

Approaches towards health promotion and doping prevention in light of determinant factors of substance abuse in sports among adolescents

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Combating societal substance abuse and doping in sports requires empirical data for goal-directed prevention and intervention measures to achieve sustained health promotion. This chapter introduces reliable data on the determinant factors of adolescent substance abuse in sports based on the results of a cross-sectional analysis carried out in the State of Thuringia, Germany in 2004, as well as recommending intervention steps with supporting scientific evidence.

In this regard, 2319 adolescents from 16 Thuringian schools were surveyed. 346 (15.1%) of the students indicated use of prohibited substances from the WADA list within the previous year (World Anti-Doping Agency Prohibited List (2004)). From this finding, substance abuse was linked to doping specific attitudes. A more negative anti-doping attitude was correlated to a more frequent use of substances from the WADA list. Moreover, non-athletes (n=490) reported substance use that was approximately 5.0% higher than that of recreational athletes (n=1254) and nearly three times higher than that of competitive athletes (n=497). All three groups performed poorly on a test regarding their knowledge about doping in general, with an average score below 60%.

The health-related quality of life measures (KINDL^R Questionnaire; Goodman, Meltzer, & Bailey 1998) identified by students regularly using substances from the WADA list, as well as legal drug usage, were significantly lower than for those students with no use at all. Just as notable, adolescents using substances from the prohibited list or legal drugs had significantly more psychological disorders (Strength and Difficulties Questionnaire; Ravens-Sieberer, & Bullinger 1998) than non-users.

The findings of this research point to the need for an alteration of attitudes towards substance abuse in sports and educational improvements in student knowledge about doping. The goal is to test the effectiveness of appropriate scientific interventions to reduce substance use and doping in sports while considering the psychological health of adolescents.

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Introduction

In an increasingly achievement-oriented society, health is valued as being of utmost importance. People take drugs without medical indications to: keep healthy and to prevent diseases, to enhance performance, as well as improve memory, concentration and creativity (Maher, 2008; Weber, & Rebscher, 2009). Adults and adolescents face the allure of using performance enhancing drugs in an attempt to increase their competitiveness and withstand the pressures to perform at jobs, schools, universities and in their leisure time activities.

Adolescence is a stage of life characterized by the development and consolidation of health-conscious, as well as risk behaviors. Since most of the time the acquired behavior patterns of adolescence will be retained and continue into adulthood, they

constitute important, influencing health factors for an individual's future (Langness, Richter, & Hurrelmann, 2005). Addressing the questions of health education for children and adolescents, such as growing up in an increasingly competitive society, gain in importance. Health is an unstable condition attended by changes, its integrity is seen as an essential challenge for humans. This relates, according to the salutogenetic model of Antonovsky, to the ability to maintain a balanced state given demands and pressures (Antonovsky, 1979). Sport reaches an even higher priority due to the health benefits of physical activity. In this regard, physical activity is considered to be an "individual investment" in body and psyche, which "gets retrieved, interest-bearing, as health" (Opper, 1998).

Sport, especially competitive sports, is linked to 'performance', as doping alludes to within the topic of sports in this society. Doping, which is "fundamentally contrary to the spirit of sport", is prohibited. This ban is based upon health protection, fairness, and the equal treatment of athletes, as well as human dignity (World Anti-Doping Agency, 2009).

At the focal point of doping, is not only performance enhancement but also the conscious changing of appearance as confirmed by numerous studies (Kindlundh, Isacson, Berglund, & Nyberg, 1998; Bahrke, & Yesalis, 2004). This phenomenon is apparent not only in elite athletes using substances from the prohibited list of the World Anti-Doping Agency (WADA) but is also evidently prevalent in adult as well as adolescent recreational athletes, which consequently risks the authenticity of sports, its positive image, and its educational options (Boos, Wulf, Kujath, & Bruch, 1998; Bahrke, & Yesalis, 2004; Nilsson, Allebeck, Marklund, Baigi, & Fridlund, 2004).

