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Elite level athletes' perspective on prohibited substances for performance enhancement: A cross-sectional study

Mehmet Gülü [a] *, Hakan Yapıcı [b]

[a,b] *Kırıkkale University, Yahsihan, Kirikkale and 71450, Turkiye*

Abstract

The aim of this research was to explore the attitudes of elite athletes towards performance enhancement through banned substances. In this study, survey model, which is one of the quantitative research methods, was used. Purposive sampling method was used in the data collection process. Participants consisted of a sample group of elite athletes (n = 418: 49.3% female, 50.7% male;). Participants answered questions about sociodemographic characteristics as well as performance enhancement attitudes. A performance enhancement attitude scale was used to determine the participants' attitudes towards performance enhancement. Data were analyzed using SPSS Version 22.0 (IBM Corp., Armonk, NY, USA). Elite level athletes participating in the study were found to have low use of prohibited substances for performance enhancement. There was no difference between the attitudes of the participants to increase their performance according to their gender and educational status. Participation of the participants in individual or team sports did not lead to a difference between their performance enhancement attitudes. It was found that as the duration of being a national athlete of the participants in the study increased, their attitudes towards using prohibited substances for performance enhancement increased. From the point of view of elite athletes, the use of banned substances for performance enhancement was found to be low. However, as the duration of being an elite athlete increases, it has been found that the attitude towards the use of banned substances for performance enhancement increases. Policies should be developed to discourage elite athletes from using banned substances. Coaches and managers need to correctly manage success strategies at all levels of sports.

Keywords: Doping, athletic performance, performance enhancement, banned substance

1. Introduction

The growth of the sports industry and increasing competition have made doping a serious problem and a complex phenomenon in sports (Hall, 2006; Petroczi & Strauss, 2015; Tutar et al., 2015; Gürkan et al.,2019; Akoğlu et al.,2019; Ayyildiz 2021). In addition, with the increase in competition, various training methods have been developed for athletes to show the highest performance in the competition (Gülü and Doğan.,2021; Güçlüöver et al.,2012). However, athletes can also apply to illegal performance-enhancing substances in addition to the improvement provided by training. The World Anti-Doping

* Corresponding author name. ORCID ID.: https://orcid.org/0000-0001-7633-7900
E-mail address: mehmetgulu@kku.edu.tr

Agency (WADA) defined doping as the use of illegal performance enhancing substances (PES) and methods of improving performance (Arandjelović, 2015; Petróczi & Haugen, 2012). Performance enhancing substances are defined as substances that trigger behavior change, arousal and/or pain perception. These substances used to improve performance; stimulants, anabolic androgen steroids, erythropoietin, human growth hormone or diuretics (Medicine & Fitness, 2005). Most doping applications stem from abuse of drugs used to treat illnesses. Great progress in scientific medicine production technologies has been observed. However, the purpose of using these advances should not be improving the performance of athletes. This practice also appears in gene doping. Therefore, considering the possibility of gene doping, WADA and other international sports organizations, give priority to this issue in doping research. Gene doping was added to the list of prohibited substances and methods for athletes, published in 2003 (Gümüşdağ et all., 2013).

There are three main reasons why the use of PES in sports is prohibited by both men and women: First, the use of prohibited substances can lead to deterioration of physical and mental illness (Horwitz et al., 2019; Nieschlag & Vorona, 2015). In addition, PES use is linked to heart disease, mental health disorders, diabetes, cancer, virilization in women and androgen deficiency in men (Bagge et al., 2017; Bird et al., 2016; La Gerche & Brosnan, 2017; Lucidi et al., 2017). Second, the use of PES renders the sport unfair by providing an unethical advantage to the athlete. Third, male and female athletes are considered role models in society, and their use of PESs may encourage early career young athletes to use such substances (Holt et al., 2009; WADA, 2015). In order to cope with these emerging situations and to prevent unfair competition in sports, a multifunctional anti-doping system has been established to detect, deter and prevent doping (Gleaves & Christiansen, 2019).

