

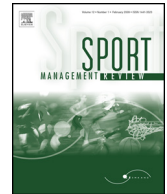


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Evaluation of an anti-doping intervention for adolescents: Findings from a school-based study

Vassilis Barkoukis^{a,*}, Katerina Kartali^a, Lambros Lazuras^b,
Haralambos Tsorbatzoudis^a

^a Department of Physical Education and Sport Science, Aristotle University of Thessaloniki, Greece

^b Department of Psychology, Sociology & Politics, Sheffield Hallam University, UK

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ABSTRACT

The present study investigated the effectiveness of a school-based intervention in promoting an anti-doping culture in adolescents. Participants were 218 high school students attending Health Education programs in Greek secondary education. Students completed a questionnaire including measures of attitudes towards nutritional supplement and doping use, social norms and norm salience, and values and harms of sport. The intervention consisted of 10 teaching units focusing on the health, moral, social and psychological aspects of nutritional supplement and doping use. The results showed that intervention group participants reported significantly weaker attitudes towards doping use, and increased norm salience. Health was ranked as the most important value of sport in both intervention and control groups, and doping use was ranked as the most important threat to the integrity of sport in the intervention group. The findings are discussed with respect to policy making and the role of school-based interventions in promoting an anti-doping culture in young people.

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The use of illegal performance enhancement substances (PES) to improve athletic performance is a major problem in contemporary sports and a large body of evidence has shown that the abuse of prohibited PES (i.e., doping), like androgenic anabolic steroids, is evidenced across all levels, amateur and competitive/elite sports, and is likely to inflict people as young as 12 years old (Dunn & White, 2011; Lucidi et al., 2008; Petroczi, 2007). Interventions are needed to prevent doping use in sports, and the focal point of anti-doping campaigns and related initiatives is usually athletes and their entourage (e.g., coaches). The ATLAS (Adolescents Training and Learning to Avoid Steroids; see Goldberg & Elliot, 2005; Goldberg et al., 1996, 2000) and ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives; see Elliot et al., 2008; Goldberg & Elliot, 2005) are two gender-based interventions that were designed to prevent the use of chemically-assisted performance enhancement, including both legal and illegal PES. These interventions were peer-led and coach-facilitated, and delivered through a series of lectures where female and male athletes were differentially targeted (e.g., emphasis on muscularity was given to male participants, whereas the drive for thinness was addressed among females). Target groups received information about the side effects of doping use, the risks involved in the excessive and careless use of legal PES, as well as the

* Corresponding author at: Department of Physical Education and Sport Science, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece. Tel.: +30 6945415797; fax: +30 2310992171.

E-mail address: bark@phed.auth.gr (V. Barkoukis).

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alternative and more legitimate performance enhancement methods (e.g., dieting and training regimes; Bahrke, 2012; Goldberg & Elliot, 2005).

A recent meta-analysis of experimental studies using the ATLAS/ATHENA programs found that, although there were significant but small effects on doping intentions, there were no effects on doping use in follow-up measures (Ntoumanis, Ng, Barkoukis, & Backhouse, 2014). A potential explanation was that ATLAS/ATHENA adopted a wider health promotion perspective and tackled a wide range of other health behaviors (e.g., eating patterns and nutrition, tobacco and alcohol use) alongside PES use. Accordingly, ATLAS and ATHENA were developed 20 years ago, and their content may be missing the most recent developments in PES use research. This signifies the need for more updated interventions that will have a clearer focus on PES use, and utilize state-of-the-art research on the psychosocial risk factors for PES use.

1. Anti-doping interventions outside sports settings: The roles of values, public attitudes and social norms

There is a need to fight doping at grassroots levels, and implement anti-doping interventions involving wider social groups (e.g., amateur athletes), inside and outside typical sports settings, such as schools. Two main reasons justify the need for such an approach. Firstly, doping use tends to be disproportionately higher in non-athletes than among athletes (Wanjek, Rosendahl, Strauss, & Gabriel, 2007), and adolescents tend to be more susceptible to PES use (Dunn & White, 2011; Petroczi, 2007); thus, implying that doping is an emerging public health issue, and not just a concern limited to the sports community. Secondly, sporting values in the social context can shape social norms towards doping and accordingly explain the formation of both public and individual (athlete) attitudes towards doping use. In support of this argument, Smith and Stewart (2010) found that values about sports shaped sporting culture, which then shaped attitudes towards doping use in sports among athletes. Values about sports, including values related to doping use in sports, may be formed early in life, and endure to shape concomitant attitudes and behavioral tendencies at later stages. Thus, by targeting values about sports, interventions could be effective in preventing the formation of pro-doping beliefs (e.g., that doping use is common practice in sports), and accordingly, making doping less acceptable among sports consumers. This argument is supported by Petroczi and Aidman (2008), who argued that values of sports may represent both systemic and situational factors that can inhibit (or facilitate) the use of PES.

The anti-doping code issued by WADA recognizes 11 attributes that represent the essential values of the Spirit or Sports: ethics, fair play and honesty; health; excellence in performance; character and education; fun and joy; teamwork; dedication and commitment; respect for rules and laws; respect for the self and other participants; courage; community and solidarity. Mazanov, Huybers, and Connor (2012) used the best-worst scaling (BWS) approach to assess how the general public prioritized these attributes, and found that ethics, fair play, and honesty topped the list. Further on, Connor, Huybers and Mazanov (2011) identified 16 attributes that harm the integrity of sports, including doping use, alcohol and illicit drugs use, athlete misconduct (on and off-field), fan misconduct, corruption, emphasis on winning, exploitation of athletes, big business in sport, legal betting, preferential government funding of certain sports, lack of diversity in sport exposure and participation, media reporting of sport, gap between sport technology and the rules of sport, and mixing politics and sport. By applying the BWS approach, Connor et al. (2011) showed that doping, illicit drug use and corruption were the most prominent threats to the integrity of sports, and further argued that interventions aimed at developing an anti-doping culture should target the prioritization of both the essential values/attributes of sports, as well as the threats of the integrity of sports.

