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Predictors of Doping Intentions in Elite-Level Athletes: A Social Cognition Approach

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Doping use is an ongoing problem in contemporary sports. Despite efforts to detect and control doping, research on its etiology is limited, especially among elite-level athletes. The present study used an integrated social cognition model to examine the predictors of doping intentions. Structured anonymous questionnaires were completed by 1075 Greek adult elite-level athletes (*M* age = 25 years, *SD* = 5.89, 36.1% females) from both team and individual sports. Multiple regression and mediation analyses showed that attitudes, normative beliefs, situational temptation, and behavioral control significantly predicted doping intentions. A normative process was identified whereby situational temptation mediated the effects of normative beliefs on intentions. The findings provide the basis for future social cognition research in doping use, and set the framework for the development of evidence-based preventive interventions.

Keywords: performance enhancing drugs, PED use in sports, normative influence, situational temptation, mediation effect

The use of prohibited performance-enhancing drugs (PEDs) is not a new issue in sports, and the collective term *doping* is officially used to denote illegitimate performance enhancement substances and methods among professional and amateur athletes. Public awareness on PED use was raised following the death of a cyclist who abused stimulants in the Tour de France in late 1960s (Dauncey & Hare, 2003). Over the last two decades, information campaigns and doping control efforts have increased across almost all competitive sports, with the active participation of international sports associations and federations (Petroczi, 2007).

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The fight against doping use was strengthened by the formation of the World Anti-Doping Agency in 1999, which is responsible for monitoring doping use in athletes participating in national and international events, such as the Olympic Games. Most importantly, the World Anti-Doping Agency has made important steps toward globalizing antidoping efforts by introducing the *Anti-Doping Code*. So far, prevention strategies focus on penalization of doping use, and campaigns striving to inform athletes about the adverse health effects related to PED use. Prevention interventions would benefit greatly by more evidence on the psychosocial risk factors for doping use, and this requires a theory-driven approach on the potential predictors of doping behavior.

The existing literature on the etiology of doping use is limited and relatively new (Backhouse, Atkin, McKenna, & Robinson, 2007). Petroczi and Aidman (2009) noted that doping use in sports is deliberate and planned, and, among other factors, they highlighted the importance of pro-doping attitudes in predicting doping use. Indeed, among the few studies on the psychological correlates of doping use, attitudes appear as significant correlates of doping behavior in both nonathletes and professional athletes (e.g., Alaranta et al., 2006; Anshel & Russell, 1997; Petroczi, Aidman, & Nepusz, 2008). Other studies on nonprofessional athletes encompassed attitudes and additional variables as proxy measures of doping behavior. Specifically, Lucidi, Grano, Leone, Lombardo, and Pesce (2004) and Lucidi, Zelli, Luca, Grano, Russo, & Violani (2008) the theory of planned behavior (TPB), and showed that the TPB variables (i.e., attitudes, subjective norms, and perceived behavioral control) significantly predicted doping intentions and behavior.

Attitudes alone describe only a small part of the range of psychosocial variables affecting the use of PEDs. Ajzen's (1991) theory of planned behavior was built on the notion that attitudes predict behavior, but it appears that the joint influence of other nonattitudinal factors also determines whether the behavior in question will eventually be enacted. Such factors include subjective norm (i.e., the belief that significant others will approve or disapprove engaging in the target behavior), and perceived behavioral control (i.e., a subjective estimation of personal control over the target behavior). According to Ajzen (1991), perceived behavioral control is an alternative term for the concept of self-efficacy described in Bandura's (1977) social cognitive theory. Furthermore, the TPB posits that the most immediate antecedent of actual behavior is behavioral intention, which typically reflects the person's motivation and determination to engage in the target behavior. Finally, the theory suggests that attitudes and subjective norms predict behavior indirectly, through behavioral intentions, whereas perceived behavioral control can exert both indirect and direct influence on behavior, especially when it reflects actual instead of illusory control (Armitage & Conner, 2001; Conner & Armitage, 1998).

