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## Article

# High-School Athletes' Knowledge, Attitudes, and Perceptions on Doping: The Cyprus Sport-School Study

Olia Tsivitanidou<sup>1,2,\*</sup>, Efstathios Christodoulides<sup>1</sup>  and Michael Petrou<sup>3</sup>

<sup>1</sup> School of Sciences, University of Central Lancashire Cyprus, Larnaca 7080, Cyprus; echristodoulides@uclan.ac.uk

<sup>2</sup> INQUIRIUM Ltd, Konstantinoupoleos 1, Nicosia 2333, Cyprus

<sup>3</sup> Cyprus Anti-Doping Authority, Makarion Athletic Centre Avenue, Engomi, Nicosia 2400, Cyprus; petrou.m@cyada.org.cy

\* Correspondence: otsivitanidou@uclan.ac.uk or otsivitanidou@inquirium.eu

**Abstract:** Doping constitutes one of the main problems in sports. The importance of sociological research on doping is widely accepted. However, such studies in Cyprus are scarce. The purpose of this study was twofold; first, it aimed to examine the knowledge about doping and the attitudes and perceptions towards sports and doping of high-school student athletes in Cyprus; and second, it aimed to explore whether the knowledge about doping and attitudes and perceptions towards sports and doping vary among student athletes with different characteristics (gender, nationality, engagement with team vs. individual sport, and grade level). The participants of this study were 164 high-school student athletes ( $16.6 \pm 0.9$  years old) who study in sports high schools in Cyprus, out of whom 106 were males (65.6%) and 57 (34.8%) females. Data were collected through the use of a questionnaire that was anonymously completed by the participants. A quantitative approach was used for analyzing the data. Descriptive statistics were calculated (i.e., mean, SD, and total scores for knowledge), and non-parametric tests (Mann–Whitney, Kruskal–Wallis) were employed, for comparing responses among different athlete groups on their knowledge, attitudes, and perceptions of doping. The findings reveal that most of the participants lack basic knowledge on doping issues. In terms of their attitudes and perceptions, most of the participants considered doping a serious problem in sports while demonstrating mostly negative attitudes towards doping. Statistically significant differences were found to exist in terms of knowledge among students of different nationalities and high-school grade levels. Also, statistically significant differences were found to exist in terms of attitudes and perceptions towards sports and doping among students of different genders and sport categories (individual vs. team), while differences were also found to exist among students of different nationalities in relation to their attitudes towards sports. The findings have implications for policymaking and educational practices, with the most prevalent need being to design and implement training programs to raise awareness among young athletes about critical features of doping and sports.

**Keywords:** doping; anti-doping; education; attitudes; high-school athletes



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## 1. Introduction

Doping involves athletes utilizing prohibited performance-enhancing substances to boost their capabilities in sports [1,2]. The utilization of prohibited substances in sports stems from the desire to enhance performance and achieve better results, while also seeking ways to regulate the methods through which such improvements can be attained [3]. As a result, doping is deemed unethical and illegal because it gives athletes an unfair advantage in competition over their competitors [4]. The general phenomenon of doping in sport has been studied by medical, physiological, and social science researchers in recent years [5]. Doping can have negative effects on physical health (e.g., diminished fertility and

elevated blood pressure in athletes [6]), mental health, and even early death in elite athletes, while also having a negative impact on the sponsorship and profitability of athletic events and teams with social and ethical consequences [7]. The World Anti-Doping Code regulates doping in sports from a legal standpoint [8]. The European Commission emphasizes the indication that the use of doping in amateur sport is a danger to public health and that preventive measures are very important and needed [7,9,10].

Henceforth, doping raises complex issues that cut across science, ethics, and sports governance [11] and constitutes a social problem. As sports occur in a social environment, doping has already been approached by researchers in previous studies from a social-cognitive perspective [4]. According to Bergsgard et al. [12], cultural factors, as well as the dopogenic environment [13], play an important role in shaping perceptions and attitudes toward doping. Several of the most widely accepted theories of doping behavior, such as the theory of planned behavior and the deterrence theory, highlight the importance of evaluating doping-related knowledge, beliefs, and attitudes [14], facilitating a better understanding of adolescent athletes' inclination towards Performance-Enhancing Substances' (PESs) utilization in sports. The importance of examining the knowledge and attitudes of athletes and the student population about doping in sport has been stressed by several researchers [15–25].

Previous studies examining young athletes' knowledge about doping have shown that their knowledge and understanding is not considered sufficient [16,17,19,21–25]. For example, Pavlović et al. [19] have shown that secondary-school students are not sufficiently informed and do not have enough knowledge about the problem of doping and all its negative consequences. Waddington et al. [16], in their study involving 706 professional footballers in the United Kingdom, found that only 68.0% of the participants stated that they knew the instructions of their national anti-doping agency on the use of substances in sport and that the remaining 32.0% were not aware of them. Erdman et al. [17] also observed comparable findings, indicating that the proportion of Canadian athletes who claimed to be familiar with anti-doping regulations varied between 75.5% (university league athletes) and 83.4% (national team athletes). However, a significantly lower percentage of 56.5% was reported among athletes aged 14 to 18 from Sports Schools. Peters et al. [21] interviewed 1757 German athletes at the level of competition and reported that 88% of the respondents were aware of doping, but the athletes themselves assessed their knowledge as poor. Motramm et al. [22] conducted a study on the awareness and knowledge of doping issues among 507 athletes from 10 different sports across the United Kingdom, Australia, Canada, and the United States. The results revealed that their understanding of doping substances, sanctions, and other consequences was also limited. Specifically, only 50.5% of the participants were cognizant of the repercussions of anti-doping rule violations, and a mere 35.1% accurately identified the status of the substances provided to them in sports. In the study of de Hon et al. [23], involving 888 Dutch athletes from various sports, that aimed to assess participants' knowledge of the Prohibited List, the results showed that the participants' level of knowledge in this subject ranges from 7.1 to 8.8 on a scale from 0 to 10 [23]. Jovanov et al. [24] concluded similar findings, according to which less than 40.0% of young athletes possessed accurate knowledge regarding the appropriate and intended use of certain substances (i.e., protein, creatine, amino acids, beta-alanine, and glutamine), while 55.5% of young athletes appeared to be unaware of the World Anti-Doping Agency (WADA) regulations. Research findings have also shown that athletes participating in championship events may not be as knowledgeable about the issue of doping as their counterparts in non-championship sports. For instance, in the study of Duda and Stula [25], athletes participating in championship events appeared to have significantly poorer knowledge on doping compared to athletes engaged in other sports, indicating that athletes participating in championship events might not be as well-informed about doping compared to their counterparts. The knowledge of young athletes about anti-doping, in particular anabolic steroids, and their side effects, is among the factors with a “protective” effect on the use of anabolic steroids and other doping substances [26]. This is

interpreted by the fact that when young athletes are not properly informed about anabolic steroids and their side effects, they become prone to trust misinformation by persons in their social environment, such as their co-athletes, trainers, or coaches [27]. Königstein et al. [14] concluded similar findings with young athletes demonstrating moderate knowledge on doping matters, arguing that medical doctors and other professionals need to shift their educational anti-doping approach from solely focusing on the negative consequences to exploring and shaping the mindset of young athletes. In addition, Ntoumanis et al. [26] argued that young athletes are more likely not to use anabolic steroids when, from the cost-benefit assessment, they realize that the expected benefit is less than the adverse effects from the use of these substances.

Regardless of athletes' knowledge of doping issues, examining their attitudes towards doping is equally important, as it may heavily depend on their own personal moral values. "Attitude" can be defined as an individual's preferences and evaluations, such as their likes or dislikes, towards specific objects that they contemplate, as per the definition proposed by Banaji and Heiphetz [28]. Prior research has demonstrated that there exists a correlation between attitudes and intentions towards doping, and in some instances, these intentions have predicted the subsequent use of doping substances, both among non-athletes and professional athletes (e.g., [29,30]). MacNamara and Collins [31] came to this conclusion after studying the reasons why athletes did not resort to the use of doping substances, using semi-structured interviews with 36 athletes from various sports. Erickson, McKenna, and Backhouse [32] reached the same conclusion, by also conducting semi-structured interviews with 10 athletes from five different sports. However, as Erickson et al. [32] emphasize, an athlete's decision to use doping or not is complex and involves both internal and external factors, taking into account not only the risks but also the expected benefits that the use of doping might entail. Ethos in sport and, in particular, the importance of morality and ethics in the decision of an athlete to use doping or not should be taken into account in the design of anti-doping programs [33]. Athletes' moral identity and their endorsement of fair play have been found to be negatively correlated with their attitudes towards doping [34], demonstrating that an individual's morality and perception of moral values in sports might serve as factors associated with doping in sports. In addition, key socializing agents and the surrounding environment have an important role to play in affecting athletes' decisions to use PESs or not. Generally, coaches and peers who shared close and trustworthy relationships with the athletes are deemed to be the most influential in doping-related decisions [35,36].

Finally, the study of Rintaugu and Mwangi [20], focusing on the evaluation of the knowledge, attitudes, and perceptions of university students in Kenya, revealed that participants' data in all three variables differed based on the selected variables of year of study, age categories, and previous participation in sport competitions; namely, Sport Science students showed significantly higher scores on attitudes towards doping than those in Physical Education courses, while significant differences in knowledge, attitudes, and perceptions on doping were in favor of those students who had previous participation in sport competitions [20]. Regarding gender and doping, there are conflicting findings within the research landscape, leading to a lack of consensus among studies. Particularly, Rintaugu et al. [20] in their study report the absence of statistically significant differences in knowledge, attitudes, and perceptions about doping across gender, despite previous research showing that male athletes are more likely than females to dope [37,38]. Collins, et al. [39] suggested that the potential feelings of shame and guilt experienced by female athletes if caught could act as a stronger deterrent against doping for them compared to male athletes. As an anti-doping culture in the athletes' environment has been considered central to an anti-doping stance [35], further research is needed in this area, especially in the course of efforts of developing educational and training programs that address the particularities of a certain community's culture.

