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Research article

Attitudes and Motivations of Competitive Cyclists Regarding Use of Banned and Legal Performance Enhancers

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Abstract
Drug 'doping' and the use of banned performance enhancing products (PEPs) remains an issue in virtually all competitive sports despite penal consequences and known health risks. The lines distinguishing "fair" and "unfair" performance enhancement have become increasingly blurred. Few studies have explored how attitudes towards legal performance enhancers (drugs/substances, diet, and equipment modifications) may influence motivations to use banned PEPs. In the present study, 68 competitive cyclists completed a survey examining the importance of choosing banned and non-banned PEPs using World Anti-Doping Agency (WADA) and Union Cycliste Internationale (UCI) criteria. Results showed that over 60 percent of cyclists used non-banned PEPs while 8 percent used banned PEPs. Health was overall the most important factor in choosing a PEP while apprehension by a doping agency was least important. Mixed-model ANOVA analyses revealed that motivations to use banned PEPs were complex, as the importance of health, violating the sprit of the sport, performance improvement, and getting caught were differentially influenced by PEP legality ($p < 0.001$) and whether a cyclist endorsed non-banned PEP use ($p < 0.001$). The importance of winning, sponsorship, and maintaining competitiveness did not influence non-banned PEP use ($p > 0.05$). Our findings illustrate the multifactorial nature of PEP use/doping attitudes and highlight the unique role that "legal" performance enhancement may plays in influencing banned and/or unethical sports behaviors.

Key words: Doping, sports ethics, health, WADA.

Introduction

The drive to succeed, to perform at the highest attainable level, is a natural component of competitive athletics. Among certain athletes, this drive may culminate in the use of performance enhancing substances or devices (Catlin et al., 2008; Lippi et al., 2008a). Sports governing bodies, such as the World Anti-Doping Agency (WADA), are primarily concerned with athletic performances achieved with unfair of dangerous means – whether these be specific techniques, equipment, substances, or medications. Drug 'doping,' the chemical alteration of athletic performances by a substance or procedure, can be associated with deleterious effects on health (Davis and Summers, 2008; Dodge and Jaccard, 2008; Lage et al., 2002, Spedding and Spedding, 2008). The WADA characterizes a drug as "illegal" in competition if it satisfies two of the following three criteria: 1) enhances performance, 2) represents a risk to health, and 3) violates the "Spirit of the Sport" (Savulescu et al., 2004). Non-pharmacological means of gaining unfair advantage, such as unsanctioned equipment modifications, typically fall under the jurisdiction of sports' individual governing bodies.

Despite potential health risks and penal repercussions (e.g., forfeiture of winnings, sport banishment) associated with doping and the use of other unsanctioned products/equipment, the use of banned performance enhancing products (PEPs) remains an issue in virtually all adult competitive sports (Lippi et al., 2008b; Noakes, 2004). In the empirical literature, the use of any substance (sanctioned or unsanctioned) to enhance performance in the face of perceived obstacles is generally defined as "doping behavior" (Johnson, 2000; Laure, 2000). Although ample evidence illustrates the dangers of doping and prevalence rates among athletes in different sports (Alaranta et al., 2006), research exploring the attitudes and beliefs that may contribute to use of unsanctioned substances/products are inconsistent. While some findings suggests that doping users and non-users may perceive health risks differently, the contributions of proposed demographic and psychological variables (e.g., self esteem, anxiety) are equivocal (Kirby et al., 2011; Laure and Binsinger, 2007; Laure et al., 2004; Mazanov et al., 2008). Despite uncertainty in the literature, it is generally understood that athletes' rationales for using PEPs likely include a desire to maximize performance/succeed (Anshel, 1991; Laure and Binsinger, 2005) and perceptions of risks to health (Lentillon-Kaestner et al., 2012).

