping education. Third, the point of contact established in the group comparison method was 29.5 points, and as a result of validating the validity based on this, 30 points were found to be the most suitable index.

Conclusion: This study could be used as important information in that it suggests a different method for evaluating PEAS and establishes a reference point that can be used more effectively in the actual field.

Keywords: Athlete; Anti-doping education; Attitude; Sport

Introduction

In the field of sports, considerable efforts are being made to strengthen the ethics of athletes. Ethics is explained as the basic principles that humans must follow, and ethics is said to be the

basic behaviors to be followed in order to perform the game (1) for athletes. Representative examples in the sports field include match-fixing, sexual violence, and doping, which violate the



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sincerity and fairness emphasized in the sports field (2-6).

In particular, in the case of doping, many athletes from the past to the present have been using prohibited substances as a means to improve their performance. However, doping is against the spirit of sport, and one of the biggest reasons for banning doping is that it can cause fatal damage as well as death to athletes who practice doping. One example is the 1967 cyclist Tommy Simpson's death while racing after taking an amphetamine drug. For this reason, the International Olympic Committee (IOC) banned doping from the 1968 Winter and Summer Olympics, and the World Anti-Doping Agency (WADA) to prevent doping by sports athletes by classifying them (7). In addition, each country has established anti-doping committees and is carrying out efforts to ban doping through education and publicity about doping to athletes (8).

Despite these efforts, incidents and accidents related to doping continue to occur regardless of sport. This is due to the social atmosphere in sports field where the process is justified if victory is achieved. So cases of doping violations inevitably occur frequently. Doping knowledge and victory-oriented tendencies possessed by athletes are reported to have an effect on their thinking on doping (9), so the attitude towards doping may be an important factor for doping prevention.

Athletes are aware that taking prohibited substances based on their knowledge and belief in doping has a tolerant disposition to actually take banned substances as a decisive factor (10). Accordingly, the World Anti-Doping Agency is conducting sociological and behavioral research as well as biological research to prevent doping. Among them, for doping prevention, it is emerging as an important factor to check the attitude and disposition toward doping, and studies on doping attitude and disposition are continuously reported. The Performance Enhancement Attitude Scale (PEAS) (11) could be introduced as a tool to identify representative doping attitude and dispositions. PEAS is a survey tool that quantitatively measures the doping attitude and disposition

of elite athletes. PEAS conducted a study to confirm doping attitude and dispositions on U.S. and Hungarian university student athletes and coaches (12) and in Korea research on the doping attitude and predisposition for national athletes participating in Asian youth competitions has been reported.

PEAS is used to prevent doping in sports players, but the evaluation criteria are only performed relative to each other. That is, the PEAS is structured to respond on a 6-point scale, and the respondent's score ranges from at least 17 to 102. Also, in the interpretation of the score, the higher the score, the more generous the attitude and predisposition toward doping (4). Although comparative comparison is possible with this interpretation, if the purpose of PEAS is to prevent doping, then information on the absolute reference point is needed. Therefore, in order to provide warning notification for doping prevention through PEAS, it is necessary to set an absolute reference point for PEAS, and it is judged that the established reference point can be used as more effective information for doping prevention. Therefore, we aimed to provide a doping education notification by setting a reference point for PEAS.

Methods

Participants

Korean sports players were selected as the population, and it was counted as 130,357 people registered as athletes by the Korea Sports Association (Korea Sports Organization) in 2022 (Korea Sports Association, 2022). Therefore, in this study, when a confidence level of 95% and a sampling error of ± 4 was applied, the required number of cases is 597, and 800 people were planned as the initial sample in consideration of the data for refusal and insincerity. As a sampling method, a simple random sampling method was applied.

A survey was conducted for 800 people initially planned, and a total of 768 participants were selected in the final study, excluding data on

refusal to respond and insincerity. This corresponds to the standard error of $\pm 3.53\%$ of the 95% confidence interval for the population. If we look at the specific characteristics of the study participants, there were 521 men and 247 women, 515 in martial arts (taekwondo, judo, boxing, wrestling, etc.), 137 in record events (swimming, athletics, cycling, etc.), and net and ball sports (Volleyball, handball, badminton, tennis, etc.) 116 people were selected.