Previous research studies [29,40,41] argue that the use of doping substances can be initiated by the time of puberty due to the lack of education regarding this matter. Overall,

it has been claimed by several researchers in the domain that it is essential for athletes to participate in anti-doping education programs and gain a thorough understanding of the anti-doping regulations (e.g., [42]). Training and educational opportunities may also affect the formation of young people's attitudes towards doping. For building tailor-made educational programs and for communicating anti-doping messages to young athletes and society broadly, there is a need to first examine the level of knowledge and awareness of the targeted group on doping and its attitudes towards doping. In Cyprus, previous research in the field [43,44] has examined the problem of the use of anabolic steroids with their focus starting in gyms. Yet social research in this region, examining young athletes' knowledge, attitudes, and perceptions towards doping, is absent. In order to develop and implement an education strategy that is adapted and tailored to the needs and particularities of young athletes in Cyprus, it is necessary to first evaluate their status regarding knowledge, attitudes, and perceptions in relation to anti-doping.

## 2. Purpose of the Study

The present study, supported by CyADA, sought to bridge the knowledge gap regarding young athletes' knowledge, attitudes, and perceptions towards doping in Cyprus, an area that has been scarcely investigated. By examining the potential differences in these factors among young athletes with diverse demographic backgrounds, the study aims to provide valuable insights into the development and implementation of targeted education strategies on a local level. Furthermore, this research contributes to the global understanding of doping prevalence and prevention efforts by offering a unique perspective from a region that has been underrepresented in the existing literature. Specifically, in this study, we aimed to examine the knowledge, attitudes, and perceptions towards doping of adolescent athletes in Cyprus and to explore any potential differences in relation to these variables among different groups of young athletes based on their demographics, by addressing the following Research Questions (RQs):

RQ1: What is the knowledge of high-school student athletes about doping in sports?

RQ2: What are the attitudes and perceptions of high-school student athletes towards sports and doping?

RQ3: Are there any statistically significant differences among high-school student athletes in their knowledge of doping issues based on their demographic characteristics (i.e., gender, nationality, engagement with team vs. individual sport, and grade level)?

RQ4: Are there any statistically significant differences among high-school student athletes in their attitudes and perceptions towards sports and doping based on their demographic characteristics (i.e., gender, nationality, engagement with team vs. individual sport, and grade level)?

## 3. Materials and Methods

### 3.1. Participants

Participants in this study were high-school athletes from two sport schools in Cyprus. The athletes who enroll in sport schools should either be athletes in individual and team sports and be qualified according to their personal achievement at a national level (e.g., first to fourth place in national competition) or participate in the national team at least twice (Cyprus Ministry of Education, Sport, and Youth). Therefore, students studying at sport schools in Cyprus comprise a representative sample of young high-school athletes from the region. Overall, 164 high-school student athletes ( $16.6 \pm 0.9$  years old) participated in this study (see Table 1 for demographic data). A total of 47.9% of the participants had already participated in international competitions, as derived from their responses to the survey of this study, while 46.6% stated that the highest level of competition in which they had participated was the Cyprus National Championships in their sport.

**Table 1.** Demographic characteristics of the participants.

|         | Nationality |          | Province    |        | Gender      |
|---------|-------------|----------|-------------|--------|-------------|
| Cypriot | 137 (83.5%) | Nicosia  | 102 (62.2%) | Male   | 106 (64.6%) |
| Greek   | 18 (11.0%)  | Limassol | 62 (37.8%)  | Female | 57 (34.8%)  |
| Other   | 9 (5.5%)    |          |             |        |             |

### 3.2. Procedure

Before initiating data collection, parental permission and informed consent were obtained from the parents of the participating athletes. To maintain anonymity, the athletes were asked to complete a questionnaire specifically designed for this study (refer to Appendix A) without disclosing their personal information. One of the authors (E.C.) was present during the completion of the questionnaires to address any questions or concerns. Participation in the study was entirely voluntary, ensuring that the athletes felt no pressure or obligation to take part. The study was approved by the Cyprus Ministry of Education, Sport, and Youth and the Cyprus National Bioethics Committee.

### 3.3. Questionnaire

The questionnaire was composed of three sections of closed-ended questions. The first section consisted of questions addressing demographic details about participants and their participation in sports. The second section included 14 questions about athletes' knowledge on anti-doping issues, adapted from the "Play True Quiz" interactive computer game, which has been developed by the World Anti-Doping Agency (WADA) for examining athletes' knowledge on anti-doping issues and is available in 23 different languages [45,46]. Questions derived from the game were used as such or have been modified so as to meet the Cyprus context. Lastly, the third section of the questionnaire focused on assessing athletes' perceptions and attitudes towards sports and doping. This section included items from the Performance, Enhancement, Attitude Scale (PEAS) [5] which has been used in several studies, with satisfactory validity and reliability [5,47], and items that have been used in previous studies (e.g., [48,49]) that have been modified for the purposes of the present study. Prior to its finalization, a pilot test of the questionnaire, to account for reading comprehension, was conducted on a sample of 15 high-school student athletes.

### 3.4. Data Analysis

A quantitative approach was used to analyze data with the use of IBM SPSS 28.0 software [50]. First, descriptive statistics for all the items (e.g., mean scores, standard deviations, and percentages) were calculated. For examining participants' knowledge and awareness about doping in sports, we grouped the items of the questionnaire, with respect to the different topics being addressed. Thus, the 14 closed-ended questions included in the second section of the questionnaire were grouped as follows: (a) 6 questions of general interest in connection with doping (General Knowledge) and (b) 8 questions in relation to doping control (Doping Control). The questions included in the first group of questions (General Knowledge) addressed, among others, the following topics: Prohibited List (Q11), anti-doping rule violations (e.g., what is doping, Q15), the basic principle of "strict reliability" governing anti-doping programs (Q20), status of commonly used substances as to whether they are prohibited in sports or not (Q22), the reasons for which doping is prohibited (Q23), and the consequences of doping (Q24). The questions included in the second group of questions (Doping Control) included questions specifically about doping control (Questions 12, 13, 14, 16, 17, 18, 19, and 21, see Appendix A). Weighted scoring (e.g., [51]) was applied to the distribution of scores in the questions in the second section of the questionnaire. That is, the score given to each question is proportional to its significance and to the subset of possible answers given. Based on this rating scheme, the highest overall score that each participant could achieve was 22 points: 14 points from

questions assessing General Knowledge and 8 points from questions assessing knowledge on Doping Control.

Attitudes towards sports were measured through participants' responses to the given items in Question 29 ("How important are the following to you in sports?") and Question 30 ("How seriously do you consider the following items as issues that the sport community is facing today?"). For checking the reliability of questions that measured attitudes and perceptions towards sports, the reliability index Cronbach's alpha was calculated. Cronbach's alpha indices were calculated as 0.757 and 0.911, respectively, demonstrating satisfactory reliability of the two scales.

Attitudes and perceptions towards doping were measured through participants' responses to the given items in Questions 28 and 31. Upon computing the mean values and standard deviations, the following data treatment was first applied: the negative statements (for Questions 28 and 31 of the questionnaire) were initially converted into positive, so that for all items, the selection of the maximum number of the Likert scale (6 and 5, respectively) suggests positive attitudes towards doping, whereas the selection of the smallest number of the Likert scale (1 in both cases) indicates negative attitudes towards doping. We then collectively summed the 16-item scores of the items given in Question 28, creating a higher-order variable for further analysis. In the same way, the 7-item scores of the items provided in Question 31 were collectively summed, creating a higher-order variable for further analysis. Cronbach's alpha indices were computed with the Likert scale items of Q28 ( $\alpha = 0.631$ ) and Q31 ( $\alpha = 0.653$ ) separately. The reliability of these scales was considered acceptable.

For proceeding with the comparison tests, first the normality of the data distribution was tested using the Kolmogorov–Smirnov test. The Kolmogorov–Smirnov test appeared to be significant for the knowledge total scores ( $p = 0.004$ ) and for the attitudes and perceptions scores ( $p < 0.001$ ), thus the data distribution is non-parametric. For addressing RQ3 and RQ4, non-parametric comparison tests (i.e., Kruskal–Wallis and Mann–Whitney tests) were performed, for exploring potential statistically significant differences among high-school student athletes' knowledge of doping issues, attitudes towards sports, and attitudes and perceptions towards doping based on their demographic characteristics (i.e., nationality, grade level, gender, and participation in individual vs. team sports). Pairwise comparisons were calculated for exploring the post-hoc results of the Kruskal–Wallis tests applying the Bonferroni correction for multiple tests.

## 4. Results

### 4.1. High-School Student Athletes' Knowledge about Doping in Sports

The descriptive statistics of the overall score resulting from the participants' valid responses to all the questions, as well as the overall score resulting from questions assessing General Knowledge and specific knowledge on Doping Control, are presented in Table 2. The mean overall score of participants' valid responses is 13.00 (SD = 3.31) (see Table 2), considering that the maximum overall score is 22. Accordingly, the mean scores were 8.90 (SD = 2.26) and 4.10 (SD = 1.83) for the total score of questions assessing General Knowledge and the total score of specific questions assessing knowledge on Doping Control, respectively.