In addition to values, public attitudes and emergent social norms towards doping should also be considered in the design of anti-doping interventions (Moston, Engelberg, & Skinner, 2015; Moston, Skinner, & Engelberg, 2012). There is ample evidence showing that public attitudes towards regulatory policies, ranging from tobacco use in public places (e.g., Hyland et al., 2009) to pro-environmental action (Jones & Eiser, 2010), can shape actual implementation of these policies. In the context of doping, one key success indicator of anti-doping policy is the public's awareness and attitudes towards doping (Stamm, Lamprecht, Kamber, Marti, & Mahler, 2008). To illustrate this point, Schneider (2006) made a case about public attitudes and anti-doping values in relation to the Tour de France. She argued that, to successfully promote an anti-doping culture in the Tour, public attitudes towards doping should be congruent with the (anti-doping) attitudes of officials and policy-makers.

Finally, cultural beliefs and expectations shape social norms towards the issue in question (Flay, Snyder, & Petraitis, 2009), and a growing body of research has shown that behavior is guided by perception of social norms, such as the perceived popularity or prevalence of a given behavior (Lapinski & Rimal, 2005). Persuasive campaigns often utilize the power of social norms to shape behavioral tendencies in a variety of domains, from pro-environmental action to reducing substance use in youth populations (Cialdini, 2003; Perkins, 2003). In the context of doping use, several studies have shown that social norms directly influence both intentions and actual doping use in athletes and non-athlete populations, across age groups (e.g., Lazuras, Barkoukis, Rodafinos, & Tzorbatzoudis, 2010; Lucidi et al., 2008; Ntoumanis et al., 2014; Wiefferink, Detmar, Coumans, Vogels, & Paulussen, 2008).

2. The present study

Recognizing the need for an empirically updated anti-doping campaign outside the sports setting, as well as the role of sport values, public attitudes and social norms towards doping use in sports, the present study was concerned with the

implementation and evaluation of a school-based anti-doping intervention. The aim of the intervention was to change adolescents' beliefs about the use of legal PES and doping use in sports, by targeting their values about sports (e.g., the importance of values and identification of threats to those values), social norms (e.g., perceived prevalence of PES use in athletes), and attitudes towards PES use (e.g., how they evaluate athletes' use of PES). Firstly, there is growing evidence from both athletes and non-athletes that beliefs about the behavior of others can be diagnostic of one's own behavioral tendencies and actual behavior with respect to doping use; for instance, prevalence estimates of doping use can be used as indirect proxy measures of one's own doping intentions and behavior (Petroczi, Mazanov, Nepusz, Backhouse, & Naughton, 2008; Uvacek et al., 2011). Secondly, we were interested in developing an anti-doping culture by placing emphasis on the doping practices of potential role models (e.g., top athletes in the country) that may shape values about sports, and even act as a risk factor for the initiation of PES use in adolescence. In line with this argument, Petroczi and Aidman (2008) asserted that the salience of role models (e.g., famous athletes) represent situational factors that can have an impact on performance enhancement motivation, and accordingly facilitate (or inhibit) individual doping use. Recognizing the importance of broader influences, such as sports values on attitudes towards doping (Connor et al., 2011; Mazanov et al., 2012; Smith & Stewart, 2010), we also assessed the values of sports, as well as the threats to the integrity of sports.

Furthermore, we focused on schools because adolescents represent a high-risk group for both legal PES and doping use (Dodge & Hoagland, 2011; Dunn & White, 2011), and schools are optimal settings for related intervention where large and representative samples of adolescents can be accessed. Hence, this type of research can provide sport managers with information on the risk and protective factors of doping use in an age group that is more likely to initiate the use of legal and illegal PES. Also, school-based interventions can have a potential impact at grassroots level of sports by targeting young athletes at the onset of their career in sports, as well as young people who will not necessarily follow a career in sports but will engage in doping use in amateur sport settings. This is relevant to the need to create an anti-doping culture outside conventional sports settings, as evidence has shown that the self-reported use of prohibited PES among adolescent non-athletes can be higher than that of recreational and competitive athletes (Wanjek et al., 2007). Hence, school-based interventions could provide sport managers an effective way to communicate anti-doping messages to large audiences of young people with diverse experiences in sports participation (from leisure time exercisers to competitive, elite athletes). Such interventions can promote the spirit of sports and an anti-doping culture, thus, potentially shaping concomitant attitudes and beliefs of future generations of sports consumers. It was hypothesized that, compared to control group participants, adolescents exposed to the intervention would display less favorable attitudes and social norms with respect to legal PES and doping use by athletes, prioritize health and morality as essential values of sports, and recognize doping as an important threat to the integrity of sports.

3. Method

3.1. Participants

The sample consisted of 218 high school students (Mage = 15.95, SD = 1.31, 107 males and 110 females, one student did not report gender) attending typical coeducational schools in urban and suburban cities in Northern Greece. All students came from families living in districts of average socioeconomic status. Most of the students were native Greeks (93%), and 7% of the participants came from Eastern European countries.

3.2. Measures

3.2.1. Attitudes towards legal PES and doping use

Two different measures were used to respectively assess attitudes towards athletes' use of legal PES (e.g., nutritional supplements), and towards doping use. The attitude measures comprised pairs of evaluative adjectives (e.g., good/bad) rated on bipolar 7-point scales, and were adapted by previous studies on doping use (Barkoukis, Lazuras, Tzorbatzoudis, & Rodafinos, 2013; Lazuras et al., 2010). More specifically, the stem proposition "The use of legal PES (or doping substances) by an athlete to enhance his/her performance is..." followed by four pairs of evaluative adjectives (bad/good; useless/useful; harmful/beneficial; unethical/ethical). Higher scores reflected more positive attitudes towards athletes' use of either nutritional supplement or doping (Cronbach's $\alpha = .72$ and $.70$, and $\alpha = .70$ and $.73$ for legal PES and doping use attitudes in the two measurement points respectively).