The prevalence of doping among adolescents, particularly the prevalence of anabolic androgenic steroid (AAS) use, has been mainly determined by international studies that have shown a mean AAS use of 2.8 % (minimum = 1.7%, maximum = 3.9%), with boys using them to a greater extent than girls (Windsor, & Dumitru, 1989; Durant, Ashworth, Newman, & Rickert, 1994; Luetkemeier, Bainbridge, Walker, Brown, & Eisenman, 1995; Tanner, Miller, & Alongi, 1995; Melia, Pipe, & Greenberg, 1996; Faigenbaum, Zaichkowsky, Gardner, & Micheli, 1998; Kindlundh et al., 1998). The standard of knowledge among students regarding doping and drug use in sports has been

poorly assessed, in light of the few existing surveys (Schwellnus, Lambert, Todd, & Juritz, 1992; Luetkemeier et al., 1995; Tanner et al., 1995; Lambert, Titlestad, & Schwellnus, 1998), and health risks associated with the abuse of doping relevant drugs are often underestimated (Laure, Lecerl, Friser, & Binsinger, 2004; Geyer, Parr, Koehler, Mareck, Schanzer, & Thevis, 2008).

It is difficult to differentiate between specific performance enhancing drug use and the use of drugs socially, which inadvertently affects sports performance. The few studies available on multiple substances abuse by adolescents indicate a connection between the most analyzed anabolic androgenic steroids and the use of other legal and illegal drugs (Durant et al., 1994; Luetkemeier et al., 1995; Kindlundh, Isacson, Berglund, & Nyberg, 1999; Kindlundh, Hagekull, Isacson, & Nyberg, 2001; Nilsson, Baigi, Marklund, & Fridlund, 2001).

While substance abuse among adolescents is evident, doping scandals among adults have increasingly come into the focus of public interest. Headlines such as, 'Six Olympic athletes test positive for doping' ("Six Olympic," 2010), 'Sponsor quits after Tour doping' ("Sponsor quits," 2009) or 'Four nordic skiers suspended on suspicion of doping' ("Four Nordic skiers," 2011) are almost constantly seen in news reports. As a result the political and social acceptance of sports has been put at risk as well as individual health.

What can be done to prevent doping and drug abuse in sports? To help answer this critical question, a German team headed by the Chair of Sports Medicine at the Friedrich-Schiller-University in Jena, conducted a study in 2004. The results of this cross-sectional analysis will be given after a brief description of the methodological procedures which were used in this study to gather reliable data on determinant factors of substance abuse in sports (legal drug use, knowledge, anti-doping attitude and psychological health), followed by recommendations for doping prevention measures.

Method of the study

In 2004, adolescents of Thuringia were interviewed in the course of a cross-sectional analysis by use of an anonymous questionnaire on doping, drugs and drug abuse in sports (Wanjek, Rosendahl, Strauss, & Gabriel, 2007). The 16 schools in the study, consisting

of five regular schools, four secondary schools, three sport schools and four vocational schools, were randomly selected, except for the three intentionally included sport schools. Students from the entire grades 7 and 9 of the regular schools, secondary schools and sport schools were interviewed. Also included was the entire grade 11 of the secondary schools and sport schools, as well as the entire first year of the apprenticeship vocational schools. The average age of the adolescents was 15.8 years (minimum = 12, maximum = older than 21). The administration of the survey was standardized on a voluntary basis. On average, across the various schools, 76% of the enrolled students participated.

Six of the 2319 questionnaires were excluded after the data exploration because of obviously untrue information provided by the students, especially in relation to the prevalence of banned substances from the list, which would have been contradictory to their apparent state of health. Consequently, the findings of the study were based on the evaluation of 2313 questionnaires.

To determine the level of athletic activity of the students, a selection of specific questions was used to classify the total sample into three groups: 490 non-athletes (21.9%), 1254 recreational athletes (65.0%) and 497 competitive athletes (22.2 %). 72 students could not be assigned to any of these three groups. Consequently, the evaluation was based on the remaining 2241 students.

Prevalence of substance use

As the findings of the study showed, 346 adolescents (15.1%; male = 16.3%, female = 13.9%) indicated use of listed banned substances in the previous 12 months: 16 (0.7%) anabolic-androgenic steroids, 10 (0.4%) growth hormones, 56 (2.4%) stimulants, 305 (13.2%) cannabis, 2 (0.1%) diuretics, 52 (2.2%) cocaine/heroin, and 6 (0.3%) erythropoietin. Table 1 lists the percentage of students, by gender, grade and type of athlete, who reported substance use. While 277 (12.0%) students indicated use of one of the substances, 69 (3.0%) students stated that they had used two or more substances.