In almost 20 years of research, the TBP has been widely applied in the health behavior domain to predict substance use and a range of other health risk behaviors, and was found to be superior in comparison with other health behavior models (Armitage & Conner, 2000). In doping research, the TPB has been tested in samples of nonprofessional and adolescent athletes. Specifically, in a longitudinal study, Lucidi et al. (2008) showed that the TPB components (i.e., attitudes, subjective norms, and self-efficacy) significantly predicted doping intentions and

behavior among Italian adolescents. Similar findings on the effectiveness of TPB variables to predict doping intentions were provided in a study with gym users (e.g., bodybuilders and people practicing fitness sports; Wiefferink, Detmar, Coumans, Vogels, & Paulussen, 2008). The aforementioned studies suggest that the TPB and/or related behavioral models can be effectively applied in research investigating the use of PEDs. However, relevant research in professional or elite athletes is still lacking, thus leaving a gap in our knowledge regarding the influences on doping use in more advanced levels of sports.

Social Context, Normative Influences and Doping Behavior

The TPB allows us to draw a distinction between attitudinal and situational influences. It essentially posits that behavior is jointly determined by a person's attitudes, as well as the same person's social context (norms), and the ability to cope with contextual/situational pressures (perceived behavioral control) to behave in a certain way. However, the TPB was initially developed to account for attitude–behavior relationships, while the role of situational or normative influences was somewhat overlooked (Rivis & Sheeran, 2003). In particular, the standard TPB approach regards normative influences only from the perspective of perceived social approval or, simply, what *ought to be* happening (i.e., subjective norms), and this may potentially undermine the range and the function of normative influences on behavior (Armitage & Conner, 2001; Conner & Armitage, 1998).

An alternative concept of normative influence is descriptive norms, which refer to one's beliefs about what *is* happening (Cialdini, Reno, & Kallgren, 1990). This concept has been found to be distinct from subjective norms (Rivis & Sheeran, 2003), and is typically assessed through judgments of prevalence estimates or the perceived behavior of similar others. Wiefferink et al. (2008) used descriptive norms in their application of TPB among gym users, and found that perceived use of steroids by other gym users significantly predicted doping intentions.

Nevertheless, because the studies done in this area are largely cross-sectional in nature, two alternative explanations are offered for the association between descriptive norms and intentions or behavior. One explanation suggests that overestimation of doping prevalence leads to stronger intentions and to actual doping use in the future (e.g., Wiefferink et al., 2008). An alternative explanation is that prevalence estimates are formed after one engages in the target behavior. This serves largely as a self-justification mechanism, and is commonly known as false consensus (Ross, Greene, & House, 1977). By this token, it is assumed that athletes who already use doping substances will tend to perceive this practice as widespread among their fellow athletes, and therefore self-justify their current behavioral choices (see Petroczi, Mazanov, Nepusz, Backhouse, & Naughton, 2008).

Doping Behavior and Perceived Behavioral Control

According to Ajzen (1991), perceived control is likely to determine behavior when nonvolitional variables are present (e.g., lack of resources). To illustrate, even if a person has strong intentions to act in a certain way, the target behavior will not be

performed if there are barriers to action. Armitage and Conner (2001) noted that perceived behavioral control is multidimensional, and should tap both internal control mechanisms (e.g., a person's abilities and skills to perform the target behavior), as well as external control mechanisms (e.g., efficacy to resist social pressures to act in a certain way, or efficacy to perform the behavior when given the opportunity).

One way of assessing external control mechanisms is through *situational temptation*, which reflects people's eagerness to endorse behaviors under specific circumstances (e.g., coercion, internal pressures; Maddock, Laforge, & Rossi, 2000; Plummer et al., 2001). Several studies with adolescents and adult populations have shown that situational temptation significantly predicted both intentions and actual behavior (e.g., Fedding & Rossi, 1999; Prokhorov, de Moor, Hudmon, Hu, Kelder, & Gritz, 2002). Moreover, research has also noted that situational temptation may act as a mediator in the relationship of social norms and intentions. Specifically, a recent study on adolescent smoking showed that situational temptation significantly mediated the effects of descriptive and subjective norms on intentions to smoke (Lazuras, Eiser, & Rodafinos, 2009). Thus, situational temptation can serve as a potential mediator of normative influences on intentions and behavior.

Within the context of doping research the distinction between internal and external control mechanisms, as well as in the methods used to assess these mechanisms, is less clear. Firstly, no study to date has directly compared the relative impact of internal and external control mechanisms on doping intentions and behavior. Secondly, problems exist in terms of its assessment. Specifically, Lucidi et al. (2008) assessed external control mechanisms by using a multi-item measure reflecting efficacy to resist situational pressures to use doping, and found this variable to be significant predictor of intentions and actual use of PEDs. Wiefferink et al. (2008), however, used only a single item to assess situation-specific self-efficacy in adult nonprofessional athletes. Although they found a significant correlation between this item and doping intentions, situation-specific self-efficacy was not predictive of intentions when a regression model was used and the effects of additional predictors were controlled for.