3.2.2. Descriptive norms

One item assessed the perceived prevalence of doping use in professional athletes in Greece (i.e., Out of 100%, how many professional athletes in Greece do you think use prohibited substances to enhance their performance), and responses were given in an open-ended format. Accordingly, two items assessed beliefs about the use of legal PES and doping use by professional athletes in Greece (i.e., How many professional athletes in Greece do you think that use legal/prohibited substances to enhance their performance?), and responses were anchored on a 7-point scale (1 = none, 7 = all of them), with higher scores reflecting more favorable descriptive norms towards doping use. Similar measures have been used in the past with Greek and Australian populations (Lazuras, Barkoukis, & Tzorbatzoudis, 2015; Skinner, Moston, & Engelberg, 2012).

3.2.3. Doping norms salience

Two items assessed the salience of doping incidents in sports ('How often have you heard of doping incidents in your sport of interest?' and 'How often have you heard of doping incidents in other sports?'). Responses were anchored on a 6-point Likert scale ranging from 1 (*never*) to 6 (*all the time*). These items were treated as separate items in the analyses as they reflected factual information about the prevalence of doping use in different sporting contexts (see also Lazuras et al., 2015 for use of such measures with adolescents).

3.2.4. Values of sport and threats of sports integrity

Best-Worse Scaling (BWS) approach was used to estimate the ratio score for each value of sport and each threat to the integrity of sports. Unlike Likert scales, this approach provides participants with a set of items from a large category (e.g., specific values from a list of values in sports), and asks for a ranking of these values from 'best' or 'most important' to 'worse' or 'least important'. This approach requires respondents to think about the relative importance of each item. It is thought that it allows for greater discrimination between the items as compared to Likert scales and other traditional rating scales. Cohen (2003) described BWS as a 'maximum difference scaling' due to capturing participants' perceptual differences on the tested variables, whereas Chrzan and Golovashkina (2006) commented on the superiority of BWS compared to other rating scales. The BWS method has been widely used to estimate the relative importance among objects in diverse domains, including food safety, quality of life, and students' evaluation of teaching (Huybers, 2014; Mazanov et al., 2012). In the present study, BWS was applied using the balanced incomplete blocks design (BIBD). This design allows for a set of items to be rated from least to most important within a small set of items.

Students' perceptions about the important *values of sport* were assessed with the BWS method used by Mazanov et al. (2012). The BWS scaling involved 11 values that comprised the Spirit of Sport as defined by the International Olympic Committee and the World-Anti-Doping Agency. The following stem proposition was used: 'The Spirit of Sport is what the Olympic Movement says makes sport intrinsically valuable. We are interested in your views about how important the different parts of the Spirit of Sport are to each other'. This stem was followed by 11 choice sets. Students were asked to choose one value that they thought to be the most important attribute in each set, and one value deemed to be the least important to the Spirit of Sport. Overall, each value was presented in five sets and the 55 possible pairs of values appeared twice in the design. The numerical BWS values are ratio scores that represent the respondents' estimates of the relative importance of the values of sport.

Accordingly, *threats of sports integrity* were assessed using Connor et al.'s (2011) BWS scaling. This approach involves 16 threats to integrity of sports. The following stem proposition was used: 'Below you can find 16 different attributes that undermine the integrity of sports. We are interested in your views about how important these attributes are to the integrity of sports' followed by 20 choice sets. All threats were equally presented in the subsets, five times each. The allocation of the threats within each subset and the subsets within the overall design were random (Connor et al., 2011). Similar to the values of sport measure, students were asked to rank threats in each set in order of importance. A ratio score was generated indicating the relative importance ratings about the threats to sports integrity.

3.3. Intervention program

The intervention program was implemented during the delivery of the Health Education program of the selected school. Health education was introduced in the Greek educational system in 2009, and is delivered in the spring and autumn trimesters in junior (12–15 years old) and senior high schools (16–18 years old). In junior high school, participation in the health education program is compulsory; whereas, in senior high school, it is obligatory. A project-based learning approach (Kilpatrick, 1918) is used to deliver health education programs. This approach requires students to participate in the design, problem-solving, decision making, or investigative activities. Students usually work in cooperation with other students autonomously over extended periods of time with little teacher supervision or interference. The outcome of the project is usually a classroom presentation demonstrating the understanding of, and critical reflection on the topic by the students (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999).

In the Greek educational system, a project is typically delivered in two consecutive school hours (i.e., 1 hour and 30 minutes) per week, and may include a wide range of topics related to students' health and personal development (i.e., health promoting physical activity and nutrition, recreational drug use, consumer education, sexual education, equality issues, emotional development, self-development, empowerment of the self, etc.). Although topics pertaining to recreational drug abuse, and physical education and nutrition are included in the official curriculum, there are no topics related to nutritional supplements and doping use. Thus, students lack the opportunity to be informed about this topic within their formal school education.

The intervention program of the present study was taught through project-based learning over 20 contact hours. Each unit addressed a different issue relevant to supplement and doping use, and included four components (Table 1). Students were divided in four teams of 5–6 students working cooperatively in a component of the unit's issue. In the first hour, each team investigated a specific component of the topic and prepared a short presentation. In the second hour, each team presented their work to others in a classroom presentation followed by group discussion.

Table 1
Aspects of the intervention.