Research tool

The questionnaire used consisted of five questions on demographic characteristics, two questions on whether it was doping education and penalty, and seventeen questions on doping attitude and disposition. For the PEAS, a tool developed Petróczi (9) was translated into Korean (8). PEAS consists of a six-point Likert rating scale (strongly disagree 1 \rightarrow strongly agree 6), which ranges from a minimum of seventeen points to a maximum of 102 points. The PEAS tool is used in doping research to measure the degree of doping awareness among athletes, and it is reported as a highly reliable tool (Cronbach α : 0.8 or more in all studies) even when the language is translated and used (8, 9, 13, 14).

Group classification for doping attitude and disposition assessment

The reference point setting method, which is applied as an empirical method, was applied to establish a reference point for doping attitude and disposition evaluation (15). In the criterion group model, it is divided into a group that has reached the criterion and a group that has not reached the criterion. The two divided groups are a method of establishing a contact point based on the intersection point of the score distribution (16). Therefore, in this study, a standard for checking doping education notifications of athletes based on doping attitude and disposition was established. For this purpose, the group was selected through the following procedure. To establish a reference point of reference, a group of experts was selected and opinions were collected. The expert group consisted of two

measurement and evaluation experts and three sports and ethics experts. Various opinions were presented in the expert opinion, but the opinion that it was appropriate for the direction of this study to set the reference point by classifying groups according to whether or not doping education was in line with the purpose of this study was finally selected. Therefore, the intersection of the score distribution for the doping attitude and disposition of the two groups was confirmed by classifying the athletes who received doping education and those who did not.

Data processing method

The data processing method was as follows. First, descriptive statistics and cross-analysis were conducted to confirm the doping attitude and disposition of athletes. Second, in order to confirm the doping attitude and disposition according to the doping education status and the type of sport, the independent sample t-test and ANOVA were applied to verify the difference between groups. Third, the reference point was confirmed by applying the EasyOZ by Excel program to check the intersection point through the group comparison method. As a result of confirming the normal distribution assumption to analyze the parametric statistics, it was found that the skewness was less than .3 and the kurtosis was less than .8, assuming the normal distribution in all cases (17).

In addition, accuracy, sensitivity, and specificity were calculated to confirm the validity of the reference point. In this case, MS-Excel 2016 and SPSS Version 25.0 programs (IBM Corp., Armonk, NY, USA) were used for the applied programs, and all statistical significance levels were set to 0.05.

Ethics approval

Participants were only allowed to participate if they had a voluntary intention to participate after the research director explained the purpose and contents of the study. (Research ethics number: HR-012-01).

Results

Current status of doping education and penalty for athletes

The skewness and kurtosis of doping mindset and propensity according to doping education used in this study are as follows. The skewness of education completion was 2.16 and the kurtosis was 7.9, which satisfied the normality distribution in the criteria set by skewness 3 or less, kurtosis 8 or less. In addition, in the case of those who did not complete the education, the skewness was 1.5 and the kurtosis was 4.1, which was

found to be satisfactory. In addition, the skewness of the punishment group was 2.14 and the kurtosis was 7.7, and the non-recognition group had a skewness of 1.68 and a kurtosis of 5.38. Table 1 is the result of investigating whether doping education and penalty for each type of sport for athletes. Regarding doping education, it was confirmed that more than 90% of doping education was completed in all sports. On the other hand, in the results of whether penalty for doping is detected, the content of penalty was relatively unaware in combative sports, net and ball sports compared to athletics.

Table 1: Comparative analysis of doping education and penalty by sport type

<i>Sports</i>	<i>Doping education</i>		<i>Recognition of doping penalty</i>		
	N	%	N	%	
Combat sport	Yes	462	89.7	431	83.7
	No	53	10.3	84	16.3
Athletics	Yes	132	96.4	132	96.4
	No	5	3.6	5	3.6
net and ball sports	Yes	110	94.8	97	83.6
	No	6	5.2	19	16.4
Total	Yes	704	91.6	660	85.9
	No	64	8.4	108	14.1
			$\chi^2=8.036, df=2, p=.018$		
			$\chi^2=14.961, df=2, p=.001$		

Comparison of doping attitude and disposition for sports athletes by sport type

Table 2 is the result of analyzing the doping attitude and disposition of athletes by sport type. As a result of confirming the difference in doping attitude and disposition according to the type of

event, there was no statistically significant difference with $F=1.703$ and $P=.183$. Therefore, there was no need to present a reference point for performing a doping attitude and disposition for each sport type to provide a doping education notification.