A challenge in developing theoretically sound and applicable PEP use models is the complexity and heterogeneity in which these behaviors occur. It is well known in the social sciences literature that beliefs, motivations, attitudes and environmental factors play an important role in understanding and predicting behavior (Ajzen, 2001). Within the context of doping behaviors, this is perhaps best summarized in Backhouse's WADA manuscript on drug use attitudes and behaviors in sports (Backhouse et al., 2011). In this comprehensive literature review, the authors systematically highlight how doping appraisals and actions are largely dependent on contextual factors, including the type of sport (e.g., body building vs. cycling), level of competition (e.g., high school, college, professional competition), and the characteristics of the individual (e.g., athlete, coach, general population).

Existing models of doping behaviors attempt to account for the complexity of this phenomenon, and often incorporate key psychological and societal/environmental factors. For example, the Drugs in Sports Deterrence

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model (DSDM) highlights the role of decisional processes involved in performance enhancer use, as well as the contributions of other factors (e.g. affect, cognition) that may influence this cost-benefit analysis (Strelan and Boeckmann, 2003). Another conceptual framework, the Drug Compliance in Sports Model, presents eight factors believed to influence intentions towards drug use: threat appraisal; benefit appraisal; personal morality; legitimacy; personal self-esteem; reference group opinion; drug affordability; and drug availability (Donovan et al., 2002). While these and other promising theories exist (Petroczi and Aidman, 2008; Strelan and Boeckmann, 2003), further empirical derived models are need, as existing perspectives often fail to account for considerable amounts of variance in predicting doping behaviors and attitudes (Petróczi, 2007).

A challenge encountered by sports governing bodies is the reality that it is virtually impossible for laws/regulations/rules to keep up with the technological advances of doping, particularly as newer drugs mimic natural human processes (Savulescu et al., 2004). This challenge also falls on athletes; in pursuit of an advantage, a competitor may find a category of PEPs that is not explicitly listed as banned or non-banned. Legal/non-banned PEPs is a broad and subjective category, as an athlete may (correctly or incorrectly) perceive virtually anything as contributing to improved performance (e.g., equipment, dietary modifications, clothing, etc). Even among established guidelines, the ethics of PEPs use can be unclear, confusing, and contradictory. For example, while the use of technologically-constructed hypoxic environments are approved by many sports governing bodies, the mechanisms underlying their efficacy are similar to those of erythropoietin (EPO), a banned substance (Loland and Caplan, 2008). Another example is the well-publicized use of AOD-9604, an analogue of growth hormone releasing factor, by the Australian Essendon Football Club in 2012. This relatively new compound fell under the WADA's "S.O." category, and thus, should have been prohibited (Paton, 2013). Predictably, the ethics of "legal" and "illegal" performance enhancement have become increasingly blurred as recent studies illustrate that society has become more tolerant of doping over time (Vangrunderbeek and Tolleneer, 2011). Another potential concern lies in dietary supplements – frequently used by athletes as non-banned PEPs – which are not required to undergo testing to confirm efficacy or safety (Dodge and Jaccard, 2007). Unfortunately, our knowledge of effective anti-doping programs is still in its infancy; this outcome literature is narrowly focused in the realm of anabolic steroid use (Sjöqvist et al., 2008), and results suggest that education alone is likely insufficient to change behaviors (Backhouse et al., 2011).

To fully understand the complexity of doping/cheating drives among athletes, it is important to also understand the motivations and attitudes driving legal/non-banned PEP use. As most efforts to eradicate doping/cheating among elite cyclists have been ineffective (Lippi et al., 2008b), a greater understanding of the interplay between athletes attitudes and beliefs about PEPs and doping behaviors is essential. Thus, the aim of the present pilot study is to examine legal, ethical, and practical considerations in choosing to use legal/non-banned PEPs among a sample of competitive cyclists, and how these attitudes may influence sanctioned/banned PEP use behaviors. Additionally, we sought to examine the differential importance of World Anti-Doping Agency (WADA) and Union Cycliste Internationale (UCI) doping criteria among non-banned PEP users.