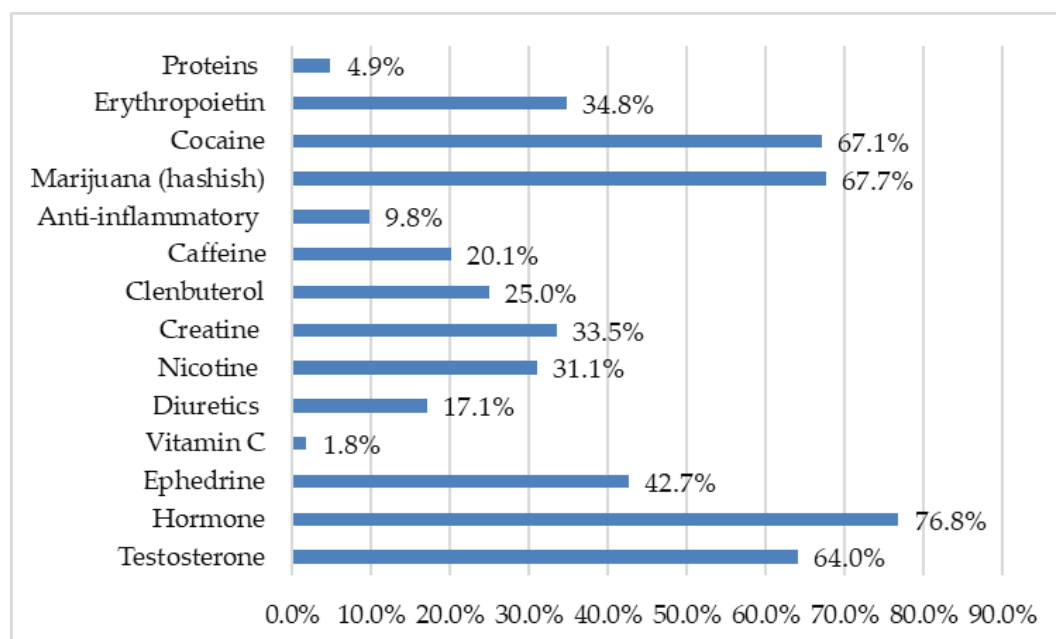
**Table 2.** Participants scores in questions assessing General Knowledge about doping, Doping Control and overall score.

|                   | Mean  | SD   | Min | Max  |
|-------------------|-------|------|-----|------|
| General Knowledge | 8.90  | 2.26 | 3.0 | 14.0 |
| Doping Control    | 4.10  | 1.83 | 0.0 | 8.0  |
| Overall score     | 13.00 | 3.31 | 4.0 | 22.0 |

We further present descriptive statistics for the responses given by the participants in each of the questions assessing their knowledge about anti-doping and, in particular, the Prohibited List, doping controls, anti-doping rule violations, and related consequences.

#### 4.1.1. Prohibited List

Three questions (Q11–Q13) examined participants' knowledge about prohibited substances and prohibited methods. In Question 11, participants were given the four criteria according to which a substance or method is considered for inclusion on the Prohibited List by WADA. Only 63 participants (38.4%) chose all criteria, which is the correct answer, while 68 participants (41.5%) chose the criterion of "health risk", 67 participants (40.9%) chose the criterion "against the spirit of sport", and 23 athletes (14.0%) chose the criterion "the potential to mask the use of other prohibited substances or methods". Ten participants (6.2%) responded that they did not know any of these criteria. Furthermore, on the statement given in Question 12, "WADA is the responsible authority for revision of the Prohibited List", 88 participants (53.7%) chose the correct answer while 19 participants (11.6%) were correct in answering that the revision happens on a yearly basis (Question 13). Moreover, participants were given a list of 14 substances or groups of substances that are used or misused in sports, and they were asked to determine whether each one of the substances is included on the Prohibited List (Q22). Descriptive statistics have shown that only one of the participants (0.6%) responded correctly, whereas the rest of the participants chose just a few of the substances which are included in the Prohibited List. The percentages of participants' responses to Question 22 are illustrated in Figure 1.



**Figure 1.** Participants' responses to Question 22 "Which of the following substances are prohibited in sports?". Participants were allowed to choose more than one of the given options.

#### 4.1.2. Doping Controls

Participants were asked when and where an athlete may be subjected to sample collection for doping control (Q16 and Q17). Of those who responded, 97 participants (59.1%) replied that athletes may be subjected to testing "anywhere", and 89 participants (54.3%) responded that athletes are eligible for testing "at any time"; those two responses were coded as correct ones. The frequency and percentages of invalid answers are given in Table 3. Moreover, 121 participants (73.8%) were aware that athletes may be subjected to testing without advance notice (Q18).



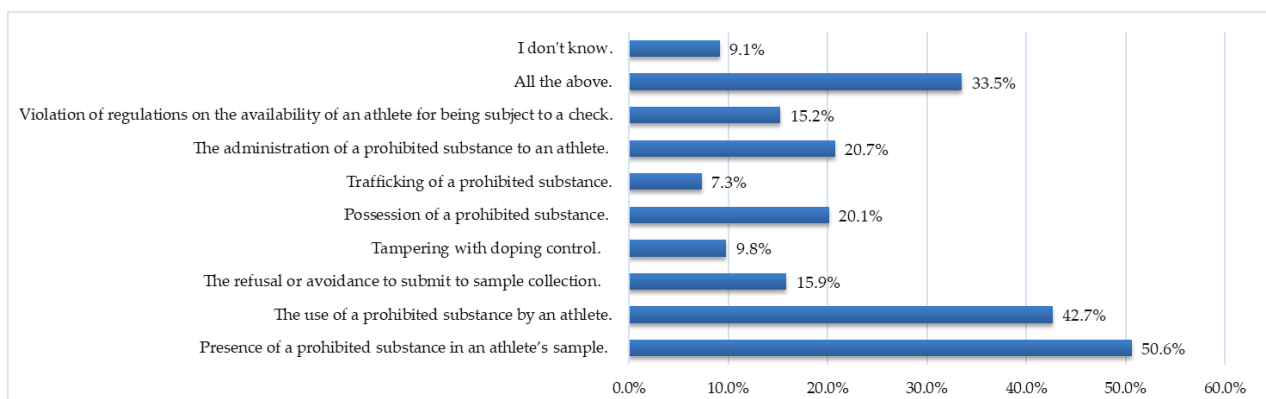
**Table 3.** Frequency and percentages of correct answers to Questions 16 and 17: When and where may an athlete be asked to do doping control?

| Question  | Items                                  | Validity of the Item | Frequency of Answers (%) |
|---|--|----------------------|--------------------------|
| 16. Where may an athlete be asked to do doping control? | Only at the training area.             | Incorrect            | 1 (0.6)                  |
|   | Only at the competition venue.         | Incorrect            | 42 (25.6)                |
|   | Anywhere.                              | Correct              | 97 (59.1)                |
|   | I do not know.                         | -                    | 18 (11.0)                |
| 17. When may an athlete be asked to do doping control?  | Only after the end of the competition. | Incorrect            | 44 (26.8)                |
|   | Prior to the start of the competition. | Incorrect            | 13 (7.9)                 |
|   | Anytime.                               | Correct              | 89 (54.3)                |
|   | I do not know.                         | -                    | 15 (9.1)                 |

#### 4.1.3. Anti-Doping Rule Violations and Related Consequences

Participants were given a list of eight actions that constitute an anti-doping rule violation according to the World Anti-Doping Code, that was in effect at the time when the data were collected. Participants were asked to choose the actions that, according to their opinion, constitute a violation (Q15). Only 55 participants (33.5%) responded correctly, accepting all eight actions as those which are prohibited according to the World Anti-Doping Code.

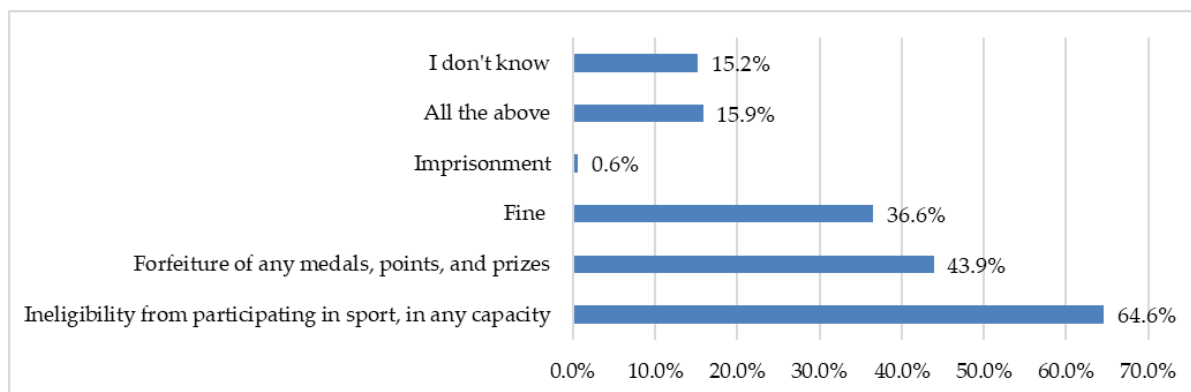
In the question “what constitutes an anti-doping rule violation?” (Q15), the results have shown that 83 athletes in this study (50.6%) thought that an anti-doping rule violation is considered as the presence of a prohibited substance or method in an athlete’s sample, whereas 15 athletes (9.1%) replied that they did not know. The responses to Question 15 are illustrated in Figure 2.



**Figure 2.** Participants’ responses to Question 15 “What can be considered as a doping offense?”. Participants were allowed to choose more than one of the given options.

Moreover, participants were asked whether the following statement is valid: “athletes are ultimately responsible for any substance that they consume” (Q20). The majority of the participants (86.0%) answered that this statement is correct. Likewise, participants were asked whether the following statement is valid: “doping is not punished when taking place off season” (Q19). Almost half of the participants (54.3%) answered correctly that this statement is not valid, which is the correct answer. Finally, participants were given the statement “when an athlete is sick, they can be excused for taking any medicine to help them get well” (Q21); a total of 112 participants (68.3%) answered correctly, that this statement is not valid. Regarding the consequences of anti-doping rule violations, the athletes were given the consequences under the Cyprus legislation (i.e., ineligibility to participate in sport, in any capacity; forfeiture of any medals, points, or prizes; fines; and imprisonment), and they were asked to determine whether the consequences given were valid or not (Q24).

The results showed that only 26 athletes (15.9%) responded correctly, choosing all the consequences. Participants’ responses to Question 24 are illustrated in Figure 3.