Table 2: Comparison and analysis of doping mindsets and propensities by sport type

<i>Sports</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>P</i>
Combat sports	515	28.65	12.41	1.703	.183
Athletics	137	27.85	11.47		
Net and Ball sports	116	26.44	9.87		

Comparison of doping attitude and disposition propensity according to whether it is doping education and punishment of sports players

Table 3 is the result of analyzing the doping attitude and disposition of sports athletes according to whether they are doping education

and punishment. As a result, there was a statistically significant difference ($t=2.140$, $P=.033$) in doping attitude and disposition depending on whether or not doping education was present. Looking at the average value, the group who completed education was 27.9,

indicating a lower average than the group without education (31.2). On the other hand, there was no statistically significant difference depending on whether or not a punishment was imposed

upon detection of doping. Therefore, in this study, reference standards were established based on whether or not doping education was present.

Table 3: Comparative analysis of doping attitude and disposition according to whether it is doping education and punishment

<i>Division</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>P</i>	
Doping education	Education complete	704	27.9	11.8	2.140	.033
	Education incomplete	64	31.2	12.4		
Recognition of doping penalty	Penalty recognised	660	28.1	12.0	.365	.715
	Penalty unrecognised	108	28.5	11.0		

Establishment of reference standards and validation of validity for notification of doping education for athletes: Applying the Doping attitude and disposition Tool

A reference point was established for the evaluation of the doping attitude and disposition of athletes. As a reference point, the group comparison method was applied, and the group was divided into a doping education group and a doping non-educational group to establish a point of contact. As a result, the point set as the contact point was 29.5

points (Fig. 1), and to verify the validity of this point, the validity was verified by considering the scores for 28 points, 29 points, and 30 points. Validity was verified based on accuracy, sensitivity, and specificity, and as a result, the standard value of 30 points (acc: 0.66, sen: 0.68, spe: 0.42) had the highest validity index. Therefore, the reference point for providing educational notifications based on the doping attitude and disposition of athletes was set at 30 (Table 4).

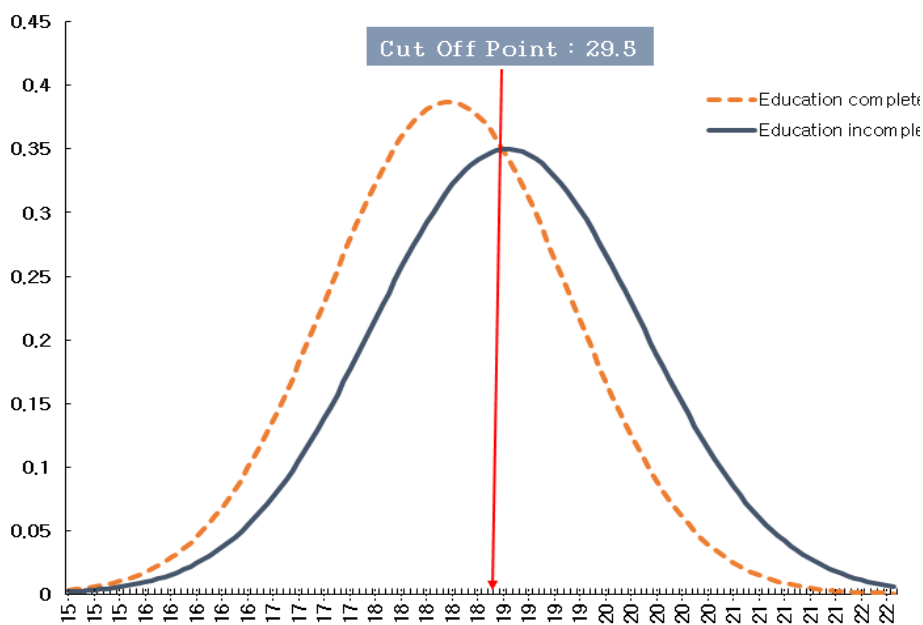


Fig. 1: Doping attitude and disposition reference point setting applying the comparative group method