Methods

Participants

Participants comprised 68 adult non-professional competitive cyclists (61 males and 7 females; *M* age = 36.38, *SD* = 10.35). Participants had to be 18 years or older. The sample's household income (*M* = $128.84 thousand, *SD* = $151.93) and educational attainment (77.9% had either a college or graduate degree; only one participant had no college or graduate education) suggests overall moderate to high socioeconomic status. The racial breakdown of our sample was as follows: Caucasian (n = 59); Hispanic/Latino (n = 6); Asian or Pacific Islander (n = 1); and "other" (n = 2).

Procedure

The present study was approved by the University of Florida Institutional Review Board. The study was advertised through flyers posted throughout the University of Florida campus as well as bike shops and cycling races in the surrounding community. Interested cyclists were provided a URL to access the web-based survey. The survey took less than five minutes to complete and consisted of twenty-two items assessing demographic characteristics and attitudes towards performance enhancing products (PEPs). Only select items were used for the present study. Informed consent was obtained from each cyclist and all responses were anonymous.

Measures

Visual Analogue Scales (VAS)

Visual analogue scale (VAS) measurements were used by participants to evaluate the importance of choosing PEPs for several distinct categories. These included "UCI Items" – four doping rationale categories presented in a UCI anti-doping certification program, and "Incentive Items" – additional factors that related to doping incentives (Table 1). Three of the four UCI items are also consistent with WADA criteria for doping. VAS anchors were "Not at all important" and "Extremely important."

Cyclists were first asked to rate the importance of four criteria (i.e., the UCI Items) believed to be of significance in choosing to use PEPs: 1) getting caught by the Antidoping Agency (ADA); 2) amount of performance improvement; 3) risk to health; and 4) violation of the spirit of the sport. Participants rated the importance of each of these factors by the "legality" of the PEPs - either banned or non-banned PEPs - comprising a total of eight VAS ratings.

For the "Incentive Items," cyclists rated the importance of choosing any PEP (i.e. PEP legality was not

specified) for three additional factors: 1) winning, 2) obtaining/retaining sponsorship, 3) and maintaining competitiveness with other cyclists using PEPs.

Table 1. Survey VAS overall means and standard deviations.

Variable	Mean	SD
UCI Factors (banned and non-banned PEPs)		
Importance in selecting BANNED substance - "Getting caught by Anti-doping agency"	35.01	41.38
Importance in selecting BANNED substance - "The amount of Performance Improvement"	38.84	41.11
Importance in selecting BANNED substance - "Risk to Health"	80.22	32.81
Importance in selecting BANNED substance - "Violation of the Spirit of Sport"	75.72	36.41
Importance in selecting NON-BANNED substance - "Getting caught by Anti-doping agency"	12.34	27.82
Importance in selecting NON-BANNED substance -"The amount of Performance Improvement"	64.46	37.17
Importance in selecting NON-BANNED substance -"Risk to Health"	83.66	29.62
Importance in selecting NON-BANNED substance -"Violation of the Spirit of Sport"	45.56	41.10
Doping Incentive Factors (for ALL PEPs)		
Importance of Winning	53.76	37.90
Importance of Obtaining/retaining Sponsorship	26.99	36.45
Importance of Maintaining competitiveness with others who are using performance enhancing products	49.76	40.91

Note: VAS anchors were "Not at all important" and "Extremely important"

Categorical Outcomes

Cyclist responded either "yes" or "no" as to whether they used non-banned PEPs.

Statistical Analyses

Descriptive Statistics

Means and standard deviations were calculated for all continuous VAS survey outcomes (Table 1). Frequencies were calculated for all categorical variables.

Analyses of Variance (ANOVAs)

UCI Items/Factors: A 4 x 2 x 2 mixed-model ANOVA examined the relationship between the four UCI Items and related PEP factors. The importance of PEP legality (i.e. choosing banned or non-banned PEPs) served as a dichotomous within-subjects factor. Non-banned PEP users vs. non-users served as a dichotomous between-subjects factor. All significant main effects and interactions were further decomposed with Bonferroni adjusted post hoc comparisons.