**Figure 3.** Participants’ responses to Question 24 “What are the consequences if an athlete is found to be “doped” in Cyprus?”. Participants were allowed to choose more than one of the given options.

#### 4.2. High-School Student Athletes’ Attitudes and Perceptions towards Sports and Doping

##### 4.2.1. Attitudes and Perceptions towards Sports

The participants were given 13 concepts concerning the benefits derived from participation in sports ( $\alpha = 0.76$ ) and they were asked to rate their importance using a 5-point Likert scale where 1 stands for “not important at all” and 5 “very important” (Question 29). The findings showed that the participants considered the concepts of win (61.6%), participation (73.2%), discipline (82.3%), respect (84.1%), health benefits (86%), fun (62.2%), performance (84.1%), teamwork (74.4%), challenging oneself (63.4%) and competition (64.6%) as very important, while the majority provided neutral responses for financial gains (45.7%). Student athletes’ responses to the items evaluating the importance of glory and recognition were scattered, with 32.3% of students providing neutral responses for the importance of glory and 16.5% and 37.8% considering glory as important and very important, respectively. Likewise, 29.9% of students provided neutral responses for the importance of recognition, and 19.5% and 40.2% considered recognition important and very important, respectively. The mean and standard deviation scores of athletes’ responses to each of the given items in Question 29 are given in Table 4.

**Table 4.** Mean scores and SD of students’ responses to the 5-point Likert scale Question 29 “How important are the following to you in sports?”

| Items                        | Mean | SD    |
|------------------------------|------|-------|
| Win                          | 4.48 | 0.059 |
| Participation                | 4.59 | 0.061 |
| Discipline                   | 4.74 | 0.051 |
| Respect                      | 4.78 | 0.044 |
| Positive impact on my health | 4.80 | 0.046 |
| Having fun                   | 4.39 | 0.073 |
| Performance                  | 4.80 | 0.041 |
| Teamwork                     | 4.61 | 0.064 |
| Challenging myself           | 4.41 | 0.070 |
| Competition                  | 4.43 | 0.069 |
| Financial gains              | 3.17 | 0.093 |
| Glory                        | 3.78 | 0.092 |
| Recognition                  | 3.90 | 0.086 |

The participants were also asked about their opinion on the severity of eight issues facing sports today ( $\alpha = 0.911$ ) using a 5-point Likert scale where 1 stands for “no serious at all” and 5 stands for “very serious”. Those issues included inappropriate behavior from

people at the stands (e.g., yelling at competitors or coaches or officials, using obscenities, etc.), inappropriate behavior from coaches (e.g., yelling at competitors or other coaches, using obscenities, etc.), violence among the competitors, doping, lack of fair play, racism, discrimination on the basis of sex, and focus on money (Q30). The findings showed that the participants perceive inappropriate behaviors of fans (45.7%), inappropriate behaviors of coaches (61.0%), violence among competitors (70.7%), the use of doping substances (82.3%), the lack of fair play (77.4%), racism (77.4%), discrimination on the basis of sex (69.5%), and the focus on money (42.1%) as “very serious”. The mean scores and standard deviations of the participants’ responses on the 5-point Likert scale for each one of the issues in Question 30 are presented in Table 5.

**Table 5.** Mean scores and SD of students’ responses to the 5-point Likert scale Question 30 on how seriously they consider the following items as issues that the sport community is facing today.

| Items   | Mean | SD    |
|---|------|-------|
| 1. Inappropriate behavior of fans <sup>1</sup>    | 3.87 | 0.100 |
| 2. Inappropriate behavior of a coach <sup>1</sup> | 4.21 | 0.095 |
| 3. Violence among competitors                     | 4.44 | 0.084 |
| 4. Use of doping substances                       | 4.62 | 0.074 |
| 5. Lack of fair play                              | 4.46 | 0.090 |
| 6. Racism   | 4.49 | 0.088 |
| 7. Discrimination on the basis of sex             | 4.34 | 0.090 |
| 8. Focus on money                                 | 3.71 | 0.105 |

<sup>1</sup> yelling at the competitors or (other) coaches, using obscenities, etc.

#### 4.2.2. Attitudes and Perceptions towards Doping

In Question 28, participants were asked to rate sixteen given statements, based on a 6-point Likert scale, where 1 corresponds to the position “totally disagree” and 6 corresponds to the position “fully agree”. The results indicate that the participants in the survey appear to have negative attitudes towards doping (Table 6). The mean scores and standard deviations of athletes’ responses to the 6-point Likert scale items of Question 28 are given in Table 6 that follows.

**Table 6.** Mean scores and SD of students’ responses to the 6-point Likert scale Question 28 on their attitudes and perceptions towards sports and doping.

| Statement  | Mean | SD   |
|--|------|------|
| 1. Doping is necessary to be competitive.  | 1.96 | 0.19 |
| 2. Doping is not a problem for sports.   | 1.50 | 1.29 |
| 3. The statement that doping can even lead to death seems exaggerated to me.                   | 2.76 | 1.68 |
| 4. The media should communicate more about anti-doping.  | 4.82 | 1.25 |
| 5. Athletes often lose time due to injuries and with doping can help to make up the lost time. | 3.06 | 1.68 |
| 6. Only win matters and not how it is achieved.  | 1.89 | 1.46 |
| 7. Athletes feel pressured to use prohibited substances.                                       | 3.65 | 1.46 |
| 8. In competitive sports, everyone uses prohibited substances.                                 | 2.29 | 1.49 |
| 9. Athletes have no alternative career choices, but sport.                                     | 2.32 | 1.21 |
| 10. Doping is an unavoidable part of the competitive sport.                                    | 2.40 | 1.63 |
| 11. In recreational sports, everyone is doing doping.  | 1.88 | 1.35 |

**Table 6.** *Cont.*

| Statement   | Mean | SD   |
|---|------|------|
| 12. If doping was not prohibited, there would be more benefits for sports.        | 2.37 | 1.67 |
| 13. Athletes who have a good and healthy diet do not need any dietary supplement. | 4.56 | 1.55 |
| 14. Doping is one of the most important problems that sports are facing today.    | 4.59 | 1.49 |
| 15. Stricter penalties should be imposed on athletes who do doping.               | 4.77 | 1.47 |
| 16. Doping is not cheating since everyone does it.                                | 1.58 | 1.06 |

The results demonstrate that the participants do not seem to endorse statements that imply a positive attitude towards doping. Only 6.1% of the respondents fully agreed with the statement “doping is necessary to be competitive” (compared to 87.2% of the participants that disagree completely or disagree). Likewise, only 6.7% of the participants fully agree with the statement “Doping is not a problem for sports” (compared to 90.2% who totally disagree or disagree). In addition, 15.2% of the respondents fully agree with the statement “doping is an unavoidable part of competitive sport” (compared to 62.8% who totally disagree or disagree). Participants’ views, as derived from their responses, on the extent to which doping can be considered a problem in competitive sports are particularly interesting. Only 12.2% of them fully agree with the statement “in competitive sports everyone uses prohibited substances” against a percentage of 65.9% that disagrees. Likewise, only 6.7% of the participants agree/fully agree with the statement “in recreational sports everyone is doing doping” against 77.5% who absolutely disagree with it. Also, only 8.5% of the respondents agree/fully agree with the statement “only win matters, and not how it is achieved” while 78.7% of the respondents disagree with it altogether. The mean scores and standard deviations of the participants’ responses on the 5-point Likert scale items of Q31 are presented in Table 7. Overall, the results indicate that the participants do not seem to endorse statements underlying an acceptance of doping in sport.

**Table 7.** Mean scores and SD of students’ responses to the 5-point Likert scale Question 31 on their attitudes and perceptions towards doping.

| Statement   | Mean | SD   |
|---|------|------|
| 1. Doping is unethical.   | 4.30 | 1.13 |
| 2. Doping can cause serious and/or permanent damage to the human body.  | 4.28 | 1.02 |
| 3. I accept individuals who are doing doping.   | 2.68 | 1.16 |
| 4. If I do doping for a short period of time, it is harmless.   | 2.29 | 1.10 |
| 5. With doping I will get faster to the desired performance results.  | 2.68 | 1.28 |
| 6. I would use doping if I knew that no one would ever discover it.   | 1.84 | 1.20 |
| 7. I would train more intensively instead of using prohibited substances and methods to improve my performance in my sport. | 4.61 | 0.87 |

#### 4.3. Differences in High-School Student Athletes’ Knowledge on Doping Based on Their Demographic Data

A Mann–Whitney U test was performed to explore statistically significant differences among male and female student athletes on their knowledge of doping matters. The results indicate that no statistically significant differences appeared to exist among male and female student athletes in terms of their knowledge on doping matters ( $U = 3331.0$ ,  $p = 0.280$ ).

A Kruskal–Wallis test was further performed to explore any potential statistical differences among high-school student athletes of different nationalities on their knowledge of doping matters. The results indicate that statistically significant differences appeared to

exist among high-school student athletes of different citizenship (Cypriot, Greek, other) and their knowledge on doping issues ( $H(2) = 12.884, p = 0.002$ ) (Table 8). Specifically, pairwise comparisons indicate that statistically significant differences appear to exist among the three groups of athletes of different nationalities, with athletes with no Cypriot or Greek nationality outperforming their counterparts. The mean score for Cypriot athletes ( $M = 13.04, SD = 3.23$ ) was significantly different from the mean score of Greek athletes ( $M = 11.28, SD = 2.64$ ) ( $p = 0.005$ ) and the mean score of athletes of other nationalities ( $M = 15.83, SD = 3.89$ ) ( $p = 0.04$ ). Also, the mean score for Greek athletes was significantly different to the mean score of athletes of other nationalities ( $p < 0.001$ ).

**Table 8.** Kruskal–Wallis test results for pairwise comparisons among athletes of different nationalities in terms of their knowledge on doping issues.

| Nationality | <i>n</i> | Mean  | SD   | H         |
|-------------|----------|-------|------|-----------|
| Cypriot     | 137      | 13.04 | 3.23 | 12.884 ** |
| Greek       | 18       | 11.28 | 2.64 |           |
| Other       | 9        | 15.83 | 3.89 |           |

\*\*  $p < 0.01$ .