WADA established an online tracking system for athletes in 2005 to prevent the use of performance-enhancing substances. In this system, elite athletes must always report their daily where abouts for non-competition testing (Hanstad & Loland, 2009; Møller, 2011). However, while the system was viewed positively by some athletes (Overbye & Wagner, 2014; Valkenburg et al., 2014), some prominent athletes also criticized it (Efverström et al., 2016). In addition, research on behavioral factors to prevent doping use has gained momentum.

The use of substances that enhance athletic performance is affected by several factors (Petroczi & Strauss, 2015). The current detection-based policy is insufficient to eliminate the prohibited use of PES (Haugen et al., 2013). Various factors such as representation, knowledge, attitude, personality and motivation have a great effect on the transformation of normative behavior into deviant behavior (Hauw & Mohamed, 2015). Psychosocial approaches and attitudes are considered as an indicator of doping behavior (Morente-Sánchez & Zabala, 2013). Additionally, a recent study reported that positive attitudes towards PES use were strongly associated with PES use intentions and behaviors (Ntoumanis et al., 2014).

Determining the psychological mechanisms underlying doping use is one of the important factors for an effective struggle against doping (Petróczi et al., 2011). PES use intention is an important predictor of doping use behavior in competitive adolescent athletes (Mudrak et al., 2018). A study reported that sub-elite athletes, amateur athletes and competitive adolescents use PES as increasing athletic performance and im-proving physical appearance (Henning & Dimeo, 2018; Lazuras et al., 2017). However, studies report that athletes can be influenced by trainers in favor of and against the use of PES (Erickson et al., 2015; Goulet et al., 2010; Laure et al., 2001). A study of elite athletes in Ugandan found that admitted use of PES was low (Muwonge et al., 2015). According to the self-reports of the athletes, the literature results reported the deliberate use of PES in elite athletes in the range of 14% to 39% (De Hon et al., 2015). Recent studies using indirect methods have reported higher per-centages (20%-57%) (Ulrich et al., 2018).

According to the results of the research, the rate of positive doping results in Olympic level athletes between 1987 and 2013 is between 0.96% and 2.45% (De Hon et al., 2015). Many studies showed that attitude is the most important predictor of PES use, followed by perceived behavioral control and morality (Alaranta et al., 2006; Lucidi et al., 2004; Lucidi et al., 2008; Petróczi, 2007; Petróczi & Aidman, 2009; Wiefferink et al., 2008). It was determined that athletes who are familiar with PES and continue to use PES have positive past and present attitudes and are more likely to repeat it in competitive athletes and amateur fitness (Ajzen, 2002; Armitage & Conner, 2001; Dunn et al., 2009; Lazuras et al., 2010; Wiefferink et al., 2008). Understanding an athlete's knowledge, attitude, and practices of PES is crucial to developing anti-doping strategies. In this context, it is necessary to evaluate attitudes and tendencies to predict and determine doping behavior in elite athletes. Following all of the above and considering the lack of studies on PES use in elite athletes in Turkey, the aim of this study was to explore the attitudes of elite Turkish athletes towards performance enhancement through banned substances.

2. Method

2.1. Research design

In this study, quantitative research methods scanning model was used (Karasar, 2016). Purposive sampling method was used in the data collection process. Volunteers who agreed to participate in the study after reading the informed consent form about the study completed the online Performance enhancement attitude scale.

2.2. Participants

The research group consists of 418 elite level athletes in Turkey. Sample size was calculated using G*power software (version 3.0.1) with a correlation ρH1= 0.70, α err prob=0.05, power= 0.95, correlation ρH0=0.80 resulting in an estimated sample size of

minimum 205 participants (Faul et al., 2007). Inclusion criteria of the research: Top level athletes over the age of 18, fluent in Turkish, currently residing in Turkey and ac-tively participating in national teams, participating in international organizations in the 2021 and 2022 seasons were included. Participants were contacted by e-mail and face-to-face verbal information about the research. Participants who wanted to with-draw from the study left the study without completing the scale.