Incentive Items/Factors: A 3 x 2 mixed-model ANOVA examined the relationship between the three Incentive Items and non-banned PEP use. Similar to the first ANOVA, non-banned users vs. non-users served as the dichotomous between-subjects factor. All significant effects were further decomposed with Bonferroni adjusted post hoc comparisons.

Results

Cyclists' characteristics

On average, the sample had over nine years experience as competitive cyclists (M = 9.16, SD = 8.08). Only five cyclists reported that they had ever used a banned PEP, while the vast majority (n = 63) denied using said products. Each of the five cyclists reported using one banned PEP each: marijuana, EPO, amphetamines, Viagra, and "B complexes, vitamin C and D." Over half the cyclists (n = 41) reported using non-banned PEP, while 27 denied use of these products. There was wide range of perceived non-banned PEPs endorsed, including over the counter supplements, energy drinks, electrolyte replacement products, EP-No, equipment modifications (e.g., power meter, aero efficient equipment, HR monitor, altitude tent, etc.) and Viagra. The fact that a non-banned PEP was perceived as banned (i.e. "b complexes, Vitamin C and D") and vice versa (i.e. Viagra) illustrates the confusion regarding PEPs likely experienced by many athletes. Means and standard deviations for survey VAS outcomes are presented in Table 1.

UCI Items/Factors

UCI Items were overall rated from most to least important in the following order: risk to health; performance improvement; violating the spirit of the sport; and being caught by the ADA. There were significant overall differences between the four factors ($p < 0.001$); only the difference between performance improvement and violating the spirit of the sport was not statistically significant ($p > 0.05$). Ratings of PEP legality (i.e., banned vs. non-banned) and non-banned users vs. non-users were not significant ($p > 0.05$).

An interaction between UCI Items and PEP legality was observed ($p < 0.001$). While the importance of choosing non-banned PEPs had an identical UCI Item rank order as described above, for banned PEPs, the rank order (from most to least important) was as follows: health; spirit of the sport; performance improvement; and being caught by the ADA. Additionally, only the difference between risk to heath and violating the spirit of the sport was not significant. Comparing individual UCI Items, violating the spirit of the sport and being caught by the ADA were more important when choosing banned PEPs; performance improvement was more important when choosing non-banned PEPs.

There was a significant 3-way interaction spanning all domains – UCI Items, PEP users vs. non-users, and PEP Legality ($p < 0.001$). For example, the importance of spirit of the sport over performance improvement was only consistent within the context of choosing banned PEPs; within the context of non-banned PEP use, performance improvement was more important for non-banned PEP users while these items were equally important for non-users. Additional post hoc comparisons for the interaction are detailed in Table 2.

Incentive Items/Factors

Overall, both winning ($p < 0.001$) and maintaining competitiveness with other riders using PEPs ($p < 0.001$) were

Table 2. UCI factors ANOVA.