Table 4: Doping attitude and disposition standard setting and validity verification (group classification based on doping education)

<i>Contact value</i>	<i>Validity index</i>			
	<i>Reference value</i>	<i>Accuracy</i>	<i>Sensitivity</i>	<i>Specificity</i>
29.5	28	0.61	0.61	0.51
	29	0.64	0.65	0.48
	30	0.66	0.68	0.42

Discussion

A reference point was established for the evaluation of the doping attitude and disposition of athletes. In the sports field, institutions and researchers have drawn considerable interest to ban doping. In order to prevent doping, studies on doping awareness, actual conditions, thinking styles, and tendencies are continuously being conducted (18-21). In particular, in studies investigating the PEAS of athletes, most of them were carried out to the extent of diagnosing the athletes' doping awareness, so there were inevitably limitations. Therefore, in this study, a reference point was established to provide educational notifications for doping prevention based on PEAS. First, it was checked whether it was doping education and penalty according to the type of sport. In the case of doping education, it was surveyed that more than 90% of all completed the education, and about 83% or more were aware of whether it was a penalty in case of doping detection. In the case of Korea, regular doping education is being conducted, so it can be interpreted that athletes are highly aware of doping education and penalty. A difference test was conducted to check whether it was necessary to set the reference point for PEAS by item type. There was no statistically significant difference in PEAS by stock type. However, depending on the event type, it was found that the PEAS score was higher in speculation and record events than in net and ball sports. Previous studies also reported that speed and power sports, that is, record and speculation sports, showed higher PEAS than group sports, confirming similar results to this result (20, 22-

24). In addition, in providing the doping education notification, the reference point setting was selected through PEAS according to whether it was doping education or not. PEAS differed only in the presence of doping education, so the group for setting the criteria was selected by doping education or not.

Applying the group comparison method according to the presence of doping education, it was confirmed that it was 3.3 higher than the group without education (M: 31.2) than the group with education (M: 27.9), and based on this, the reference point was set to 30. As a result of examining PEAS in the previous study, the number of Irish athletes was 31.15, Canada 24.67, United States 24.53, and Hungary 22.53, which are reported to be lower than the reference point set in this study in all countries except Ireland (9, 11). In most countries, it appears to have a value between 20 and early 30, but it is interpreted that there is a difference in PEAS value depending on the country.

Practical contents based on the results of this study are as follows. First, The reference point of PEAS presented in this study will have a significant meaning in evaluating athletes through the reference point as well as the high and low PEAS scores of athletes in evaluating the doping mindset and propensity. Second, it will inevitably be an important factor in providing doping education notification to athletes through the evaluation reference point. This can be used as basic data for athletes to recognize the degree of doping awareness and at the same time confirm the point of view on education. Also, since the importance of education is being emphasized for anti-doping (9, 25-28), if the results of this study

are used together, they will be able to be used as meaningful data in the actual field.

This result is a study that established a reference point by conducting on Korean players, so foreign players should also be considered in the future. In addition, it is judged that more specific information could have been calculated if the criteria for selecting educational notifications had been subdivided into multiple sections (3 or more) rather than dichotomous (education required, no education required). Nevertheless, it is judged that this study can be used as important information in that it suggests a different method for evaluating PEAS and establishes a reference point that can be used more effectively in the actual field. There for based on this study, we suggest an appropriate reference point is established by examining the PEAS for the athletes of each country in future research.

Conclusion

This study developed a reference point by applying a doping attitude and propensity tool to prevent doping in sports athletes. First, in the case of anti-doping education, it was confirmed that more than 90% of the anti-doping education was completed in all sports, and in the result of whether doping is a penalty in case of doping detection, there was a relatively higher level of penalty in combat sports, net and ball sports than in recorded sports. Appeared to be unaware of the content. Second, there was no statistically significant difference in PEAS according to the type of sport, and there was only a difference in the PEAS according to whether or not anti-doping education was provided and whether or not there was anti-doping education. Third, the point of contact established in the group comparison method was 29.5 points, and validating the validity based on this, 30 points the most suitable index.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interests.

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