2.3. Data Collection Method

The data collection method consists of two parts: In the first part, the participants filled out a personal information form consisting of questions about age, education level, national team experience, gender and sports event categories, and sports events were categorized as follows speed and power, endurance, individual and team (Alaranta et al., 2006). For some events whose categories were unclear, a senior coach of each discipline was consulted and asked to select the categories (Moran et al., 2008). The speed and power category is athletics, weightlifting, taekwondo, judo, etc., while the endurance category is swimming and athletics (distance running); in individual categories, tennis, fencing, badminton, etc.; and team category, handball, hockey, football, volleyball, rugby, basketball etc. took place. In the second part, there is a 6-point Likert type scale consisting of 17 questions, (strongly disagree (1), strongly agree (6), and no neutral, middle point) developed by Petroczi and Aidman, 2009 and adapted into Turkish by Yıldız and Toros 2018. The score range of the scale is between 17 and 102. A high score indicates that the performance enhancement attitude is positive, and a low score indicates that the performance enhancement attitude is negative, the theoretical middle-point was 59.5 (Petróczi & Aidman, 2009). According to previous studies, the Cronbach's alpha values for performance enhancement scale (PEAS) range from 0.71 to 0.91 (Kim & Kim, 2017; Moran et al., 2008; Muwonge et al., 2015; Petróczi & Aidman, 2009) and in this study, the Cronbach's alpha values were 0.88.

2.4. Statistical analysis

The mean and standard deviation values of the data were calculated. "Kolmogorov Smirnov test" was applied whether the data showed normal distribution or not. Standard deviation, arithmetic mean and t test for independent samples were used for the variables of the participants' gender and branch type. ANOVA Post-Hoc (Tukey) test was used to examine the differences between education and sports experience, since parametric assumptions were satisfied. The significance level was specified as 0.05. Data SPSS 22 Version 22.0. (IBM Corp., Armonk, NY, USA).

3. Results

Elite level athletes participating in the study were found to have low use of prohibited substances for performance enhancement. There was no difference between the attitudes of the participants to increase their performance according to their gender and educational status. Participation of the participants in individual or team sports did not lead to a difference between their performance-enhancement attitudes. It was found that as the duration of being a national athlete of the participants in the study increased, their attitudes towards using prohibited substances for performance-enhancement increased.

Table 1. Frequency and percentage distributions of elite athletes by sport event category and gender

Characteristic	**n**	**%**
Total number of participants	418	100
Gender		
Male	206	49.3
Female	212	50.7
Educational status		
High school	133	31.8
College student	187	44.7
Graduated from a College	98	23.4
Sport event category		
Individual Sports	137	35.9
Team Sports	281	64.1
National team experience		
1-3 year	157	37.6
4-7 year	149	35.6
8-11 year	65	15.6
12-15 year	34	8.1
16 and over	13	3.1

Table 2. Sport event category

Individual Sports	**N=281**	**%**	**Team Sports**	**N=137**	**%**
Athletics	24	5.7	Volleyball	33	7.9
Kickboxing	10	2.4	Football	27	6.4
Swimming	15	3.6	Basketball	16	3.8
Tennis	13	3.1	Handball	50	11.9
Taekwondo	20	14.6	Hockey	1	0.2
Archery	2	0.5	Rugby	10	2.4
Badminton	55	13.1			
Dart-Bocce	17	4.1			
Boxing	9	2.1			
Wrestling	21	9.8			
Karate	13	3.1			
Budokaido	9	2.1			
Judo	4	1.0			
Weightlifting	26	6.2			
Table Tennis	7	1.7			
Kung fu	1	0.2			
Gymnastics	7	1.7			
Muay thai	13	3.1			
Wushu	15	3.6			

Table 3. PES Attitudes based on Gender and Sports Event Categories

Variables		**n=418**	**PEAS**	**t (p)**	**η²**
Gender	Female	212 (50.7)	37.2±13.7	t_{416}=-0.668	0.1
	Male	206 (49.3)	36.3±13.1	p=0.504	52
Sports event categories	Speed & power	225 (53.8)	36.7±13.2	t_{416}= -0.035	0.1
	Endurance	193 (46.2)	36.8±13.7	p = 0.972	19
	Team Sport	281 (64.1)	36.9±12.9	t_{416}= 0.208	0.0
	Individual Sport	137 (35.9)	36.6±13.6	p = 0.836	99

PEAS Performance Enhancement Attitude Scale *p < 0.05

Table 3 showed that there was no significant difference between the PES attitudes of male and female participants. No difference was found between the PES attitudes of speed and power athletes and endurance athletes. In addition, there was no statistical difference between the PES attitudes of the participants in individual and team sports.