Factor/Post Hoc Comparison	F/Mean Difference	P
UCI Items	F(2.36, 155.90) = 46.367	<.001**
Performance Improvement > Anti-Doping-Agency	26.632	<.001**
Health > Anti-Doping-Agency	58.921	<.001**
Spirit of Sport > Anti-Doping-Agency	37.197	<.001**
Health > Performance Improvement	32.290	<.001**
Health > Spirit of Sport	21.724	<.001**
Non-banned Users vs. Non-users	F(1, 66) = 2.672	>.05
User > Non-user	6.479	>.05
PEP Legality	F(1,66) = 3.513	>.05
Banned > Non-banned	5.532	>.05
Non-banned Users vs. Non-users X PEP Legality	F(1, 66) = .461	>.05
Non-banned Users vs. Non-users X UCI Items	F(3, 198) = 1.356	>.05
UCI Items X PEP Legality	F(2.64, 174.03) = 25.545	<.001**
For Banned PEPs…	-	-
Health > Anti-Doping-Agency	46.284	<.001**
Spirit of Sport > Anti-Doping-Agency	40.048	<.001**
Health > Performance Improvement	42.013	<.001**
Spirit of Sport > Performance Improvement	35.777	<.001**
For Non-banned PEPs….	-	-
Performance Improvement > Anti-Doping-Agency	48.993	<.001**
Health > Anti-Doping-Agency	71.559	<.001**
Spirit of Sport > Anti-Doping-Agency	34.346	<.001**
Health > Performance Improvement	22.566	.001*
Health > Spirit of Sport	37.213	<.001**
Anti-Doping-Agency Bannned > Anti-Doping-Agency Non-banned	21.606	<.001**
Performance Improvement Non-banned > Performance Improvement Banned	23.116	<.001**
Spirit of Sport Banned > Spirit of Sport Non-banned	5.582	<.001**
UCI Items X PEP Legality X Non-banned Users vs. Non-users	F (3, 198) = 5.491	<.01 *
For Banned PEPs, Performance Improvement for Non-banned user > nonuser	30.548	<.01*
For Non-banned PEP users…	-	-
Health > Anti-Doping-Agency for Banned PEP	41.049	<.001**
Spirit of Sport > Anti-Doping-Agency for Banned PEP	43.244	<.001**
Health > Performance Improvement for Banned PEP	38.951	<.001**
Spirit of Sport > Performance Improvement for Banned PEP	41.146	<.001**
Performance Improvement > Anti-Doping-Agency for Non-banned PEP	64.171	<.001**
Health > Anti-Doping-Agency for Non-banned PEP	70.415	<.001**
Spirit of Sport > Anti-Doping-Agency for Non-banned PEP	28.878	<.001**
Performance Improvement > Spirit of Sport for Non-banned PEP	35.293	<.01*
Health > Spirit of Sport for Non-banned PEP	41.537	<.001**
Banned Anti-Doping-Agency > Non-banned Anti-Doping-Agency	26.805	<.001**
Non-banned Performance Improvement > Banned Performance Improvement	35.268	<.001**
Banned Spirit of Sport > Non-banned Spirit of Sport	41.171	<.001**
For Non-banned PEP Non-users…	-	-
Health > Anti-Doping-Agency for Banned PEP	51.519	<.001**
Spirit of Sport > Anti-Doping-Agency for Banned PEP	36.852	<.05*
Health > Performance Improvement for Banned PEP	45.074	<.001**
Performance Improvement > Anti-Doping-Agency for Non-banned PEP	33.815	<.01*
Health > Anti-Doping-Agency for Non-banned PEP	72.704	<.001**
Spirit of Sport > Anti-Doping-Agency for Non-banned PEP	39.815	<.001**
Health > Performance Improvement for Non-banned PEP	38.889	<.001**
Health > Spirit of Sport for Non-banned PEP	32.889	<.01*
Banned Anti-Doping-Agency > Non-banned Anti-Doping-Agency	16.407	<.05*

Note: *F*, *F* Statistic; *P*, *P* value; PEP, Performance Enhancing Product; Anti-Doping-Agency, importance of being caught by the ADA; Performance Improvement, importance of performance improvement; Health, importance of risk to health; Spirit of the Sport, importance of violating the spirit of the sport; * Indicates significant difference ($p < 0.05$); ** Indicates significant difference ($p < 0.001$).

significantly more important than maintaining sponsorship (Table 3). There was no significant difference between winning and maintaining competition with other cyclists using PEP ($p > 0.05$). There were no overall significant differences between PEP users and non-users ($p > 0.05$), although the interaction of this factors with UCI Items trended towards significance ($p = 0.058$).

Discussion

The aim of the present investigation was to identify the importance of several factors, including WADA/UCI doping criteria, in choosing to use PEPs among competitive cyclists, and to determine the extent to which these factors interact across different contexts. A unique aspect of this pilot study was the examination of attitudes towards non-banned PEP use – an areas that has received scant attention in the literature (Dodge and Jaccard, 2007). Although use of banned PEPs was low in our

Table 3. Incentive factors ANOVA.