Effects of Past Behavior on Future Actions

Regarding past behavior, a number of studies over the past 20 years have shown that past (or current) habits tend to predict both future intentions and behaviors (Armitage & Conner, 2001; Conner & Armitage, 1998; Sutton, 1998). In fact, past and/or current behavior often has a direct link to, and in many cases appears to be the strongest predictor of, future actions, over and above the effects of TPB variables (Armitage & Conner, 2001; Conner & Armitage, 1998). Furthermore, Armitage and Conner (2001) argued that TPB variables, may, in some cases, mediate the effects of past and current behavior on intentions and future actions; hence past and current behavior should be used as an additional variable in the traditional TPB model. In doping research, the powerful effect of past behavior was recently demonstrated by Wiefferink et al. (2008), who reported that "past experience of performance-enhancing drugs appeared to be the most powerful predictor" (p. 77). Nevertheless, what has not been examined is whether TPB variables or other psychosocial constructs mediate the effects of past or current doping use on future doping intentions and behavior.

The Confounding Role of Social Desirability

Although social cognitive variables, such as attitudes, norms, and efficacy beliefs can help in better understanding doping behavior, empirical findings may be confounded by the tendency to respond in socially desirable ways, especially in studies using self-report measures. Social desirability may act as a potential confounder by inflating the associations of self-reported use, attitudes, normative, and behavioral control beliefs with doping intentions. This may happen because respondents might be reluctant to disclose their true attitudes toward doping, past use, or doping intentions, in fear of sanctions or punishments. Another reason for responding in socially desirable way is impression management and self-deception (e.g., Paulhus, 1984). These reasons highlight the need to include social desirability measures and examine for potential confounding effects in studies of broader social cognition mechanisms underlying doping use.

The Present Study

Overall, previous research among nonprofessional and adolescent athletes has shown that the TPB can be used effectively in the study of doping behavior (Lucidi et al., 2008; Wiefferink et al., 2008). Moreover, assessing additional measures of normative influence (i.e., descriptive norms) and the different facets of perceived behavioral control (i.e., internal and external control mechanisms) may provide further insights into the psychosocial processes underlying doping use. The present study set out to explore these issues in a sample of elite-level athletes in Greece. For this purpose we used an integrated social cognition model, assessing past and current behavior, attitudes toward doping use, normative influences (subjective and descriptive norms), and self-efficacy beliefs reflecting both internal and external control mechanisms (see Figure 1). Regarding the distinction between internal and external control mechanisms, we respectively employed measures assessing personal ability (i.e., the belief that someone has total control over using PEDs), and situational temptation to capture the tendency to endorse and accept doping use under specific risk-conducive situations. Finally, given that self-reports of doping use may be confounded by strategic responding due to impression management or fear of sanctions, we included a measure of social desirability and examined for potential confounding effects.

The following hypotheses were formed. Firstly, it was expected that attitudes, social norms (descriptive and injunctive), and behavioral control beliefs (reflecting both internal and external control processes) will significantly predict doping intentions (e.g., Lucidi et al., 2008). Secondly, based on recent findings on the mediating role of situational temptation on the relationship between social norms and behavioral intentions (Lazuras et al., 2009), we expected that situational temptation would mediate the effects of descriptive and subjective norms on doping intentions. However, in absence of data supporting a similar function for perceived behavioral control (reflecting internal control mechanisms), we hypothesized that perceived behavioral control will not mediate the effects of social norms on intentions.