Table 1 Prevalence of substances from the list by Thuringian adolescents in the previous 12 months

	Anabolics	Growth hormones	Stimulants	Cannabis	Diuretics	Cocaine/ Heroin	Erythro-poeitin
Gender							
Male	0.5%	0.5%	2.4%	15.0%*	0%	2.0%	0.2%
Female	0.9%	0.3%	2.4%	11.8%*	0.2%	2.5%	0.3%
Grade							
Grade 7	1.1%	0.6%	0.9%	2.8%**	0.3%	2.0%	0.6%
Grade 9	0.4%	0.4%	1.9%	12.4%	0%	1.6%	0.1%
Grade 11	0%	0.4%	1.5%	13.9%	0%	0.9%**	0%
First year of vocational school	1.2%	0.4%	4.3%**	18.8%**	0.1%	3.9%**	0.4%
Type of athlete							
Non-athlete	0.4%	0.4%	4.1%*	18.8%**	0.4%*	4.1%**	0.8%*
Recreational athlete	0.9%	0.6%	2.3%	14.3%	0%	2.4%	0.2%
Competitive athlete	0.4%	0.2%	1.2%	5.5%**	0%	0%**	0%

Comparison of subgroups to the total sample with Chi-square-test; */**: $p < 0.05/ 0.01$

In awareness of validity concerns, as mentioned in different studies (Durant et al., 1994; Tanner et al., 1995; Melia et al., 1996; Lambert et al., 1998), self-reporting questionnaires pertaining to the use of banned substances often exhibit limitations to the acquisition of valid responses. Students who wish to keep their substance use secret may give false responses out of fear that the data may not be handled confidentially. Others might report an inflated substance use based on a need to demonstrate strength and self-assurance. In light of this problem, and in order to assure the highest possible validity, the findings of the study were integrated into this survey along with voluntary attendance and complete anonymity. A standardized content and time-flow were also considered fundamental to the design of the questionnaire.

The most significant use of substances from the WADA list was by non-athletic students, as opposed to recreational athletes and competitive athletes (Figure 1). This was mainly due to the use of cannabis. However, cannabis use also displayed no rarity among the Thuringian athletes either, which was particularly surprising considering the potential of doping violations based on the long-term traceability of this substance. In light of this

finding, the decision-making and personal responsibility of athletes in particular ought to be strengthened by doping specific knowledge transfer.

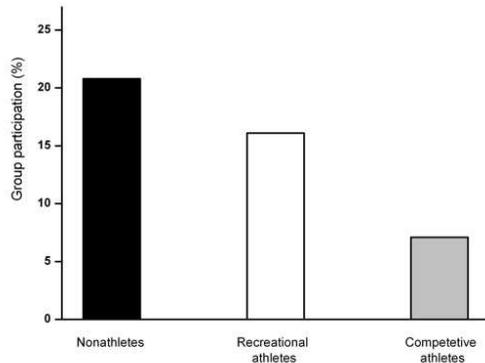


Figure 1 Description of the use of substances from the 2004 list in the previous 12 months of

the survey in connection to the type of athlete. Substances surveyed: anabolics, growth hormones, stimulants, cannabis, diuretics, cocaine/heroin, erythropoietin.

As suggested in the survey by Boos et al. (1998), the use of substances from the prohibited list is obviously not just limited to competitive athletes. The findings of this study among Thuringian adolescents follow this trend and reveal the social problem of an increased substance use that does not stop at athletes. Since society values performance, the faster and more convenient methods of achieving these goals via drug use are going to be preferred over physical training alone for performance enhancement and the conscious changing of appearance. The use of substances from the prohibited list could also be part of the drug culture of adolescents and, as shown by the results, not exclusively attributed to the goal of enhancing athletic performance. Along the same lines, the majority of Thuringian adolescents (80.4%) reported using legal drugs in the previous 12 months (cigarettes: 52.0%; alcohol: 77.3%). Non-athletes showed a strikingly higher use of cigarettes and alcohol when compared to recreational athletes and competitive athletes (Figure 2). Even though several studies (Schmidt, 1998; Kirkcaldy, Shephard, & Siefen, 2002; Laure et al., 2004) have found a positive influence of physical activity on the reduced use of legal drugs, this study shows questionable results in this regard. However, on the basis of the significant differences ($p < 0.05$) between type of athlete and substance use, it did show that participating in recreational sports in general,

and competitive intensive sports in particular have positive influences on the diminished use of alcohol and cigarettes.