Factor/Post Hoc Comparison	F / Mean Difference	P
Incentive Factors	F(1.74, 114.71) = 18.945	<.001**
Winning > Sponsorship	24.762	<.001**
Competition > Sponsorship	20.990	<.001**
Winning > Competition	3.772	>.05
Non-banned PEP Users vs. Nonusers	F(1, 66) = 2.525	>.05
Users > Nonusers	12.672	>.05
Incentive Factors X Non-banned Users vs. Nonusers	F(1.74, 114.71) = 3.066	>.05

Note: *F*, *F* Statistic; *P*, *P* value; *, Indicates significant difference ($p < 0.05$); **, Indicates significant difference ($p < 0.001$).

sample (less than 8 %), over 60% of the cyclists endorsed using non-banned PEPs. Overall, risk to health was the most important factor and being caught by the ADA was least important in selecting PEPs. Not surprising for our sample of non-professional athletes, winning and maintaining competiveness were viewed as more important than preserving sponsorship. Although not a priori hypothesized, several interactions between factors were observed, highlighting the complexity of attitudes towards PEP use across different contexts and sample subpopulations.

Risk to health

Although rated as the overall most important criteria in choosing to use PEPs, risk to health was deemed as important as other UCI Items under certain conditions. For example, violating the spirit of the sport was as important as risk to health when considering banned PEPs. Within the context of non-banned PEP use, performance improvement was as important as risk to health, though only for cyclists acknowledging non-banned PEP use. The value of health (compared to other UCI items) was consistently high for cyclists identifying themselves as PEP non-users.

Apprehension by Anti-doping Agency (ADA)

Getting caught by the ADA was the least important UCI factor when choosing a PEP under most circumstances. Within the context of banned PEP use, performance improvement was equally unimportant. Not surprisingly, being caught by the ADA was generally less important when choosing to use a non-banned PEP.

Performance improvement

Performance improvement (along with spirit of the sport), was one of the UCI Items that was most influenced by contextual factors. Although typically falling somewhere between the important of health and being caught by the ADA, under certain contexts (described above) it was as meaningful as the most important factors or as insignificant as the least important factor. Within the context of non-banned PEP use, performance improvement was more important than spirit of the sports for non-banned users and equally important as spirit of the sports for non-users.

Violating the "Spirit of Sport"

The WADA code of ethics (2009) defines "Spirit of The Sport" as "the celebration of the human spirit, body and mind" characterized by several values, including "ethics, fair play, and honestly," "respect for rules and laws," "health," and "excellence in performance." Some research suggests that, among the general population, "heath" is often considered when conceptualizing this concept (Mazanov et al., 2008). This UCI Item was highly context dependent. For example, within the context of choosing banned PEPs, non-banned PEP users rated it as equally important as health while non-users rated health as more important. Furthermore, within the context of choosing non-banned PEPs, spirit of the sport was much less important than performance improvement for non-banned PEP users, while these factors were equally important for non-users.

Incentive items

Our sample viewed maintaining competitiveness and winning as more important than retaining sponsorship across all settings. This was an expected finding considering the sample of non-professional athletes. A trend towards significance ($p = 0.058$) suggests that non-banned PEP users may value winning and competition more than their non-user counterparts. Additional studies are needed with larger sample sizes to explore this relationship.

Limitations

There were several limitations to this study. Firstly, this population represents a convenience sample of cyclists who responded to study advertisements at races and through online message boards, making our research susceptible to potential selection bias issues common in survey research. Also, although the use of self-report measures is prevalent in doping research, these measures have some limitations, including the tendency for self-presentation bias (Backhouse et al., 2011). More work also is needed to establish the psychometric properties of our survey measure. While our examination of non-banned PEPs was a strength, no specific definition of non-banned PEPs was given. The findings could have been enriched if we examined banned PEP users and non-users in our model. Although these data were collected, a limited sample of PEP users ($n = 5$) would have drastically limited the interpretations of those findings. We hope to present findings from a more robust data set in the future. Although the factors examined in this study were composed of WADA and UCI doping criteria, survey construction was not driven by a specific theoretical model. Similarly, the authors understand that there are several possible contributors to doping behavior (e.g., affect, self-esteem, reference group opinion) that were not incorporated into the pilot study; we aim to broaden the scope of our investigation in future iterations of our survey meth-

odology. Finally, although the sample size was too small for model testing, the investigators hope is that these findings will contribute to existing or new hypothesis-driven theoretical models.