Moreover, a Kruskal–Wallis test was conducted to explore any potential statistical differences among high-school student athletes from different grade levels (i.e., grade 1, grade 2, and grade 3) on their knowledge on doping matters. The results indicate that statistically significant differences appeared to exist ( $H(2) = 13.411, p = 0.001$ ) (Table 9). Pairwise comparisons indicate that the mean scores of students from the 3rd grade level ( $M = 14.49, SD = 2.99$ ) were significantly different and higher than the mean scores of students from the 2nd grade level ( $M = 12.45, SD = 12.45$ ) ( $p = 0.002$ ) and 1st grade level ( $M = 12.26, SD = 3.32$ ) ( $p < 0.001$ ).

**Table 9.** Kruskal–Wallis test results for pairwise comparisons among athletes from different high-school study years (i.e., grade) in terms of their knowledge on doping issues.

| High-School Grade Level | <i>n</i> | Mean  | SD    | H         |
|-------------------------|----------|-------|-------|-----------|
| 1st grade               | 57       | 12.26 | 3.32  | 13.411 ** |
| 2nd grade               | 53       | 12.45 | 12.45 |           |
| 3rd grade               | 51       | 14.49 | 2.99  |           |

\*\*  $p = 0.001$ .

It should be noted that similar comparison tests were performed to explore potential statistically significant differences among student athletes engaged in team vs. individual sports (Mann–Whitney  $U = 3188.00, p = 0.681$ ) and their participation different levels of competition (i.e., club matches, provincial competitions, Pancyprian competitions, international competitions) (Kruskal–Wallis  $H(3) = 7.219, p = 0.065$ ), but no statistically significant differences were found in terms of their knowledge on doping issues.

#### 4.4. Differences in High-School Student Athletes' Attitudes and Perceptions towards Sports and Doping Based on Their Demographic Data

##### 4.4.1. Differences in High-School Student Athletes' Attitudes and Perceptions towards Sports

A Mann–Whitney  $U$  test was performed to explore statistically significant differences among male and female student athletes on how seriously they perceive certain issues that the sport community is facing (Q30) (Table 10). Statistically significant differences appeared to exist among participants' responses in the following statements: inappropriate behavior of fans ( $U = 3729.0, p = 0.009$ ), inappropriate behavior of a coach ( $U = 3725.0, p = 0.005$ ), violence among competitors ( $U = 3706.5, p = 0.002$ ), discrimination on the basis of sex ( $U = 3379.0, p = 0.007$ ), and emphasis given on money ( $U = 3649.0, p = 0.028$ ). Female

athletes consider the above-mentioned issues as more serious compared to their male counterparts.

**Table 10.** Mann–Whitney test results for comparing the responses of male and female student athletes on how seriously they consider the following items as issues facing sports today.

| Items                                 | Male Student Athletes<br>( <i>n</i> = 106) |      |           | Female Student Athletes<br>( <i>n</i> = 57) |      |           | U                    |
|---------------------------------------|--|------|-----------|---|------|-----------|----------------------|
|                                       | Mean                                       | SD   | Mean Rank | Mean  | SD   | Mean Rank |                      |
| 1. Inappropriate behavior of fans     | 3.66                                       | 1.37 | 75.32     | 4.26  | 0.99 | 94.42     | 3729.0 **            |
| 2. Inappropriate behavior of a coach  | 4.00                                       | 1.35 | 75.36     | 4.61  | 0.77 | 94.35     | 3725.0 **            |
| 3. Violence among competitors         | 4.26                                       | 1.20 | 74.70     | 4.79  | 0.64 | 94.03     | 3706.5 **            |
| 4. Use of doping substances           | 4.57                                       | 1.01 |           | 4.75  | 0.76 |           |                      |
| 5. Lack of fair play                  | 4.35                                       | 1.28 | 79.79     | 4.70  | 0.84 | 86.11     | 3255.5 <sup>ns</sup> |
| 6. Racism                             | 4.36                                       | 1.25 | 78.88     | 4.72  | 0.77 | 87.80     | 3351.5 <sup>ns</sup> |
| 7. Discrimination on the basis of sex | 4.18                                       | 1.26 | 78.62     | 4.68  | 0.80 | 88.28     | 3379.0 **            |
| 8. Focus on money                     | 2.55                                       | 1.36 | 76.08     | 4.02  | 1.26 | 93.02     | 3649.0 *             |

Note: <sup>ns</sup> = non-significant, \*  $p < 0.05$ , \*\*  $p < 0.01$ .

A Kruskal–Wallis test was performed to explore any potential statistical differences among high-school student athletes of different nationalities on attitudes and perceptions towards sports. The results indicate that statistically significant differences appeared to exist among high-school student athletes of different citizenships (Cypriot, Greek, other) on how seriously they consider inappropriate behaviors exhibited by individuals who attend sport competitions ( $H(2) = 8.944$ ,  $p = 0.011$ ) and the emphasis given to money ( $H(2) = 7.678$ ,  $p = 0.022$ ). Pairwise comparisons indicate that statistically significant differences appear to exist among student athletes with Greek and Cypriot nationalities, with Cypriots considering inappropriate behaviors exhibited by fans who attend sport competitions ( $p = 0.003$ ) and emphasis on money ( $p = 0.007$ ) as more serious. Similar comparison tests were performed for exploring potential statistical differences among high-school student athletes from different grade levels and their responses to items in Q30, with no statistically significant differences being reported.

A Mann–Whitney U test was performed to explore statistically significant differences among student athletes engaged in team vs. individual sports on how seriously they perceive certain issues that the sport community is facing (Q30). The results indicate statistically significant differences in student athletes' responses for the following issues: inappropriate behavior from fans ( $U = 4103.50$ ,  $p = 0.005$ ) and violence among competitors ( $U = 4007.50$ ,  $p = 0.002$ ). Athletes engaged with individual sports perceive those two issues as more serious compared to athletes who engage in team sports (see Table 11). No statistically significant differences were found in relation to the rest of the given items in Question 30.

Likewise, a Mann–Whitney U test was conducted to explore statistically significant differences among student athletes from team and individual sports on how important they perceive certain given values (Q29). The results indicate statistically significant differences in student athletes' responses for the following values: "win" ( $U = 2616.0$ ,  $p = 0.016$ ) and "having fun" ( $U = 2513.0$ ,  $p = 0.010$ ). Athletes engaged in team sports perceive winning in a competition ( $M = 4.61$ ,  $SD = 0.72$ , mean rank = 90.15) and having fun ( $M = 4.60$ ,  $SD = 0.75$ , mean rank = 89.60) as more important compared to their counterparts ( $M = 4.37$ ,  $SD = 0.75$ , mean rank = 74.75 and  $M = 4.22$ ,  $SD = 1.00$ , mean rank = 73.42, respectively).

#### 4.4.2. Differences in High-School Student Athletes' Attitudes and Perceptions towards Doping

A Mann–Whitney U test was conducted to explore statistically significant differences among male and female student athletes on their attitudes and perceptions towards doping.

The findings demonstrate that statistically significant differences exist among male and female athletes on their attitudes and perceptions towards doping as measured through their responses to the items of Question 28 ( $U = 1834.5, p < 0.001$ ) and to the items of Question 31 ( $U = 2252.5, p = 0.007$ ), with female athletes having more negative attitudes towards doping compared to male athletes (Table 12).

**Table 11.** Mann–Whitney test results for comparing the responses of student athletes engaged in individual vs. team sports to Question 30 on how seriously they consider the following items as issues facing sports today.

| Items                                 | Team Sports Athletes<br>( $n = 72$ ) |      |           | Individual Sports Athletes<br>( $n = 92$ ) |      |           | U                    |
|---------------------------------------|--------------------------------------|------|-----------|--|------|-----------|----------------------|
|                                       | Mean                                 | SD   | Mean Rank | Mean                                       | SD   | Mean Rank |                      |
| 1. Inappropriate behavior of fans     | 3.58                                 | 1.30 | 71.51     | 4.10                                       | 1.22 | 91.10     | 4103.5 **            |
| 2. Inappropriate behavior of a coach  | 4.01                                 | 1.35 | 76.66     | 4.37                                       | 1.06 | 97.07     | 3732.5 <sup>ns</sup> |
| 3. Violence among competitors         | 4.24                                 | 1.10 | 71.84     | 4.59                                       | 1.02 | 90.04     | 4007.5 **            |
| 4. Use of doping substances           | 4.54                                 | 0.96 | 77.13     | 4.68                                       | 0.92 | 96.71     | 3699.0 <sup>ns</sup> |
| 5. Lack of fair play                  | 4.46                                 | 1.10 | 80.87     | 4.47                                       | 1.20 | 83.78     | 3429.5 <sup>ns</sup> |
| 6. Racism                             | 4.58                                 | 0.96 | 83.56     | 4.41                                       | 1.23 | 81.67     | 3235.5 <sup>ns</sup> |
| 7. Discrimination on the basis of sex | 4.37                                 | 1.13 | 83.02     | 4.32                                       | 1.18 | 82.09     | 3274.5 <sup>ns</sup> |
| 8. Focus on money                     | 3.77                                 | 1.24 | 83.18     | 3.65                                       | 1.42 | 81.09     | 3182.0 <sup>ns</sup> |

Note: <sup>ns</sup> = non-significant, \*\*  $p < 0.01$ .