A significant correlation was identified (single logistic regression; $F(1, 2284) = 200.52$; $\beta = 0.28$; $p < 0.001$) between the use of legal drugs and the use of substances from the WADA list. The probability of consuming substances from the WADA list was approximately eleven-fold ($OR = 10.98$) for adolescents using legal drugs versus non-users. It might be assumed, that students using legal drugs also have ready access to, and willingness to use, illegal substances. Consequently, intervention measures ought to be aimed primarily at reducing legal drug consumption.

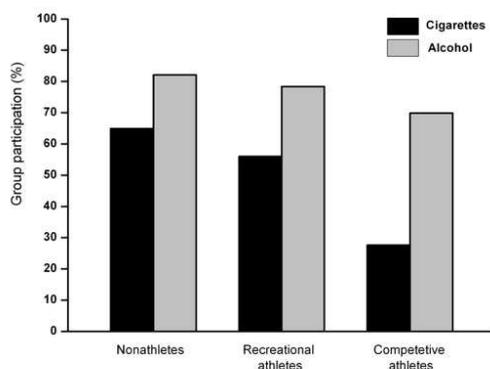


Figure 2 Consumption by type of athlete of alcohol and cigarettes in the 12 months previous to the survey

Knowledge

The findings, in regard to the student's specific knowledge of doping revealed a poor state of awareness in Thuringian youths in general, and specifically, a poor state of awareness about the potential effects and side effects of individual substances, as well as their existence on the prohibited list. The doping specific knowledge of all students was, out of a possible 33 points (100%), on average below 60%, with a mean of 20 (SD = 3.8). These results concur with research data from other studies on the consumption of AAS (Luetkemeier et al., 1995; Tanner et al., 1995), which also reported generally large gaps in knowledge. In a survey by Peters, Oberhoffer, & Michna (2009) almost 90% of competitive athletes declared themselves to be informed about doping, while they nevertheless assessed their knowledge in this regard mostly as 'poor'. Because of a lack of information, it is also important to point out that athletes may be not sufficiently

prepared to avoid accidental doping violations by “unconscious” substance use (Somerville, Lewis, & Kuipers, 2005; Geyer, Parr, Köehler, Mareck, Schänzer, & Thevis 2008).

The pure availability of educational material does not seem to be adequate to fight drug abuse in sports and doping violations. As shown by Peters et al. (2009), informational brochures specifically published for athletes were only sparsely known. It is suggested that a more proactive approach to the prevention of substance abuse needs to be implemented. The promotion of a variety of informational materials seems just as important as their creation. For example, as part of furthering anti-doping education programs such as “Education & Awareness”, the World Anti-Doping Agency (WADA (2010)) has recently launched “Coach True”, a computer-based anti-doping learning tool. It contains separate platforms for coaches of elite-level athletes, as well as coaches of young or recreational-level athletes, to educate them about anti-doping. The use of such internet based resources, especially since they offer increased opportunity to provide up-to-date information, should be promoted. In addition to trainers, as critically noted by Vitzthum, Quarcoo, Groneberg, & Schoffel (2010), parents, teachers, doctors, therapists and others need to be involved in developing an integrated concept of health promotion and anti-doping prevention as part of the need for continuing education. Comprehensive information, particularly through the use of appropriate problem-oriented and age-based teaching materials, didactically and methodically prepared, should be a main focus of prevention work (German teaching material “Doping, Drugs and Drug Abuse in Sports”, Wanjek, Albrecht, & Gabriel, 2010); Thuringian anti-doping advisory board (“Beratungsstelle,” (2011); www.antidoping-thueringen.de). Primarily, understanding and defining health-conscious behaviors that are contrary to substance abuse, as well as juvenile at risk behaviors should be studied with the goal of testing the effectiveness of various intervention measures.

Attitude

While 7.5% of Thuringian adolescents reported a supply of substances to improve athletic performance, results of a Finnish survey revealed that even twice as many competitive athletes confirmed such an offer (Nilsson, Spak, Marklund, Baigi, &

Allebeck, 2005). Besides age, the amount of physical activity and the athletic proficiency of an individual appears to have an essential influence on attitudes towards substance use. Friends were the most frequent providers of substances to improve sports performance, indicated by students, as Tanner et al. (1995) and Laure et al. (2004) also reported. Considering the mutual trust required for dealing with illegal substances, this information does not seem surprising. It should, at the same time, be seen as alarming, because peer pressure and the need to 'belong' may strongly influence the use of prohibited substances.