Conclusion

These results show that PEP use is widespread, even in a sample of amateur, well-educated, relatively wealthy cyclists. The distinction between "banned" and "non-banned" products is often unclear, and the use of these products by the cyclist sample is not decided on simple factors. Non-banned PEPs that purport to manipulate the same parameters as banned substances (red blood cell count, for instance) might still be used, despite potentially similar risks to health. This highlights that the decision to use banned or non-banned PEPs is likely complex and multifactorial, and may support a "slippery slope" conceptualization of PEP use. Forming firm distinctions between types of PEPs and the criteria for their legality is difficult, and perhaps not always well understood by the typical athlete. This may contribute to lessening the distinction between banned and non-banned approaches, and subsequent use. Findings from the current investigation are important contributions to the literature as there is relatively sparse evidence, empirical or theoretical, on factors that may impact PEP use among athletes (Petroczi and Aidman, 2008). Although some theory-driven models have been developed (Perko et al., 2000, Dodge et al., 2003), this literature is still in it's infancy. Understanding the differences in attitudes among adult athletes who use and don't use PEPs may help to formulate theories on how other factors (e.g., societal, psychological) drive doping behaviors, and ultimately, may inform effective anti-doping measures and prevention programs.

References

Ajzen, I. (2001) Nature and operation of attitudes. *Annual Review of Psychology* **52,** 27-58.

Alaranta, A., Alaranta, H., Holmila, J., Palmu, P., Pietilã, K. and Helenius, I. (2006) Self-reported attitudes of elite athletes towards doping: differences between type of sport. *International Journal of Sports Medicine* **27,** 842-846.

Anshel, M.H. (1991) A survey of elite athletes on the perceived causes of using banned drugs in sport. *Journal of Sport Behavior* **14,** 283-310.

Backhouse, S., Mckenna, J., Robinson, S. and Atkin, A. (2011) International literature review: attitudes, behaviours, knowledge and education – drugs in sport: past, present and future. *Leeds Metropolitan University Carnegie Research Institute,* Prepared for World Anti-Doping Agency.

Catlin, D. H., Fitch, K.D. and Ljungqvist, A. (2008) Medicine and science in the fight against doping in sport. *Journal of Internal Medicine* **264,** 99-114.

Davis, E. and Summers, R. (2008) The rush to adrenaline— drugs in sport acting on the b-adrenergic system. *The British Journal of Pharmacology* **154,** 584-597.

Dodge, J., Ford, M.A. and Perko, M.A. (2003) From epedra to creatine: using theory to respond to dietary supplement use in young athletes. *American Journal of Health Studies* **17,** 98-104.

Dodge, T. and Jaccard, J.J. (2007) Negative beliefs as a moderator of the intention–behavior relationship: decisions to use performance-enhancing substances. *Journal of Applied Social Psychology* **37,** 43-59.

Dodge, T. and Jaccard, J.J. (2008) Is abstinence an alternative?: predicting adolescent athletes' intentions to use performance enhancing substances. *Journal of Health Psychology* **13,** 703-711.

Donovan, R.J., Egger, G., Kapernick, V. and Mendoza, J. (2002) A conceptual framework for achieving performance enhancing drug compliance in sport. *Sports Medicine* **32,** 269-284.

Johnson, M.B. (2000) A systematic model of doping behavior. *The American Journal of Psychology* **124,** 151 -162.

Kirby, K., Morgan, A. and Guerin, S. (2011) A qualitative analysis of the experiences of elite athletes who have admitted to doping for performance enhancement. *International Journal of Sport Policy and Politics* **3,** 205-224.

Lage, J.M.M., Panizo, C., Masdeu, J. and Rochea, E. (2002) Cyclist's doping associated with cerebral sinus thrombosis. *Neurology* **58,** 665.