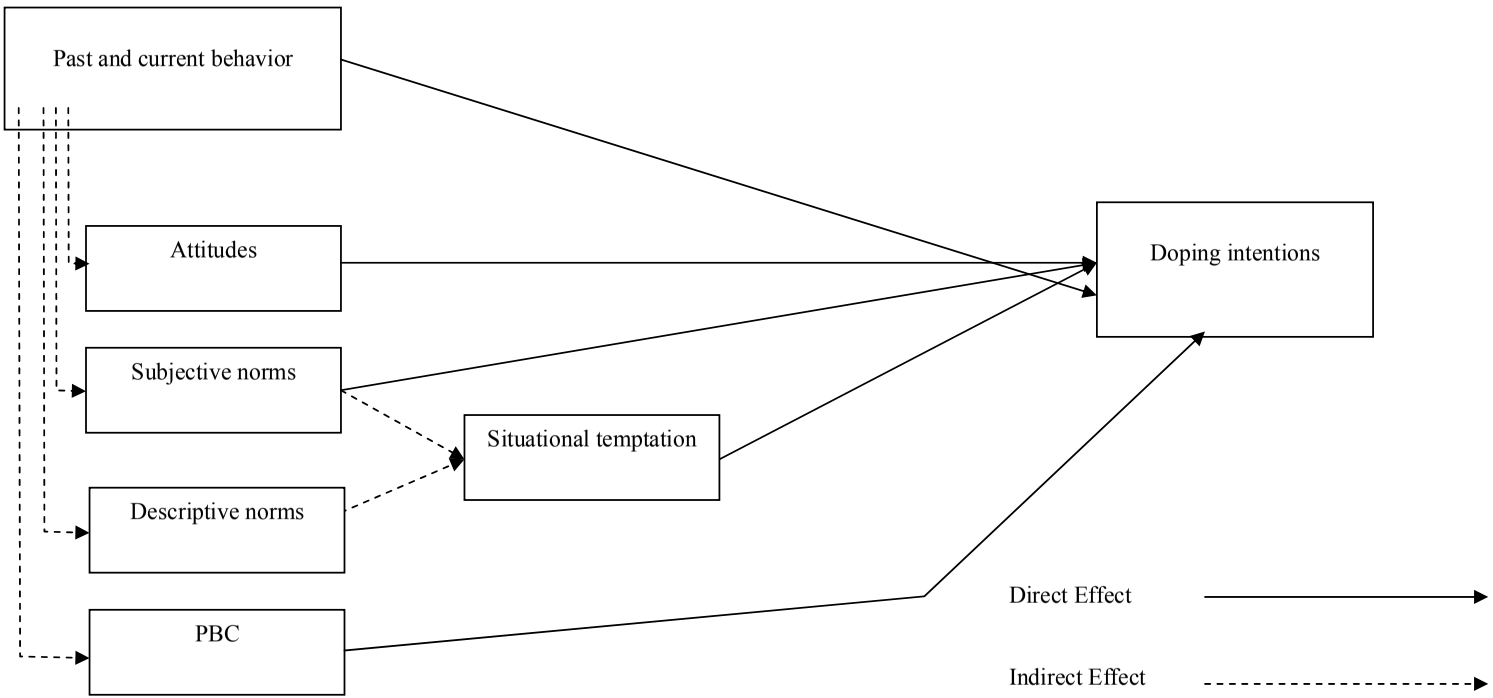

Figure 1 — Integrated social cognition model used in the current study.

Method

Participants

Anonymous questionnaires were given to Greek elite-level athletes from nine different sports (football, basketball, volleyball, handball, athletics, swimming, shooting, Tae Kwon Do, and rowing). Sports teams (for team sports) and clubs (for individual sports) were randomly selected from the databases of each sports federation. Further on, participants from the selected sports teams and clubs were recruited based on the following criteria: participation in professional leagues (A1 for basketball, volleyball and handball teams and Superleague for football teams) and systematic training for the past 5 years (for athletes in team sports); participation in the finals of the national and/or international championships during the past 5 years (for athletes in individual sports). Overall, 2000 athletes were approached and 1075 agreed to participate in the study (response rate = 53.7%). Thirty-five surveys were excluded from the analysis because of missing data and noncompletion of main parts, leaving 1040 completed questionnaires. Excluded also were responses from some participants under 18 years, leaving a database with 750 adult athletes. This final sample consisted of athletes from both team (63.6%, or $n = 477$) and individual sports (36.4%, or $n = 273$). Mean age was 25 years ($SD = 5.89$), and 63.9% of the participants were males. All participants were informed about the purposes of the study and were told that their participation was voluntary, with no foreseeable penalties for withdrawing from the study at any point. Ethics approval for the data collection methods and procedures of the study was granted by the respective University authority.

Measures

Demographic variables included age (reported in years), gender (1 = male, 2 = female), sport type (1 = team, 2 = individual), and years of involvement in the specific sport. Additional measures included a) self-reported use of prohibited substances (doping behavior), b) social desirability, c) attitudes, subjective norms, perceived behavioral control beliefs and doping intentions as measured according to the TPB, d) descriptive norms (i.e., perceived prevalence of doping among other elite athletes), and e) situational temptation.