Approximately three-fourths of the students (72.7%) thought that doping harms health. In contrast, students using substances from the WADA list assessed their adverse health effects significantly lower than non-users. Based on this finding, the aforementioned low state of knowledge of the questioned adolescents can be seen as one of the reasons for juvenile use of substances from the prohibited list. Tossman and Pilgrim (2001) identified a similarly interesting connection in their survey regarding the subjective evaluation of health risks from using drugs. As they found out, the more dangerous the use of substances was estimated to be by adolescents, the fewer drugs were consumed. Therefore, intervention measures should be aimed at a general substance-specific increase of knowledge by using age-based strategies to transmit this type of information, as supported by scientific research data. The majority of the students (91.7%) found the use of substances from the prohibited list unfair and, overall 87.6% of the adolescents declared that they were against the release of doping substances. A significant difference between athletes and non-athletes became apparent. This result shows that, given the background of cheating, manipulation and health risks, a debate about values in life (e.g. trust, reliability and responsibility), including a debate about what life is worth, should be part of an extensive doping prevention program.

Competitive athletes were more likely to vote against the release of doping substances with increasing age, comparing the grade 11 and first year of vocational school students to the grade 7 and 9 school students. It is assumed that younger competitive athletes, in particular, still have an insufficiently developed personality. Because of this, age-based training with the goal of providing a balanced legal and health consciousness for adolescents, establishing inner strength and self-confidence in their

own performance, and fostering a sense of responsibility toward fair athletic cooperation, is suggested.

In light of their own willingness to intake doping relevant substances, 4.5% of the students indicated that they would use substances from the prohibited list if they knew other athletes had also taken them. Additionally, 7.6% of the students stated that they would use substances from the WADA list if there were “no risk of getting caught,” and almost twice as many adolescents (14.0%) would use substances from the WADA list if they could “make a million euro in a competition.” Based on these results, the influence of financial reward on the students seems to be remarkable, which replicates the material focus of life in many cases. Figure 3 shows the attitudes regarding the use of doping relevant substances, without a risk of being caught, as seen by type of athlete.

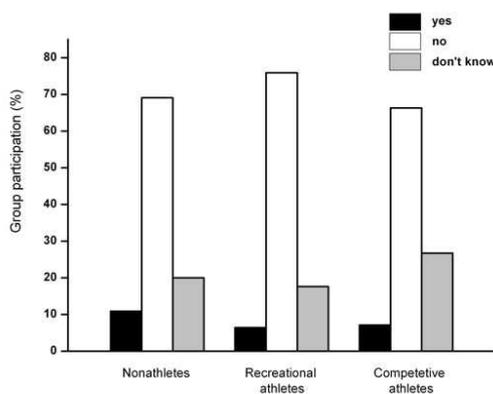


Figure 3 Doping specific attitudes of Thuringian adolescents by type of athlete concerning the question: “If there were no risk to use substances from the WADA list, would you take them?”

As a result of these findings, there should be major interest in the discussion on the ethics of this topic. Prior studies (Goldberg, Bosworth, Bents, & Trevisan, 1990; Goldberg, Bents, Bosworth, Trevisan, & Elliot, 1991) dealt exclusively with the prevention of AAS, suggesting that pure increases in knowledge are not enough to deter drug use and that scare tactics, especially with males, may achieve opposite results. One of the few existing surveys that address intervention, by Nilsson et al. (2004), reported a trend of declining AAS use with the help of a health program consisting of various

activities to build self-confidence in adolescents, and to increase awareness of society's promotion of outward appearance ideals. The goal of individual prevention strategies should be, on the one hand, to sensitize adolescents to these topics by educational measures, and, on the other hand, to discuss and modify their attitudes and ethical opinions.

Psychological health

About one third of Thuringian adolescents identified adverse effects to their health-related quality of life (KINDL^R Questionnaire; mean total score: 66.3, *SD* = 10.1). In the findings related to physical activity, non-athletes (*total score: M* = 62.8, *SD* = 10.4) assessed their health-related quality of life significantly lower than the recreational athletes (*total score: M* = 67.1, *SD* = 10.0) and the competitive athletes (*total score: M* = 67.5, *SD* = 9.0). In surveying almost 1000 adolescents from the ages of 14 to 18, Kirkcaldy et al. (2002) also found a significant connection between the level of physical activity and an individual's physical and psychological state of health. The same findings, were also seen, in a survey of 175,850 adults, by Brown et al. (2003). Based on the strength of these results, it must be considered essential to encourage adolescents into sports, to increase their participation in physical activity, and to foster lifelong physical sport involvement.