Unit	Components
1. Knowledge about nutritional supplements	(a) Proteins and amino acids (b) Vitamins, minerals, lipotropics and other herbal supplements (c) Natural testosterone boosters (d) Creatine and related supplements
2. Knowledge about prohibited substances	(a) Anabolic steroids (b) Growth hormone (c) Erythropoietin and blood doping, and (d) All other prohibited substances (e.g., beta-blockers, diuretics)
3. Side effects of doping use	(a) Most commonly used prohibited substances (b) Contaminated nutritional supplements (c) Prolonged use of prohibited substances (d) Psychological side effects
4. Nutrition as an alternative to doping use	(a) Intake of proteins (b) Intake of carbohydrates and fat (c) Intake of vitamins and minerals (d) Safe use of herbal nutritional supplements
5. History of doping use	(a) Doping use from antiquity to modern times (b) Historical aspects of doping use (c) Examples of deviant approaches of performance enhancement in ancient Olympic Games (d) Examples of doping use in modern Olympic Games
6. The modern culture of sport	(a) Commercialization of sport (b) Professional sports (c) Emphasis on records and winning (d) Sports and mass media
7. Moral hazards of doping use	(a) Fair play, Spirit of Sport, threats to integrity of sports and Olympic ideals (b) Morality of doping use (c) Morality of nutritional supplement use (d) Morality of doping controls
8. Psychological determinants of doping use	(a) Attitudes towards nutritional supplements and doping use (b) Motives for using nutritional supplements and prohibited substances (c) Self-efficacy to refrain from use (d) Strategies to resist temptations for using
9. and 10. Development of end-product	Website Online forum Oral presentations Short movies

3.4. Experimental design

The selected schools were randomly divided into the intervention (five classes consisted of 109 students; 42 males and 67 females, $M = 16.09$ years, $SD = 1.71$) and control (five classes consisted of 109 students; 65 males and 43 females, one student did not report gender, $M = 15.8$ years, $SD = .69$) groups. The intervention program about legal PES and doping use was implemented by physical education (PE) teachers in each school. The PE teachers in the control schools implemented programs about other health-related issues (i.e., recycling, bullying, psychological well-being, etc.) without any reference or hint to nutrition and dietary supplements. All teachers were experienced in teaching health education through project-based learning. However, they lacked knowledge about the specific topic of PES use, hence two meetings were conducted with the PE teachers of the intervention group to inform them about the content and aims of the intervention. The rationale for including each unit and its importance for doping prevention was discussed, examples from sport settings and how they can be experienced by adolescent students were provided, and practical issues (i.e., time constraints, limited access to computers during school time, etc.) pertaining to how students will be guided to achieve the project's objectives were also addressed.

3.4.1. Procedure

Permission from the regional educational authorities was obtained to conduct the study. Eight schools were randomly selected from the list of schools in the region of Central Macedonia, Greece. The researchers contacted the school principals and teachers, and obtained informed consent to participate in the study. Students were told that as part of the health education project they would be asked to complete a series of questionnaires throughout that year. All students obtained informed consent from their parents to complete the questionnaire. The health education projects of both the experimental and control groups were implemented in the fall trimester.

The baseline measurement took place at the beginning of the first lesson of the project under the supervision of the PE teachers and the researchers. The students were assured about the confidentiality of their responses, and received oral and written instructions regarding the completion of the questionnaire. The students completed the questionnaire in approximately 20 minutes. The second measurement took place in the last lesson of the project using the same procedure to the baseline one. During the implementation of the intervention, the researchers were visiting the schools of the intervention

group every week and were meeting the PE teachers. In each meeting, the implementation of the project was discussed, any issues that arose and possible solutions. The PE teachers of the control group continued to implement their projects and weekly communications were held to ensure their participation in data collection.

3.5. Data analysis

The BWS ratio scores were calculated by taking the square root of the ratio of the “most important” and “least important” counts of the attribute across the five subsets in which it appeared (Mazanov et al., 2012). Repeated measures ANOVAs were used to evaluate the effectiveness of the intervention on the outcome variables (attitudes, social norms, and norm salience with respect to doping use in athletes). This analysis was used instead of multilevel analysis due to the small number of classes in each group and in total for this type of analysis. According to Maas and Hox (2005), in order to run HLM analysis, at least 50 units should be included in this level of analysis, otherwise the results may be questionable and lack statistical power. A descriptive approach was used to investigate the effect of the intervention on the values and threats of the sport integrity.

4. Results

Means and standard deviations of the study's variables for both measurements are presented in Table 2.

4.1. Effectiveness of the intervention on attitudes, social norms and norm salience

The results of the repeated measures ANOVA pertaining to attitudes towards nutritional supplement use indicated a significant group \times time interaction, $F(1, 215) = 16.58, p < .001, \eta^2 = .07$. Scheffe post hoc analyses showed that attitudes towards the use of legal PES in athletes were less favorable in the intervention group after the intervention ($M = 4.83$ pre-intervention, $M = 4.04$ post-intervention), as compared to the attitude scores of control group participants ($M = 4.44$ pre-intervention, $M = 4.48$ post-intervention) (Fig. 1). On the contrary, no significant group \times time interaction or main effect was found with respect to attitudes towards athletes' doping use.

Regarding descriptive norms, the analysis of variance with repeated measures on measurement point demonstrated a non-significant group \times time interaction on the perceived prevalence of doping use in professional athletes in Greece and the beliefs about the use of legal PES and doping use by professional athletes in Greece. With respect to norm salience, the results of the analysis revealed a significant group \times time interaction only for the item measuring knowledge of doping users in the sport participants were interested in, $F(1, 215) = 7.99, p = .005, \eta^2 = .03$. Scheffe post hoc analyses indicated that the salience of the intervention group students about having heard of athletes using doping substances was increased after the intervention ($M = 2.76$ pre-intervention, $M = 3.27$ post-intervention), whereas those of the control group remained stable ($M = 3.25$ pre-intervention, $M = 3.29$ post-intervention) (Fig. 2).