**Table 12.** Mann–Whitney test results for comparing the responses of male and female student athletes to items of Questions 28 and 31 measuring attitudes and perceptions towards doping.

| Items                   | Male Student Athletes<br>( $n = 106$ ) |      |           | Female Student Athletes<br>( $n = 57$ ) |      |           | U          |
|-------------------------|--|------|-----------|---|------|-----------|------------|
|                         | Mean                                   | SD   | Mean Rank | Mean                                    | SD   | Mean Rank |            |
| Question 28 total score | 2.32                                   | 0.65 | 93.19     | 1.92                                    | 0.40 | 61.18     | 1834.5 *** |
| Question 31 total score | 2.21                                   | 0.84 | 89.25     | 1.87                                    | 0.58 | 68.52     | 2252.5 **  |

Note: \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

The Kruskal–Wallis test results indicate that there are no statistically significant differences among the responses of high-school student athletes of different citizenship (Cypriot, Greek, other) on their attitudes and perceptions towards doping as measured through their responses to the items of Question 28 ( $H(2) = 1.078, p = 0.583$ ) and Question 31 ( $H(2) = 0.921, p = 0.631$ ). Likewise, no statistically significant differences were found among the responses of high-school student athletes studying in different grade levels (grade 1, grade 2, grade 3) and to the items of Question 28 ( $H(2) = 4.103, p = 0.129$ ) and Question 31 ( $H(2) = 1.264, p = 0.532$ ). The Mann–Whitney U tests also demonstrated the absence of statistically significant differences among student athletes from team and individual sports on their responses to the given items of Question 28 ( $U = 2942.0, p = 0.220$ ); yet statistically significant differences were found among their responses to the given items of Question 31 ( $U = 2684.0, p = 0.037$ ). Athletes engaged in individual sports had more negative attitudes and perceptions towards doping (mean = 1.99) compared to their counterparts (mean = 2.23) (Table 13).

**Table 13.** Mann–Whitney test results for comparing the responses of student athletes engaged in individual vs. team sports to items of Questions 28 and 31 measuring attitudes and perceptions towards doping.

| Items                   | Team Sports Athletes<br>( <i>n</i> = 72) |       |           | Individual Sports Athletes<br>( <i>n</i> = 92) |       |           | U                    |
|-------------------------|--|-------|-----------|--|-------|-----------|----------------------|
|                         | Mean                                     | SD    | Mean rank | Mean   | SD    | Mean rank |                      |
| Question 28 total score | 2.24                                     | 0.061 | 87.64     | 2.15   | 0.061 | 78.48     | 2942.0 <sup>ns</sup> |
| Question 31 total score | 2.23                                     | 0.082 | 90.22     | 1.99   | 0.072 | 75.76     | 2684.0 *             |

Note: <sup>ns</sup> = non-significant, \* *p* < 0.05.

## 5. Discussion

This study aimed at examining high-school student athletes' knowledge on anti-doping matters, as well as their attitudes and perceptions towards doping. The study also aimed to explore whether statistically significant differences exist among high-school student athletes of different demographic characteristics (i.e., gender, nationality, grade level at high school, and type of sport they engage in) in relation to their knowledge on anti-doping matters, as well as their attitudes and perceptions towards doping. This is the first study to take place in Cyprus with high-school athletes with such objectives. We discuss the key findings of this study per Research Question (RQ).

### 5.1. High-School Athletes' Knowledge about Anti-Doping

For addressing the first RQ, we evaluated high-school athletes' knowledge on doping. The findings of this study reveal that a great percentage of the participants lack basic knowledge on doping issues, with participants demonstrating a better understanding of general knowledge compared to their knowledge on doping control. The relatively lower mean score in the Doping Control section implies that there might be a need for more targeted education and awareness initiatives to improve athletes' understanding of doping control procedures and regulations. This knowledge gap may potentially impact their ability to make informed decisions and comply with anti-doping rules. Moreover, the results of our study indicate that participants' knowledge about prohibited substances and methods was not sufficient, while participants had varying levels of knowledge regarding sample collection for doping control, anti-doping rule violations, and the consequences of such violations, confirming results of previous studies [16,17,19,21,22]. The results indicate that participants have some understanding of doping control processes and the athletes' responsibilities, but there is a need for more targeted education to improve their knowledge of anti-doping rule violations and their consequences. The limited knowledge of athletes on anti-doping issues identified by this study is in agreement with the findings of previous studies [16,17,19,21–25], even among elite athletes in Europe and other countries. It is obvious that the role of educational interventions is critical to this end. Specifically, the above-mentioned results of this study highlight the need for improved education and awareness initiatives regarding prohibited substances and methods, as well as the criteria used by WADA to determine inclusion on the Prohibited List. A more comprehensive understanding of these aspects is crucial for athletes to make informed decisions and abide by anti-doping rules, promoting a fair and drug-free sporting environment.

### 5.2. High-School Athletes' Attitudes and Perceptions towards Sports and Doping

The second main objective of the current study was to examine the participants' attitudes and perceptions on specific sport-related problems and doping in particular, as well as on the benefits that arise from participation in sport (RQ2). Participants in the study were asked to rate the importance of various sport-related concepts and the severity of issues facing sports today. On the one hand, concepts such as winning, participation, discipline, respect, health benefits, fun, performance, teamwork, challenging oneself, and competition were generally considered very important by the majority of participants. As



reported in previous studies, athletes' concern about their health and the possible impact of doping on it has always been one of the main reasons why athletes do not resort to doping [28,52]. Mohamed et al. [52] argue that athletes' concern about the impact of doping on their own health is the most commonly cited factor that would prevent them from doping. Likewise, the study of Moore and Werch [53] with American adolescent athletes showed that athletes who value their health as important are less prone to doping. On the other hand, financial gains and glory were considered as less important outcomes resulting from participation in sports by the participants in this study. Interestingly, the study conducted by the United States Anti-Doping Agency [49] reached different findings, with American athletes valuing competition and winning as essential components of sports. Although a majority of participants in this study considered winning important, few agreed with the notion that "only the win matters and not the way it is achieved". Financial gains from sports participation are known to be one of the main factors driving athletes into doping [54–56]. While the percentage of respondents considering financial gains to be significant or very important was not particularly high, it is worth noting that these are young, amateur athletes, which makes this finding somewhat concerning.

Regarding the severity of issues facing sports today, doping emerged as the most serious problem according to participants' responses, with the majority considering it a serious or very serious issue. In a comparable survey conducted by the United States Anti-Doping Agency [49], participants were asked to identify the most significant problem in sports from a provided list. The findings of that survey [49] align with those of the current study, indicating that doping is perceived by participants as the most serious issue in sports. Violation of fair play was also perceived as a significant problem by a large proportion of participants. This perception is relevant to the literature, as athletes' moral identity and their endorsement of fair play have been found to be negatively correlated with their attitudes towards doping [34]. This suggests that an individual's morality and perception of moral values in sports may play a role in shaping their attitudes and behaviors associated with doping in sports. It is interesting to note, however, that a small percentage of respondents did not consider doping and the violation of fair play to be serious problems. The findings highlight the varying perceptions and attitudes of student athletes towards different aspects of sports, with the majority recognizing the importance of values such as discipline, respect, and teamwork. The results also underscore the need for continued efforts to address doping and fair play violations in sports in order to maintain a positive and ethical environment for all athletes.

Participants' attitudes and perceptions towards doping were also examined and the results suggest that athletes generally hold negative attitudes towards doping. It is noteworthy that participants' views on the extent to which doping is considered a problem in competitive sports show that the majority of participants do not hold the belief that everyone uses prohibited substances. Also, participants seem to perceive doping as unethical and appreciate the benefits derived from participation in sports, such as health and societal benefits (e.g., respect). Overall, they seem to endorse an ethical aspect in sports, as shown by their responses considering doping and the violation of fair play, racism, inappropriate behavior of the coach, violence between athletes, etc., as important problems. Furthermore, the results reinforce the finding that participants do not seem to endorse statements that support an acceptance of doping in sports. This insight into athletes' attitudes towards doping can be valuable for designing effective anti-doping education and awareness campaigns. In addition, a large portion of the participants fully agree that doping can cause serious and/or permanent damage to the human body, and only a small percentage of them fully agree or agree that doping, if used for a short time, is harmless. This contrasts with other studies [31,32] that do not mention the risk of doping-related health damage as a reason for athletes not resorting to the use of doping substances, emphasizing the importance of personal ethical values as the most decisive factor.

### *5.3. Differences in High-School Student Athletes' Knowledge on Doping Based on Their Demographic Data*

The Mann–Whitney U test results indicated that there were no significant differences in doping knowledge between male and female student athletes, suggesting that both genders have a similar understanding of this topic. This aligns with previous research findings [20], according to which no significant differences are reported in doping knowledge across genders, even though other studies have shown that male athletes are more likely than females to dope [37,38]. Interestingly, the Kruskal–Wallis test revealed significant differences in doping knowledge among high-school student athletes of different nationalities. Athletes from non-Cypriot or Greek nationalities outperformed their Cypriot counterparts, which could be attributed to differences in previously attended educational programs, cultural factors, or access to information about doping in sports across these nationalities.

Furthermore, the Kruskal–Wallis test showed significant differences in doping knowledge among high-school student athletes across different grade levels. This suggests that, as the students progress through grade levels, their knowledge about doping matters tends to increase. However, when comparing student athletes engaged in team vs. individual sports and their participation at different levels of competition, no significant differences were found in terms of their doping knowledge. This implies that the type of sport and the level of competition do not have a significant impact on student athletes' knowledge about doping matters, as per findings of this study.

### *5.4. Differences in High-School Student Athletes' Attitudes and Perceptions towards Sports and Doping Based on Their Demographic Data*

Statistical tests were conducted to explore differences in high-school student athletes' perceptions of various issues facing the sports community and their attitudes towards sports values. The findings suggest that female athletes perceive certain issues, such as inappropriate behavior of fans, inappropriate behavior of a coach, violence among competitors, discrimination based on sex, and emphasis on money, as more serious compared to their male counterparts. This highlights the potential importance of discussing the consequences of doping on fairness, athlete health, and integrity of sports. Moreover, Cypriot athletes were found to view inappropriate fan behavior and emphasis on money as more serious issues compared to Greek athletes. No significant differences were found between grade levels. Last, athletes engaged in individual sports perceived inappropriate fan behavior and violence among competitors as more serious issues compared to those engaged in team sports. Conversely, team sports athletes placed greater importance on values such as winning and having fun.