Laure, P. (2000) Dopage et société. *L' Eurobiologiste* **34,** 47 - 50.

Laure, P. and Binsinger, C. (2005) Adolecent athletes and the demand and supply of drugs to improve their performance. *Journal of sports Science and Medicine* **4,** 272-277.

Laure, P. and Binsinger, C. (2007) Doping prevalence among preadolescent athletes: a 4-year follow-up. *British Journal of Sports Medicine* **41,** 660-663.

Laure, P., Lecerf, T., Friser, A. and Binsinger, C. (2004) Drugs, recreational drug use and attitudes towards doping of high school athletes. *International Journal of Sports Medicine* **25,** 133-138.

Lentillon-Kaestner, V., Hagger, M.S. and Hardcastle, S. (2012) Health and doping in elite-level cycling. *Scandinavian Journal of Medicine & Science in Sports* **22,** 596-606.

Lippi, G., Franchini, M. and Guidi, G.C. (2008a) Doping in competition or doping in sport? *British Medical Bulletin* **86,** 95-107.

Lippi, G., Framchini, M. and Guidi, G.C. (2008b) Switch off the light on cycling, switch off the light on doping. *British Journal of Sports Medicine* **42,** 162-162.

Loland, S. and Caplan, A. (2008) Ethics of technologically constructed hypoxic environments in sport. *Scandinavian Journal of Medicine & Science in Sports* **18,** 70-75.

Mazanov, J., Petróczi, A., Bingham, J. and Holloway, A. (2008) Towards an empirical model of performance enhancing supplement use: a pilot study among high performance UK athletes. *Journal of Science and Medicine in Sport* **11,** 185-190.

Noakes, T.D. (2004) Tainted glory - doping and athletic performance. *New England Journal of Medicine* **351,** 847-849.

Paton, A. (2013) Essendon drug defence hangs on whether AOD-9604 is an illegal substance. *Herald Sun*. Available from URL: http://www.heraldsun.com.au/sport/afl/essendon-drug-defence-hangs-on-whether-aod9604-is-an-illegal-substance/story-fni5f6kv-1226669509975

Perko, M.A., Eddy, J.M., Bartee, R.T., Wang, M.Q. and Eddy, J. (2000) Giving new meaning to the term "taking one for the team": influences on use/non-use of dietary supplements among adolescent athletes. *American Journal of Health Studies* **16,** 99-106.

Petróczi, A. (2007) Attitudes and doping: a structural equation analysis of the relationship between athletes' attitudes, sport orientation and doping behaviour. *Substance Abuse Treatment, Prevention, and Policy* **2,** 34.

Petróczi, A. and Aidman, E. (2008) Psychological drivers in doping: The life-cycle model of performance enhancement. *Substance Abuse Treatment, Prevention, and Policy* **3,** 7.

Savulescu, J., Foddy, B. and Clayton, M. (2004) Why we should allow performance enhancing drugs in sport. *British Journal of Sports Medicine* **38,** 666-670.

Sjöqvist, F., Garle, M. and Rane, A. (2008) Use of doping agents, particularly anabolic steroids, in sports and society. *The Lancet* **371,** 1872-1882.

Spedding, M. and Spedding, C. (2008) Drugs in sport: a scientist–athlete's perspective: from ambition to neurochemistry. *British Journal of Sports Medicine* **154,** 496-501.

Strelan, P. and Boekmann, R.J. (2003) A new model for understanding performance-enhancing drug use by elite althletes. *Journal of Applied Sport Psychology* **15,** 176 - 183.

Vangrunderbeek, H. and Tolleneer, J. (2011) Student attitudes towards doping in sport: shifting from repression to tolerance? *International Review for the Sociology of Sport* **46,** 346-357.

Key points

- Use of performance enhancers is high even among non-professional athletes.
- Cyclists overall rated “risk to health” as the most important factor in choosing to use a performance enhancing product.
- Motivations to use banned performance enhancer are complex and are significantly influenced by whether an athlete utilizes “legal” performance enhancers.

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