4.2. Values of sport

The ranking of the values of sport before the intervention indicated that students in both groups (i.e., intervention and control) prioritized Health as the most important value of sport participation, and this was the case in the post-intervention measurement (Table 3). Considering the moral hazards associated with doping use and past evidence suggesting that

Table 2
Descriptive statistics of the study's variables.

	Total sample		Intervention group		Control group	
	Mean	SD	Mean	SD	Mean	SD
<i>Pre-intervention</i>						
Attitudes (NS)	4.63	1.38	4.83	1.41	4.44	1.34
Attitudes (Doping)	2.51	1.42	2.48	1.26	2.54	1.57
Descriptive Norm 1	53.36	22.41	53.09	21.43	53.63	23.11
Descriptive Norm 2	5.26	1.71	5.41	1.73	5.11	1.82
Descriptive Norm 3	5.09	1.53	5.12	1.65	5.06	1.40
Salience 1	3.00	1.40	2.76	1.33	3.25	1.44
Salience 2	3.96	1.26	3.97	1.24	3.95	1.29
<i>Post-intervention</i>						
Attitudes (NS)	4.26	1.44	4.04	1.56	4.48	1.28
Attitudes (Doping)	2.42	1.45	2.25	1.34	2.60	1.54
Descriptive Norm 1	55.46	22.67	57.29	21.43	53.62	23.11
Descriptive Norm 2	5.25	1.75	5.39	1.67	5.11	1.82
Descriptive Norm 3	5.26	1.34	5.47	1.25	5.05	1.39
Salience 1	3.29	1.28	3.29	1.17	3.29	1.39
Salience 2	4.00	1.24	3.99	1.20	4.00	1.29

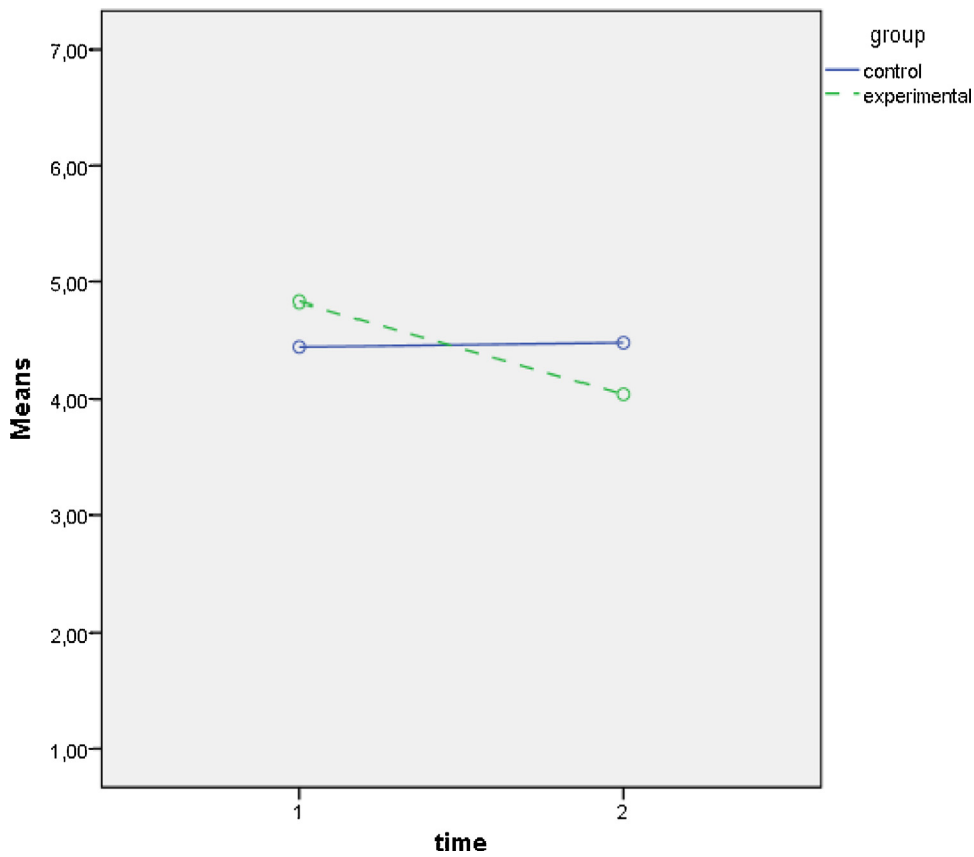


Fig. 1. Effect of the intervention on attitudes towards NS.

athletes use doping to enhance their performance (Petroczi, 2007) and morality is an important value of sport (Mazanov et al., 2012); we mainly focused on the relevant values of sport, namely Ethics, fair play and honesty; Character and education; Respect for rules and laws; Respect for self and other participants; and, Excellence in performance. The value of Ethics, fair play and honesty was ranked second in both groups, in the pre-intervention and post-intervention measurements. Character and education was ranked fourth by the control group participants, and fifth by the intervention group in the pre-intervention measurement. In the post-intervention measurement, however, Character and education remained at the same rank for intervention group participants, and changed from fourth to fifth rank for control group. Students of the control group ranked Respect for rules and laws fifth in the pre-intervention measurement and sixth in the post-intervention, whereas students of the intervention group ranked this value fourth in both measurements. Respect for self and other participants was ranked sixth in the pre-intervention measurement and third in the post-intervention for both groups. Excellence in performance was ranked tenth in the pre-intervention measurement and eighth in the post-intervention by the students of the control group, whereas students of the intervention group ranked this value eleventh and tenth respectively.