Finally, we investigated the differences in attitudes and perceptions towards doping among high-school student athletes based on gender, nationality, grade levels, and the type of sport they participate in. The results indicated that female athletes displayed more negative attitudes towards doping than male athletes, suggesting that gender plays a role in shaping athletes' attitudes towards doping. While previous research has reported no significant differences in knowledge, attitudes, and perceptions about doping across gender [20], it has been suggested that feelings of shame and guilt experienced by female athletes if caught could act as a stronger deterrent against doping compared to male athletes [39]. Additionally, while no significant differences were found among student athletes from team and individual sports for the items included in Q28, statistically significant differences emerged for the items included in Q31. Athletes engaged in individual sports exhibited more negative attitudes and perceptions towards doping compared to athletes engaged in team sports. These findings suggest that factors such as gender and the type of sport (team vs. individual) play a role in shaping high-school student athletes' attitudes and perceptions towards doping. However, nationality and grade level did not show a significant impact.

The above-mentioned findings can help inform targeted doping prevention programs and education initiatives that consider these demographic factors. Education is crucial in

shaping attitudes and perceptions about doping. De Hon et al. [23] and Moran et al. [48], as well as Gradidge et al. [57], also emphasize the need for providing more educational opportunities for athletes on anti-doping issues, in an effort to raise their knowledge on these matters. The vast majority of participants in the present study (95.7%) acknowledged the need for more educational and training opportunities on anti-doping. Special importance should be given to values-based educational programs, engaging young athletes in the moral and ethical arguments of fair play and the spirit of sport and thus promoting positive attitudes toward clean sport and doping-free behavior. Understanding public awareness and knowledge of doping and the perception of doping within the population in general and among athletes in particular are therefore crucial for an effective anti-doping strategy [58].

It has been argued, however, that even when educational programs adhere to many of the current recommendations for program design, the outcomes are often unsatisfactory and have been the subject of much criticism [59]. One reason for this is that educational theory and practice were not taken into account during the development of previous educational programs. Also, it has been claimed that there is a disconnect between the goals of education, the methods used to impart knowledge, and the evaluation of that knowledge [59]. The emphasis on the prevention measures is supported moreover by the Council of Europe which specifies the need for education and training towards young athletes in the Anti-Doping Convention [60], by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the International Convention against Doping in Sport [61], by the World Anti-doping Agency in the World Anti-Doping Code [8], and the 2020–2024 World Anti-Doping Agency Strategic Plan [62,63]. Since 2021, all anti-doping organizations are required by the International Standard for Education to implement anti-doping education programs. This shift in focus is evident in WADA's 2020–2024 strategic plan [63]. According to Backhouse et al. [64], for planning and preparing educational strategies and actions, it is necessary to firstly examine the knowledge and attitudes of young athletes regarding doping. Also, findings on the attitudes, perceptions, and knowledge of high-performance athletes have stressed the necessity of intensifying efforts on the part of the sports authorities to provide education and information about doping issues [65–67]. It is hoped that the findings of the current study contribute further to the existing literature in this field.

## 6. Conclusions

Concluding, the findings of this study indicate that although high-school student athletes appreciate core values in sports (e.g., fair play, participation) and exhibit negative attitudes towards doping, they lack basic knowledge about doping. These observations underscore the necessity and significance of education in fostering a culture that opposes doping in sports. Practical implications arise for tailored and systematic anti-doping initiatives, which should be developed by sports organizations and educators to address the distinct concerns of various groups of student athletes, ultimately promoting a cleaner and more ethical sports environment. The role of education in shaping attitudes and perceptions about doping is crucial, and these findings lay the groundwork for devising more effective strategies to counter doping in sports. Reflecting on the findings of this specific study, it is recommended that educational programs should incorporate gender-sensitive approaches, given that female athletes exhibited more negative attitudes towards doping than their male counterparts. By catering to the distinct needs and concerns of both male and female student athletes, such strategies can enhance the efficacy of anti-doping initiatives. Moreover, as attitudes towards doping varied between athletes participating in team sports and those in individual sports, anti-doping education should be tailored to the unique dynamics of each type of sport. Emphasizing the specific risks and consequences associated with doping can help address these differences effectively. Educational programs should also accentuate the importance of core values in sports, such as fair play, participation, respect, and teamwork. These programs could discourage illicit behavior by fostering a strong sense of ethical

responsibility and sportsmanship. Lastly, recognizing and addressing cultural differences in attitudes and perceptions towards doping can facilitate the creation of more inclusive and effective anti-doping educational programs through culturally responsive education.

Also, addressing the knowledge gap among student athletes is of paramount importance, and promoting a comprehensive understanding of doping is crucial. Educational programs should provide accurate information regarding the health risks, legal ramifications, and ethical implications of doping, thereby enabling athletes to make informed decisions. It is important for a secure and open environment to be established, for discussing doping concerns, sharing experiences, and offering support, encouraging open dialogue and peer support, and ultimately contributing to the development of a strong anti-doping culture among student athletes. Role models and mentors, such as accomplished athletes, coaches, and other sports professionals who epitomize clean and ethical sports values, can further inspire and motivate student athletes to reject doping and embrace fair competition.

However, this study does not come without limitations. The sample size and geographical scope were limited, which may affect the generalizability of the results. Moreover, the cross-sectional design of the study does not allow for the exploration of causal relationships or changes in attitudes and perceptions over time. Future research should aim to address these limitations by employing larger, more diverse samples and longitudinal study designs to better understand the development of attitudes and perceptions towards doping over time. Additionally, the impact of various educational approaches and interventions on athletes' attitudes towards doping is an area that needs further exploration, as well as the potential influence of other factors, such as cultural background, socio-economic status, and access to information about doping in sports. By building on the findings of this study and addressing its limitations, future research can contribute to the ongoing efforts to promote clean, ethical sports and prevent doping among high-school student athletes.

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**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ethical restrictions.

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## Appendix A

Questionnaire on knowledge, attitudes, and perceptions of high-school students in relation to doping. The information you provide will be used solely for research purposes, i.e., the evaluation of your opinions and the recording of your attitudes and perceptions about doping. The questionnaire is anonymous. The information you are asked for in Part A of the questionnaire (demographic information such as year of birth, gender, grade level and information about your sport) is necessary to better capture and assess your knowledge, attitudes, and perceptions about doping. Answer the questionnaire yourself, freely, based on your own knowledge, views, and perceptions.

### Part A:

Select what applies for you.

1. Gender:
  1. Female
  2. Male
  3. Prefer not to say
2. Nationality
  1. Cypriot
  2. Greek
  3. Other (specify):
3. Age (in years):
  - a. 14
  - b. 15
  - c. 16
  - d. 17
  - e. 18
  - f. Other (specify)
4. School class (Lyceum-High school):
  1. A grade level
  2. B grade level
  3. C grade level
5. What sport are you involved in?
 

|                            |               |                        |
|----------------------------|---------------|------------------------|
| 1. Tennis                  | 7. Karate     | 13. Taekwondo          |
| 2. Weightlifting           | 8. Swimming   | 14. Judo               |
| 3. Gymnastics (gymnastics) | 9. Volleyball | 15. Dance              |
| 4. Gymnastics (rhythmic)   | 10. Cycling   | 16. Other (which one?) |
| 5. Basketball              | 11. Soccer    |                        |
| 6. Canoe                   | 12. Track     | .....                  |
6. How many days a week do you deal with your sport (training and/or competitions)?
 

|              |            |             |
|--------------|------------|-------------|
| 1. 1-2 times | 2. 3 times | 3. 4 times  |
| 4. 5 times   | 5. 6 times | 6. Everyday |
7. How many years have you been involved in your sport?
 

|                      |                      |
|----------------------|----------------------|
| 1. Less than 2 years | 2. 6-8 years         |
| 3. 2-5 years         | 4. More than 8 years |
8. Are you a member of a sports club (in your sport)?
 

|        |       |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|
9. In the last two years, have you participated in competitions for your sport?
 

|        |       |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|

If yes, at what level of competition?

|                             |                               |
|-----------------------------|-------------------------------|
| 1. Club matches             | 2. Provincial competitions    |
| 3. Pancyprrian Competitions | 4. International competitions |
10. Have you undergone doping control?
 

|        |       |
|--------|-------|
| 1. Yes | 2. No |
|--------|-------|

Move on to Part B, on the next page.

**Part B:**

Circle what you think is right (*you can choose more than one answer*).