Past and Current Doping Behavior. The question, "have you ever used prohibited substances to enhance your performance?" was used to assess self-reported doping behavior, and four different response options were given (1 = *no, I have never used prohibited substances to enhance my performance*; 2 = *yes, I used prohibited substances to enhance my performance once, but not ever since*; 3 = *yes, I use prohibited substances occasionally to enhance my performance*; and 4 = *yes, I use prohibited substances systematically to enhance my performance*). To avoid misinterpretations of the meaning of these items by our participants, it was explicitly stated during data collection that the first response option referred to athletes who never used banned substances for performance-enhancing reasons; the second response reflected the use of banned substances for a single cycle over the span of the athlete's career/involvement in sports; the third and fourth options respectively reflected nonsystematic (incomplete or partial cycles of banned substances) and

systematic use (use of banned substances in complete and repetitive cycles) of banned substances during the competitive season that the survey was carried out. For purposes of subsequent statistical analysis, these responses were categorized as "*never users*," including those who said they never used prohibited substances, and "*ever users*," including those who reported they have used prohibited PEDs.

Social Desirability. The social desirability scale was used to measure the tendency to respond in socially desirable ways (e.g., reporting not using PEDs, when in fact one is/or has been a user). A short 10-item version of the Marlowe-Crowne Social Desirability Scale (SDS) developed by Strahan and Gerbasi (1972) was employed for the purposes of the study. Responses were given on a true/false format, and were summarized to generate a total score, with higher values indicating greater tendency to respond in a socially desirable way (Cronbach's $\alpha = .63$). The alpha of the scale was relatively low, but as Bowling (2002) noted for measures with up to 10 items, values greater than 0.60 may as well indicate adequate levels of internal consistency reliability.

Theory of Planned Behavior. The variables derived from the TPB (attitudes, subjective norms, and perceived behavioral control) were structured for the purposes of this study according to the guidelines provided by Ajzen (1991). Attitudes to doping were measured with the stem proposition "the use of prohibited substances to enhance my performance this season is . . ." followed by four semantic differential evaluative adjectives (bad/good; useless/useful; harmful/beneficial; unethical/ethical) scored on a 7-point scale. The mean score was calculated, and higher scores reflected more positive attitudes toward doping (Cronbach's $\alpha = .77$).

Subjective norms were assessed with the mean of three items (e.g., "most people who are important to me would want me to use prohibited substances to enhance my performance during this season"), scored on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). Higher scores in this measure reflected greater perceived social pressure to use prohibited performance-enhancing substances (Cronbach's $\alpha = .84$).

Perceived prevalence of doping in sports (descriptive norms) was measured with one open-ended question asking participants to give a subjective estimate of doping use among elite-level athletes in Greece respectively (i.e., "out of 100%, how many elite athletes in Greece do you think engage in doping to enhance their performance?"). This method for assessing descriptive norms has been used effectively in previous studies on substance use (e.g., Lai, Ho, & Lam, 2004; Lazuras et al., 2009).

Perceived behavioral control was measured with three items (e.g., "I feel in complete control over whether I will use prohibited substances to enhance my performance during this season"), using a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*). Due to low Cronbach's alpha (< .60), one item (i.e., "if I wanted to, I could use prohibited substances to enhance my performance during this season") was removed, to enhance the internal consistency of this measure ($\alpha = .76$). Higher scores indicated lower perceived behavioral control over doping.

Intentions to use prohibited performance-enhancing substances during the season were assessed by the mean of three items (e.g., "I intend to use prohibited substances to enhance my performance during this season") scored on a seven-point scale (1 = *definitely not*, 7 = *definitely yes*). Higher scores reflected stronger intentions to use doping substances (Cronbach's $\alpha = .97$).

Situational Temptation. This construct was assessed with an adapted version of the respective measure used by Lazuras et al. (2009), and included a stem proposition "How much would you be tempted to use prohibited doping substances to enhance your performance this season," followed by four items reflecting temptations to use prohibited performance-enhancing substances under different circumstances that potentially induce normative influence ("when your coach suggests so," "when you believe that most colleagues of yours use prohibited substances," "when you were told to enhance your performance," and "when you prepare for an important game/competition"). Responses were recorded on a five-point Likert scale (1 = *not at all tempted*, 5 = *very much tempted*), and a mean score was calculated with higher scores denoting greater temptation to engage in doping (Cronbach's $\alpha = .86$).