4.3. Threats to the integrity of sports

Having in mind that the intervention was based on informing health and moral hazards of doping use in relation to athletes, we mainly focused on the relevant threats, namely doping, illicit drug use, alcohol, athlete misconduct (on- and off-field), and emphasis on winning. The ranking of the threats to the integrity of sport revealed illicit drug use as the major harm of sport in both control and intervention group in the pre-intervention measurement. In the post-intervention measurement, illicit drug use remained the most important threat in the control group, whereas it dropped to the second place in the intervention group. Importantly, doping became the most important threat for sports in the intervention group at the post-intervention measurement, being second in the pre-intervention. In the control group, doping was and remained the second major harm of sport before and after the intervention. Alcohol was the fifth most important threat in the pre-intervention for the control group and fell to the seventh position, whereas for the intervention group it moved from the fifth position to third. Off-field athlete misconduct moved from ninth to eighth position for the control group, whereas it fell from ninth to eleventh position for the intervention group. Similarly, on-field athlete misconduct moved from sixth to the fifth position for

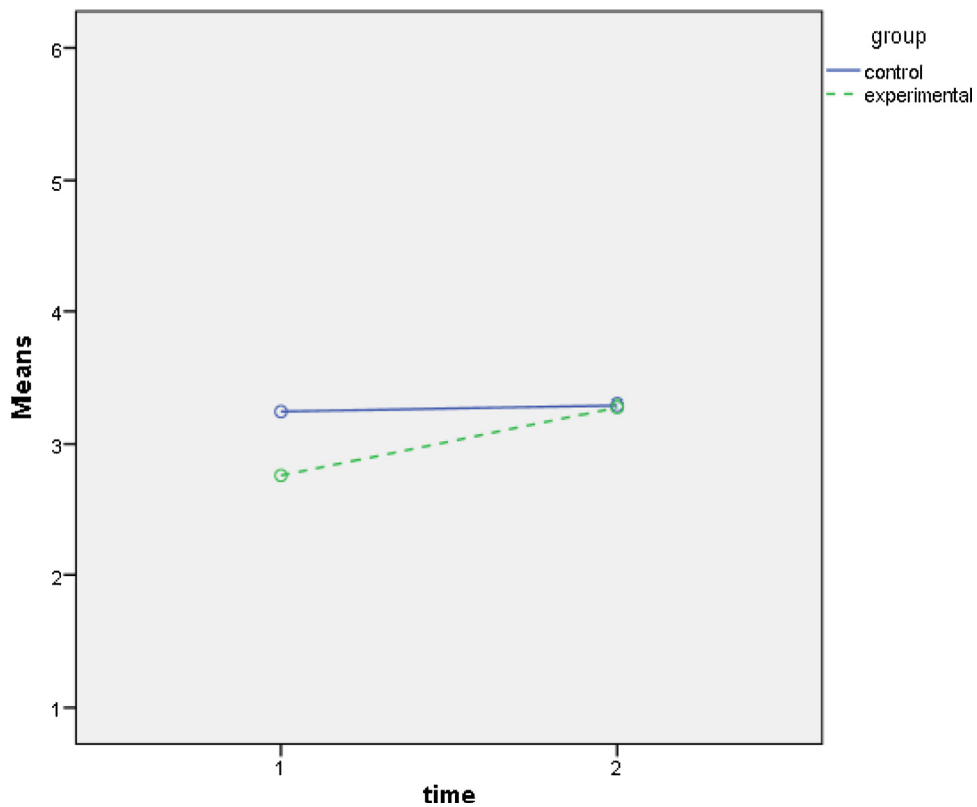


Fig. 2. Effect of the intervention on norm salience.

the control group, whereas it fell from third to fifth position for the intervention group. Finally, emphasis on winning was ranked low for both control (twelfth in pre-intervention and thirteenth in the post-intervention) and intervention (fourteenth in both measurement points) groups (Table 4).

5. Discussion

The present study investigated the effectiveness of a school-based intervention in promoting anti-doping culture among adolescents, by targeting their perceptions of sport values, social norms and attitudes towards PES use in sports. This intervention is highly relevant to sport management, especially for managers working in the areas of recreational sports. More specifically, recreational sport managers can utilize our findings in order to develop interventions and information/awareness-raising campaigns against doping use targeting young people. The European Fitness Code of Conduct on Anti-Doping published by the European Health & Fitness Association (EHFA) recognizes that doping practices in fitness and amateur sport settings can be harmful to the integrity and public perception of the fitness sector. Thus, relevant campaigns and initiatives are needed to promote doping-free recreational sport, especially among young people (EHFA, 2012a).

With respect to attitudes, participants in the intervention group reported significantly more negative attitudes towards legal PES use in sports after the intervention, as compared to control group participants. Changing attitudes is an effective way to shape behavioral tendencies through persuasion campaigns (Briñol & Petty, 2009), and previous research has shown that more negative attitudes towards PES use is associated with weaker intentions to use PES (Ntoumanis et al., 2014). However, although the intervention used in the present study was effective in changing attitudes towards legal PES use, there was no change in attitudes towards doping use. One potential explanation of this finding is that attitudes towards doping use were already low (mean score 2.5 in baseline, pre-intervention assessments on a 7-point scale) among our participants. Thus, the intervention could not produce a significant and noticeable change. This floor effect might be due to the fact that the participants of the present study were high school students not participating in competitive sports and, thus, not familiar with the use of performance enhancing substances. In contrast, attitudes towards legal PES were relatively more permissive (higher than the 3.5 midpoint of the scale) before intervention, so it was more likely for the intervention to produce significant changes in this variable.

The change in attitudes towards legal PES is promising mainly because PES use is widespread and far more prevalent than doping use in adolescents and adults, in amateur, school-level and collegiate, as well as elite sports (Backhouse, Whitaker, & Petroczi, 2011). Most importantly, legal PES use has been associated with greater intentions and actual doping use

Table 3
Rank of values of sport.