In addition to the recommended increase in sports participation, a decrease of substance use, as mentioned before, should be the declared preventive aim, supported by the following results. Students regularly using legal drugs, as well as substances from the WADA list, reported a significantly lower health-related quality of life as well as significantly more psychological disorders (in respective total scores) when compared to non-users. Looking at indicators of psychological disorders (Strength and Difficulties Questionnaire - SDQ), 2011 (87.5%) students had 'normal' behavior, 206 (8.9%) students had 'borderline' disorders and 86 (3.7%) students had 'abnormal' behavior.

Figure 4 illustrates a graph of 'abnormal' behavior (psychological disorders) of Thuringian adolescents as seen by use of legal drugs and use of substances from the WADA list.

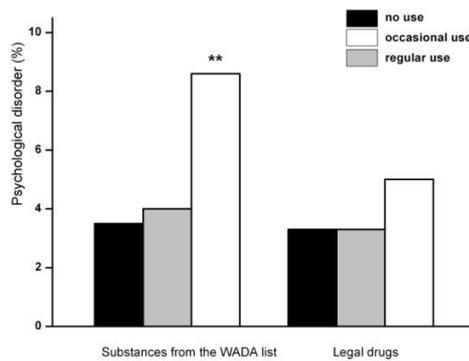


Figure 4 Psychological disorders (total difficulties score – abnormal behavior) as seen by use of legal drugs and use of substances from the WADA list. Subgroups compared to analyzed population using chi-square test; ** $p < 0.01$

Adolescents who regularly consume legal drugs and/or substances from the WADA list reported significantly more conduct problems and hyperactivity than non-consumers.

Considering the answering requirements of the SDQ-questionnaire, it is conceivable that some students do not always have their behavior under control due to chronic disobedience, and may lie or steal to acquire substances. Additionally, various psychological difficulties may occur based on specific effects of various substances used. In future studies, the psychological effects of substance use must be more clearly defined in order to achieve a singularly reliable result on probable causes.

Summary

The aforementioned determinant factors influencing substance use among adolescents revealed that an anti-doping attitude ($\beta = -0.30, p < 0.001$), along with knowledge ($\beta = 0.06, p < 0.01$), legal drug use (alcohol, cigarettes: $\beta = 0.22, p < 0.001$), and psychological health (health-related quality of life: $\beta = 0.06, p < 0.01$; psychological disorders: $\beta = 0.07, p < 0.01$) made significant contributions to the resulting variance (F

(5, 2250) = 91.41, $p < 0.01$, $R^2 = 0.17$). What the present findings do tell us is that the lower the anti-doping attitude, the higher the occurrence of legal drug use and the higher the likelihood of more psychological disorders, the more often substances from the prohibited list were consumed. While anti-doping attitude proved to have the largest influence, it must be mentioned that the stated factors only define 17 % of the variance among all factors leading to WADA list substance use. As a result, the larger contribution to this variance must be attributed to the influence of other factors, which need to be investigated in future studies. Such studies might consider the correlation between self-concept related to health promotion and doping prevention in sports among adolescents, since, according to Pinguart and Silbereisen (2000), particularly with positive self-confidence, adolescents show a reduction of age-related risk factors. Thus, it is assumed that a negative self-concept among adolescents (e.g. image of beauty ideal) is related to a lower anti-doping attitude and an accordingly higher substance abuse in sports.

Conclusion

The widespread use of legal and illegal substances in society today, with their attendant potential health risks, must be seen as a serious public health problem.

Doping and drug abuse are continuing to spread among adolescents in general, and have been proven to exist among Thuringian youth, including young people involved in sports.

Effective doping prevention measures need to be initiated at an early stage, before a substance is first used. The successful implementation of prevention campaigns should essentially target the sporting environment, not just the individual athlete. The aim of these campaigns would be to alter attitudes towards substance abuse in sports in general, as well as increase the knowledge among adolescents of the health issues related to specific drugs and doping. Finally, prevention campaigns should aspire to decrease legal drug use as well as increase participation in sports as a fundamental factor worth promoting. An important future goal is to evaluate the practicality and effectiveness of doping prevention-interventions through longitudinal analysis.

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