11. By which of the following criteria is it decided which substances are prohibited in sport?

- |    |   |
|----|---|
| 1. | They can cause harm to the health of the athlete.               |
| 2. | May improve performance in sports.                              |
| 3. | It is against the athletic spirit.                              |
| 4. | They may conceal the athlete's use of another banned substance. |
| 5. | All the above.  |
| 6. | I do not know.  |

12. The List of Banned Substances is reviewed by the World Anti-Doping Agency (WADA).

- |    |       |    |       |    |                |
|----|-------|----|-------|----|----------------|
| 1. | Right | 2. | Wrong | 3. | I do not know. |
|----|-------|----|-------|----|----------------|

13. How often is the List of Prohibited Substances revised?

- |    |                |    |                          |
|----|----------------|----|--------------------------|
| 1. | Every month    | 4. | Every 5 years            |
| 2. | Yearly         | 5. | Every 10 years           |
| 3. | Every 2 years  | 6. | It always stays the same |
| 7. | I do not know. |    |                          |

14. Each sport has its own List of Prohibited Substances.

- |    |       |    |       |    |                |
|----|-------|----|-------|----|----------------|
| 1. | Right | 2. | Wrong | 3. | I do not know. |
|----|-------|----|-------|----|----------------|

15. Which of the following are considered doping in sport?

- |     |  |
|-----|--|
| 1.  | Presence of a prohibited substance in an athlete's sample.   |
| 2.  | The use of a prohibited substance by an athlete.   |
| 3.  | The refusal or avoidance to submit to sample collection.   |
| 4.  | Tampering with doping control.   |
| 5.  | Possession of a prohibited substance.  |
| 6.  | Trafficking of a prohibited substance (e.g., sale, marketing).   |
| 7.  | The administration of a prohibited substance to an athlete.  |
| 8.  | Violation of regulations on the availability of an athlete for being subject to a check ('unsuccessful check' and/or 'non-reporting'). |
| 9.  | All the above.   |
| 10. | I do not know.   |

16. Doping control can be done:

- |    |  |
|----|--|
| 1. | Only at the training ground.                 |
| 2. | Only at the venue of the competitions/games. |
| 3. | Anywhere.                                    |
| 4. | I do not know.                               |

17. Doping control can be done:

- |    |   |
|----|---|
| 1. | Immediately after the end of a competition, merely. |
| 2. | Before the start of a competition, merely.          |
| 3. | Whenever.   |
| 4. | I do not know.                                      |

18. Doping control is carried out:

- |    |                                 |
|----|---------------------------------|
| 1. | After at least a week's notice. |
| 2. | After a day's notice.           |
| 3. | No warning.                     |
| 4. | I do not know.                  |

19. Doping is not punishable when it is done off-season.

- |    |       |    |       |    |                |
|----|-------|----|-------|----|----------------|
| 1. | Right | 2. | Wrong | 3. | I do not know. |
|----|-------|----|-------|----|----------------|

20. Each athlete is solely responsible for any substance that enters in their own body.

- |    |       |    |       |    |                |
|----|-------|----|-------|----|----------------|
| 1. | Right | 2. | Wrong | 3. | I do not know. |
|----|-------|----|-------|----|----------------|

21. When an athlete is sick, s/he can arbitrarily use whatever substance s/he wants to get well.

- |    |       |    |       |    |                |
|----|-------|----|-------|----|----------------|
| 1. | Right | 2. | Wrong | 3. | I do not know. |
|----|-------|----|-------|----|----------------|

22. Which of the following substances are prohibited in sports?

- |    |              |     |                     |
|----|--------------|-----|---------------------|
| 1. | Testosterone | 8.  | Clenbuterol         |
| 2. | Hormone      | 9.  | Caffeine            |
| 3. | Ephedrine    | 10. | Anti-inflammatory   |
| 4. | Vitamin C    | 11. | Marijuana (hashish) |
| 5. | Diuretics    | 12. | Cocaine             |
| 6. | Nicotine     | 13. | Erythropoietin      |
| 7. | Creatine     | 14. | Proteins            |

23. For which of the following reasons is doping prohibited?

- |    |   |
|----|---|
| 1. | It is a danger to the health of an athlete                |
| 2. | Improves athletic performance in a fraudulent way (fraud) |
| 3. | It violates sports rules                                  |
| 4. | It is against the spirit of sport                         |
| 5. | All the above   |
| 6. | I do not know.  |

24. What can be the consequences if an athlete is found "doped" in Cyprus?

- |    |  |
|----|--|
| 1. | Ineligibility from participating in sport, in any capacity |
| 2. | Forfeiture of any medals, points, and prizes               |
| 3. | Fine   |
| 4. | Imprisonment   |
| 5. | All the above  |
| 6. | I do not know.   |

Move on to Part C on the next page.

### Part C:

Circle what you think is right (*you can choose more than one answers*).

25. Have you been informed or attended any training in relation to anti-doping?

- |    |     |    |    |
|----|-----|----|----|
| 1. | Yes | 2. | No |
|----|-----|----|----|

If so, by whom?

|    |                                  |
|----|----------------------------------|
| 1. | My trainer/coach                 |
| 2. | My parents                       |
| 3. | My doctor                        |
| 4. | The school                       |
| 5. | The Cyprus Anti-Doping Authority |
| 6. | The internet                     |
| 7. | Other (Specify: .....            |

26. Do you feel satisfied with your knowledge about anti-doping?

|    |     |    |    |
|----|-----|----|----|
| 1. | Yes | 2. | No |
|----|-----|----|----|

27. Do you think there should be more anti-doping training/awareness?

|    |     |    |    |
|----|-----|----|----|
| 1. | Yes | 2. | No |
|----|-----|----|----|

28. For each of the statements below, circle the number that best corresponds to what you believe. There are no right or wrong answers.

|     | I totally disagree  | Disagree | I slightly disagree | I slightly agree | I agree | I totally agree |   |   |
|-----|---|----------|---------------------|------------------|---------|-----------------|---|---|
|     | 1   | 2        | 3                   | 4                | 5       | 6               |   |   |
| 1.  | Doping is necessary to be competitive.  |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 2.  | Doping is not a problem for sport.  |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 3.  | The statement that doping can even lead to death seems exaggerated to me.                   |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 4.  | The media should communicate more about anti-doping.  |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 5.  | Athletes often lose time due to injuries and with doping can help to make up the lost time. |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 6.  | Only win matters and not how it is achieved.  |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 7.  | Athletes feel pressured to use prohibited substances.                                       |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 8.  | In competitive sports everyone uses prohibited substances.                                  |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 9.  | Athletes have no alternative career choices, but sport.                                     |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 10. | Doping is an unavoidable part of the competitive sport.                                     |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 11. | In recreational sports, everyone is doing doping.   |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 12. | If doping was not prohibited, there would be more benefits for sports.                      |          | 1                   | 2                | 3       | 4               | 5 | 6 |
| 13. | Athletes who have a good and healthy diet do not need any dietary supplement.               |          | 1                   | 2                | 3       | 4               | 5 | 6 |



|     |  |   |   |   |   |   |   |
|-----|--|---|---|---|---|---|---|
| 14. | Doping is one of the most important problems facing sport today. | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. | Stricter penalties should be imposed on athletes who do doping.  | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. | Doping is not cheating since everyone does it.                   | 1 | 2 | 3 | 4 | 5 | 6 |

29. For each of the statements below, circle the number that best corresponds to what you believe. There are no right or wrong answers.

|                      |   |         |   |   |                |  |
|----------------------|---|---------|---|---|----------------|--|
| Not important at all |   | Neutral |   |   | Very important |  |
| 1                    | 2 | 3       | 4 | 5 |                |  |

How important are the following to you in sports?

|     |                              |   |   |   |   |   |
|-----|------------------------------|---|---|---|---|---|
| 1.  | Win                          | 1 | 2 | 3 | 4 | 5 |
| 2.  | Participation                | 1 | 2 | 3 | 4 | 5 |
| 3.  | Discipline                   | 1 | 2 | 3 | 4 | 5 |
| 4.  | Respect                      | 1 | 2 | 3 | 4 | 5 |
| 5.  | Positive impact on my health | 1 | 2 | 3 | 4 | 5 |
| 6.  | Having fun                   | 1 | 2 | 3 | 4 | 5 |
| 7.  | Performance                  | 1 | 2 | 3 | 4 | 5 |
| 8.  | Teamwork                     | 1 | 2 | 3 | 4 | 5 |
| 9.  | Challenging myself           | 1 | 2 | 3 | 4 | 5 |
| 10. | Competition                  | 1 | 2 | 3 | 4 | 5 |
| 11. | Financial gains              | 1 | 2 | 3 | 4 | 5 |
| 12. | Glory                        | 1 | 2 | 3 | 4 | 5 |
| 13. | Recognition                  | 1 | 2 | 3 | 4 | 5 |

30. For each of the statements below, circle the number that best corresponds to what you believe. There are no right or wrong answers.

|                   |   |         |   |              |
|-------------------|---|---------|---|--------------|
| No serious at all |   | Neutral |   | Very serious |
| 1                 | 2 | 3       | 4 | 5            |

How serious is each of the following problems for you when it comes to sports?

|    |                                    |   |   |   |   |   |
|----|------------------------------------|---|---|---|---|---|
| 1. | Inappropriate behavior of fans     | 1 | 2 | 3 | 4 | 5 |
| 2. | Inappropriate behavior of a coach  | 1 | 2 | 3 | 4 | 5 |
| 3. | Violence among competitors         | 1 | 2 | 3 | 4 | 5 |
| 4. | Use of doping substances           | 1 | 2 | 3 | 4 | 5 |
| 5. | Lack of fair play                  | 1 | 2 | 3 | 4 | 5 |
| 6. | Racism                             | 1 | 2 | 3 | 4 | 5 |
| 7. | Discrimination on the basis of sex | 1 | 2 | 3 | 4 | 5 |
| 8. | Focus on money                     | 1 | 2 | 3 | 4 | 5 |

31. For each of the statements below, circle the number that best corresponds to what you believe. There are no right or wrong answers.

| I totally disagree | Disagree | Neutral | I agree | I totally agree |
|--------------------|----------|---------|---------|-----------------|
| 1                  | 2        | 3       | 4       | 5               |

|    |  |   |   |   |   |   |
|----|--|---|---|---|---|---|
| 1. | Doping is unethical.   | 1 | 2 | 3 | 4 | 5 |
| 2. | Doping can cause serious and/or permanent damage to the human body.  | 1 | 2 | 3 | 4 | 5 |
| 3. | I accept individuals who are doing doping.   | 1 | 2 | 3 | 4 | 5 |
| 4. | If I do doping for a short period of time, it is harmless.   | 1 | 2 | 3 | 4 | 5 |
| 5. | With doping I will get faster to the desired performance results.  | 1 | 2 | 3 | 4 | 5 |
| 6. | I would use doping if I knew that no one would ever discover it.   | 1 | 2 | 3 | 4 | 5 |
| 7. | I would train more intensively instead of using prohibited substances and methods to improve my performance in my sport. | 1 | 2 | 3 | 4 | 5 |

32. Would you break the rules by using prohibited substances to win a major medal or a cash prize, knowing that these substances cannot be detected and that, from their use, you will lose your life within the next five years?

[ 1. ----- ] Yes [ 2. ----- ] No [ ----- ]

**Thank you for your participation!**

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