	Total sample		Control group		Intervention group	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Ethics, fair play and honesty	2.236 (2)	2.436 (2)	2.108 (2)	2.108 (2)	2.382 (2)	2.879 (2)
Health	3.817 (1)	3.697 (1)	2.87 (1)	3.373 (1)	4.399 (1)	4.026 (1)
Excellence in performance	0.482 (9)	0.458 (11)	0.507 (10)	0.674 (8)	0.452 (11)	0.399 (10)
Character and education	1.43 (4)	1.31 (5)	1.383 (4)	1.383 (5)	1.374 (5)	1.238 (5)
Fun and joy	0.766 (7)	0.799 (7)	0.952 (7)	0.952 (7)	0.556 (9)	0.66 (7)
Teamwork	1.563 (3)	1.299 (6)	1.614 (3)	1.401 (4)	1.625 (3)	1.148 (6)
Dedication and commitment	0.451 (11)	0.502 (10)	0.527 (9)	0.538 (10)	0.627 (7)	0.571 (8)
Respect for rules and laws	1.346 (5)	1.369 (4)	1.258 (5)	1.258 (6)	1.436 (4)	1.474 (4)
Respect for self and other participants	1.175 (6)	1.83 (3)	1.119 (6)	1.665 (3)	1.23 (6)	2.127 (3)
Courage	0.467 (10)	0.544 (8)	0.485 (11)	0.377 (11)	0.472 (10)	0.363 (11)
Community and solidarity	0.598 (9)	0.53 (9)	0.573 (8)	0.573 (9)	0.623 (8)	0.528 (9)

Note: Numbers with three decimals correspond to the score produced by the best-worse scaling approach for each value in pre- and post-intervention; numbers in brackets reflect the rank of each value.

Table 4
Rank of threats to the integrity of sports.

	Total sample		Control group		Intervention group	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Athlete off-field misconduct	0.849 (9)	0.945 (9)	0.897 (9)	1.167 (8)	0.802 (9)	0.749 (11)
Athlete on-field misconduct	1.764 (4)	1.365 (6)	1.549 (6)	1.549 (5)	2.118 (3)	1.2 (5)
Fan misconduct	1.211 (7)	1.242 (7)	1.375 (7)	1.466 (6)	1.004 (7)	1.124 (6)
Corruption	1.831 (3)	1.64 (5)	1.872 (3)	1.872 (4)	1.79 (4)	1.501 (4)
Alcohol	1.7 (5)	1.811 (3)	1.568 (5)	1.418 (7)	1.758 (5)	1.881 (3)
Illicit drug use	3.787 (1)	2.926 (1)	2.995 (1)	2.995 (1)	3.765 (1)	2.776 (2)
Doping	2.522 (2)	2.548 (2)	2.254 (2)	2.4 (2)	2.935 (2)	3.01 (1)
Emphasis on winning	0.582 (12)	0.573 (12)	0.539 (12)	0.539 (13)	0.416 (14)	0.61 (14)
Exploitation of athletes	1.231 (6)	1.711 (4)	1.822 (4)	1.971 (3)	1.612 (6)	1.036 (7)
Big business in sport	0.896 (8)	0.984 (8)	0.945 (8)	0.598 (11)	0.845 (8)	1.026 (8)
Legal betting	0.466 (14)	0.479 (14)	0.409 (15)	0.579 (12)	0.427	0.556
Govt. funding of sport	0.727 (11)	0.737 (11)	0.751 (11)	0.712 (10)	0.689 (10)	0.759 (9)
Lack of diversity	0.542 (13)	0.485 (13)	0.524 (13)	0.524 (14)	0.559 (12)	0.421 (15)
Popular media	0.41 (15)	0.401 (15)	0.459 (14)	0.401 (15)	0.445 (13)	0.394 (16)
Technology-rules gap	0.345 (16)	0.395 (16)	0.404 (16)	0.361 (16)	0.331 (15)	0.726 (13)
Mixing politics and sport	0.732 (10)	0.771 (10)	0.789 (10)	0.789 (9)	0.675 (11)	0.755 (10)

Note: Numbers with three decimals correspond to the score produced by the best-worse scaling approach for each threat in pre- and post-intervention; numbers in brackets reflect the rank of each threat.

(Ntoumanis et al., 2014). Some scholars argue that more permissive attitudes and beliefs towards legal PES familiarizes people with the use of chemically assisted performance enhancement, and this may later lead to more favorable views and behavioral tendencies towards doping use (Backhouse et al., 2011). Hence, campaigns altering adolescents' attitudes towards legal PES use are expected to promote safe use of legal PES and decrease the likelihood of doping use in the future. This is an important finding having in mind that supplement use is quite common in young athletes (Moston et al., 2012).

With respect to social norms, the intervention used in the present study increased norm salience by making doping incidents more accessible in memory, but did not change beliefs about the prevalence of doping use in sports. Increased norm salience is an expected and hypothesized outcome of the intervention, but, contrary to our expectations, beliefs about the prevalence/popularity of doping in sports remained unaffected. In fact, a potential boomerang effect may have emerged – although the difference was not statistically significant, participants in the intervention group reported greater perceived prevalence of doping use in sports, as compared to control group participants who retained the same mean prevalence estimates. It appears that by increasing norm salience, the intervention led to more biased estimates of doping prevalence. Such boomerang effects are likely to emerge in campaigns targeting social norms (e.g., Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). For this reason, it is advisable that subjective norms (what is perceived as socially approved and desirable) are also targeted, so that normative messages are more effective in producing the anticipated behavior and/or attitudinal change (Cialdini, 2003).