Table 4. Distribution of anova test results showing the change of PEAS scores of elite athletes according to educational status

Educational status	**High school**	**College student**	**Graduated from a College**	**Anova**		
PEAS scores	**(n=133)**	**(n=187)**	**(n=98)**	**p-value**	**Tukey**	**η²**
	35.93±13.49	37.56±13.33	36.38±13.60	0.539	---	0.130
PEAS scores (Male)	**(n=69)**	**(n=87)**	**(n=50)**			
	36.52±13.13	37.03±13.59	38.49±15.01	0.738	---	0.210
PEAS scores (Female)	**(n=64)**	**(n=100)**	**(n=48)**			
	35.31±13.96	38.02±13.15	34.19±11.72	0.191	---	0.169

Table 4 showed that the PEAS scores of elite athletes do not differ significantly according to the educational status variable.

Table 5. Distribution of anova test results showing the change of PEAS scores of elite athletes according to their national team experience

NTE	1-3 year	4-7 year	8-11 year	12-15 year	16 and above	Anova		
PEAS scores	**(n=133)**	**(n=127)**	**(n=156)**	**(n=1)**	**(n=1)**	**p-value**	**Tukey**	**η²**
	32.03±10.90	35.01±10.82	42.20±15.39	33.00	46.00	**0.001**	**5>3>2>1=4**	0.198
PEAS	**(n=63)**	**(n=63)**	**(n=80)**	**(n=0)**	**(n=0)**			
(Male)	34.06±11.64	35.95±10.96	40.69±16.38	-	-	**0.001**	**3>1=2**	0.295
PEAS	**(n=70)**	**(n=64)**	**(n=76)**	**(n=1)**	**(n=1)**			
(Female)	30.20±9.91	34.09±10.70	43.79±14.21	33.00	46.00	**0.001**	**5>3>2>4>1**	0.318

NTE=National team experience

Table 5 showed that the PEAS scores of elite athletes vary according to their national team experience. It was found that PEAS scores increased as the national team experience increased.

Table 6. PES Attitudes based on Gender and Sports Event Categories

	Gender	Sports event categories	PEAS	t (p)	η²
PEAS scores	Male (n=122)	Speed & power	36.1±13.4	t_{204}=-1.385	0.291
	Male (n=84)	Endurance	38.8±14.0	p=0.167	
	Female (n=103)	Speed & power	37.5±12.9	t_{210}= 1.251	0.195
	Female (n=109)	Endurance	35.2±13.3	p = 0.212	
	Male (n=80)	Team Sport	36.5±12.9	t_{204}=-0.593	0.208
	Male (n=126)	Individual Sport	37.7±14.1	p=0.204	
	Female (n=57)	Team Sport	37.6±13.1	t_{210}= 0.859	0.220
	Female (n=155)	Individual Sport	35.9±13.1	p = 0.391	

Table 7. PES Attitudes based on Gender and Sports Event Categorie

	Gender	**Sports event categories**	**PEAS**	**t (p)**	**η²**
PEAS scores	Male (n=122)	Speed & power	36.1±13.5	t_{223}=-0.781	0.256
	Female (n=103)		37.5±12.9	p=0.436	
	Male (n=84)	Endurance	38.8±14.1	t_{191}= -1.801	0.314
	Female (n=109)		35.2±13.3	p = 0.73	
	Male (n=80)	Team Sport	36.5±12.9	t_{135}=-0.593	0.317
	Male (n=57)		37.6±13.1	p=0.622	
	Female (n=126)	Individual Sport	37.7±14.3	t_{279}= -1.098	0.213
	Female (n=155)		35.9±13.1	p = 0.279	

4. Discussion

The aim of this study was to explore the attitudes of elite Turkish athletes towards performance enhancement through banned substances. Elite level athletes participating in the study were found to be low in the use of prohibited substances for performance enhancement. There was no difference between the PES usage attitudes of the partici pants according to gender and education level. Participation of the participants in in dividual or team sports did not lead to a difference between their performance enhancement attitudes. It was found that as the experience of being a national athlete of the athletes included in the research increased, their PES usage attitudes increased.