With respect to values, the findings showed that health and ethics were rated consistently as the most important values of sport across groups. These findings are in contrast with those reported by Mazanov et al. (2012) where health was ranked seventh in order of importance. However, unlike the present study that included young people, Mazanov et al. (2012) surveyed adults with a mean age of 46.5 years. Perhaps the prioritization of sport values varies between different age groups,

but this argument warrants further empirical investigation. At a practical level, our findings suggest that, as far as adolescent students are concerned, sport is associated with health outcomes, signifying a belief in the health-enhancing aspects of exercise and sports participation. It also appears that, within the specific sample, sports serve a character-building role and, therefore, contribute to the moral development of the person. Taken together, these findings imply that both health and morality should be important pillars of anti-doping prevention efforts targeting adolescents.

Finally, concerning the threats of sports, the intervention was found effective in changing adolescents' beliefs and highlighting doping as the most important harm to sports integrity. This is important for future interventions aiming to promote an anti-doping culture in youth populations, and suggests that the methodology and content of the intervention used in this study can provide the basis for such interventions. People perceiving doping as a behavior that can harm sports are expected to be less tolerant to doping-related behaviors and more open to participate in anti-doping campaigns. This is crucial for policy-makers and professionals involved in strengthening the anti-doping fight by promoting stronger anti-doping attitudes and culture in the general public.

The implications of our study for sports management are simple but profound. First, our findings speak directly to the relevance and importance of co-creation in the fight against doping use. More specifically, the intervention used in the present study was co-created by pooling together students and teachers' input. Although teachers maintained a facilitating role, students actively provided their input along the process. In business contexts, co-creation is a basic tool for open innovation and allows for the development of more customized, personalized, and tailor-made services and products, thus, accelerating competitiveness and value creation (Chesbrough, 2007; Prahalad & Ramaswamy, 2004). In the context of anti-doping interventions, a co-creation process, like the one used in the present study, incorporating input from the athletes' entourage (i.e., coaches, physicians, etc.) can lead to more context-specific, and personalized information about doping use that has taken into account the end-users' own perspectives. This can further lead to greater responsiveness of end-users to the intervention process, as compared to interventions that would rely on more traditional approaches, such as one-way communication model (e.g., knowledge delivered by educators and/or experts without taking into account the end-users' perspectives). Of course, these arguments warrant further empirical investigation, but still highlight the role of co-creation as a tool for value-creation in the management of doping policies and anti-doping interventions, and especially in the development of innovative anti-doping services (e.g., anti-doping consultancy in teams and/or sport clubs) and/or products (e.g., online anti-doping education material for young people).

Second, the present study indicates that health and morality are important milestones of anti-doping prevention in adolescents. Past interventions (i.e., ATLAS and ATHENA; Elliot et al., 2008; Goldberg et al., 2000) focused mainly on the health hazards of doping use. However, morality may play an important role in developing an anti-doping culture. This has also been highlighted by Engelberg, Moston, and Skinner (2015) in a study of competitive athletes. Therefore, anti-doping agencies and stakeholders should include both health and moral messages in their campaigns in order to more effectively change attitudes and beliefs towards doping use.

Finally, findings of this study show that there is promise in building an anti-doping culture at grassroots level of sport. More specifically, our study adds to the existing evidence-base of anti-doping educational interventions, and provides a useful framework for the systematic de-normalization of doping use among younger populations. Having the capacity to bolster perceptions of doping as the most important threat to sports, the intervention used in the present study indicates the areas where efforts should be focused in order to de-normalize doping use in sports, while highlighting the importance of sports participation as a health-enhancing activity.

5.1. Limitations

The present study is not free of limitations. No objective measures, such as students browsing anti-doping websites after the intervention, were used to assess the effects of the intervention. In addition, the large pre-intervention differences between control and experimental groups may have distorted the data. Although these differences were the result of the random allocation of the classes into the control and experimental condition, future studies should try to control for pre-existing differences between the groups. In addition, the use of more sophisticated statistical analyses, such as multilevel analysis, could assist in future studies to control the possible effect of large pre-intervention differences among the groups, and could also provide the opportunity to examine the effect of class/teacher level. In addition, there was no student evaluation of the taught material teaching approach/delivery style used. Having more information about these aspects of the intervention would help us better understand subjective experiences of the impact of the intervention. Most importantly, the present study did not include measures of subjective norms and this could have led to the observed boomerang effect whereby norm salience led to more biased prevalence estimate of doping in sports. In line with Cialdini's (2003) recommendations for developing norms-based campaigns, future interventions should emphasize the role of subjective norms and convey clearly that doping use in sports is socially unacceptable.

Notwithstanding these limitations, the present study has important implications for sport management professionals involved in anti-doping. First, it highlights that anti-doping school-based interventions can be effective in changing doping-related beliefs and cognitions among adolescents with diverse experiences and background in sports participation. Importantly, this study provides evidence on which beliefs and cognitions are important for anti-doping and, therefore, should be targeted in future anti-doping campaigns targeted at young people. Second, the present study is among the first interventions delivered outside the typical sports setting and amongst non-athlete adolescents. This is an important aspect

that is directly pertinent to efforts to prevent doping use in recreational and fitness sports. In line with this argument, the Fitness against Doping report (EHFA, 2012b) indicated that, unlike elite and competitive sports, recreational sports lack the comprehensive strategies and initiatives to prevent doping use in the general public, especially among younger exercisers. School-based anti-doping interventions are important in this respect as they can target large audiences of young people and accordingly bolster anti-doping beliefs and attitudes early on. The present findings can also provide a 'prototype' of interventions against doping that can be directly applied in recreational sport settings. Sport managers can utilize the design and findings of our study and accordingly develop their own initiatives to promote an anti-doping culture among young exercisers. Such interventions can be implemented in sport academies where young athletes should be cultivated with an anti-doping culture, and gyms and fitness centers where there is an increase of performance and appearance substance use that threatens the ideal of exercising for health, the image of exercise and fitness, and may result in a significant public health issue.

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