Studies have reported that the PES usage behaviors of elite athletes show a low tendency (Morente-Sánchez & Zabala, 2013; Muwonge et al., 2015). A similar study by Allen et al. reported that elite athletes were against the use of PES to improve their performance (Allen et al., 2015). These results were in parallel with our findings. However, another study of Greek athletes reported that a significant number of athletes appeared to be positive about PES use (Psouni et al., 2015). Another study reported the use of PES by young Croatian amateur athletes (Miskulin et al., 2021). The use of PES may be caused by factors such as the desire to achieve success quickly, especially in young people, and the lack of sufficient information about prohibited substances and possible damage to health.

In one study, the authors reported that athletes who played sports for one to five years were more tendency to PES use (Miskulin et al., 2021). This can be explained by the fact that those who do sports for a shorter period of time are less competitive than those who do sports for a longer time. However, as a result of a research, it has been

deter-mined that the athletes who have high competitive experience, international competi-tion experience, doping sanction and PES-related knowledge have low tendency to-wards PES (Yalçınkaya, 2016). In another study, no relationship was found between the experience of doing sports, the experience in the national team and the tendency to use PES (Karaca, 2018). The differences in the results of the research may have differed ac-cording to the sports event requirements, the country factor, informative educations on doping use, and suspension from competitions.

Contrary to research findings in Korean athletes (Kim & Kim, 2017), this study did not show statistically significant differences in overall attitudes towards PES use be-tween individual and team sports athletes. In a study similar to our findings, there was no difference in attitudes towards PES use between individual and team sports (Miskulin et al., 2021). In a study, no difference was found between the PES usage atti-tude scores of speed and power events athletes and endurance events athletes. The fact that there is no difference between the attitudes towards performance enhancement among sports events may be due to the fact that the needs of each sport events differ, and that the main goals such as competition and achievement have common points.

This study found no statistically significant difference in PES use attitudes in men and women; While this finding is in line with the results of studies conducted in Ugandan, Spanish, Korean and Danish athletes, studies conducted in Polish and Greek male athletes reported that male athletes tend to use PES more than females in PES use attitudes (Karaca, 2018; Kim & Kim, 2017; Morente-Sánchez et al., 2014; Muwonge et al., 2015; Psouni et al., 2015; Sas-Nowosielski & Budzisz, 2018). Another study found that female athletes were more tendency to PES use (Miskulin et al., 2021). Differences in research results are probably due to factors such as cultural difference, coach effect, etc.

Limitations of this research, the research was carried out according to the reports of the athletes, but the answers and thoughts of the athletes may differ. Only elite level athletes were included in this study. More in-depth results could have been obtained if the athletes competing in a sport as an amateur were included in the research. Attitudes towards PES were evaluated in the study, and the use of PES was not directly measured. In addition, we could not identify the underlying causes of doping use in this study, but preventive programs will be more effective when we correctly identify the main factor underlying the athletes' tendency to doping.

5. Conclusions

This research uncovered some important new findings. From an anti-doping per-spective, it is also important to understand more deeply the beliefs of athletes in their attitudes and decisions towards PES use. The most important result of this research is that elite athletes in Turkey have low attitudes towards PES. The gender variable did not have an effect on attitudes towards doping use. Participation in the individual, team, endurance and speed and power events did not lead to a difference in attitudes towards

PES use. However, as the experience of the national team increases, the attitude towards the use of PES tends to increase. Considering our research findings, anti-doping programs should be expanded. Athletes should be given in-depth educational seminars on doping at certain intervals, especially in the beginning of their careers. In addition, policies to prevent doping should be developed.

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