Procedure

Sports clubs were contacted and the aim of the project was described to the administrative board and the coaches. Following the permission of the administrative board and coaches, athletes were briefed about the project, and informed consent was requested from those wishing to participate. Both oral and written instructions were given to participants regarding the completion of the questionnaire, with special attention paid to the definition of elite athletes, and doping use items (e.g., what each response option represented in the relevant measures of doping behavior). The participating athletes were also reminded about voluntary participation, anonymity of their responses, and encouraged to ask any questions regarding the understanding/comprehension of the questionnaire items. Questionnaires were completed in isolation. Athletes returned the completed questionnaires to the researchers in a sealed envelope.

Analyses

Several methods were used for statistical analyses. Chi-square analysis was used to assess differences in self-reported doping use between team sport and individual athletes, and between males and females. One-way analysis of variance (ANOVA) was used to identify differences in perceived prevalence of doping use between user and nonuser athletes. Partial correlation with calculation of the variance reduction rate (VRR = [zero-order correlation]^2 – [partial correlation]^2 / [zero-order correlation]^2; see also Chen & Spector, 1991) was used to examine whether social desirability acted as a confounder (also termed *nuisance variable*), by inflating the correlations between doping intentions, past and current behavior, attitudes, normative and behavioral control beliefs, and situational temptation. Finally, the hypotheses of the study were tested with the use of hierarchical linear regression analysis and multiple mediation modeling.

Results

Self-Reported Doping Use and Perceived Prevalence

One out of ten athletes reported doping use (9.9% or $n = 74$). More specifically, 32 athletes (4.3%) said they used doping substances once but not ever since, 27 (3.6%)

reported occasional use of doping substances, and 15 (2%) reported systematic use of prohibited performance-enhancing substances. Ever users were significantly more, $\chi^2(1) = 9.52$, $p < .005$, in individual (14.4%) than in team sports (7.4%). No significant differences in doping use (ever/never) were found between female and male athletes.

Athletes perceived doping as highly prevalent and reported that more than half of elite-level athletes in Greece engage in doping for performance-enhancement reasons. One-way ANOVA indicated that, compared with never users, ever users gave higher estimates of doping prevalence, $M_{\text{never users}} = 52.1$, $M_{\text{ever users}} = 74.3$, $F(1, 714) = 33.01$, $p < .001$. (These findings are the same with those obtained from nonparametric tests [Mann–Whitney]. Yet, for reasons of clarity and to better illustrate mean differences instead of mean ranks between the two groups [ever / never users], only the ANOVA findings are reported here.)

Effects of Social Desirability

Pearson's correlation indicated that social desirability was negatively but significantly correlated with doping intentions, $r(732) = –.16$, $p < .001$, and situational temptation, $r(732) = –.27$, $p < .001$; however, the effect sizes were small. Partial correlation analysis with VRR estimation indicated that the sizes of the correlations between doping intentions and their predictors (all zero-order *r*s ranged from to .24 to .72) did not change significantly after controlling for social desirability (following partial correlation all *r*s ranged from .23 to .71). Thus, social desirability had a minimal impact on associations between PED use intentions and TPB variables. The results of the VRR analysis are shown in Table 1.

Intentions to Use Prohibited Substances

A hierarchical regression analysis was used to identify the predictors of intentions to use prohibited performance-enhancing substances, and examine the hypotheses of the study. The analysis was completed at three steps, and an overall significant

Table 1 Variance Reduction Rate (VRR) Analysis on the Effect of Social Desirability

	Doping Intentions		
	Zero-order correlation	Partial correlation†	VRR
Doping behavior	.631	.623	2.5%
Attitudes	.602	.592	3.2%
Subjective norm	.485	.472	5.2%
Descriptive norm	.242	.233	7.2%
Perceived behavioral control	–.253	–.241	9.2%
Situational temptation	.721	.713	2.2%

Note. Statistically significant correlations ($p < .05$) are presented.

†Partial correlation after controlling for social desirability.

model emerged, $F(9, 700) = 172.31$, $p < .01$, predicting 69.2% of the variance in the criterion variable; a large multivariate effect size according to Cohen (1992). Tolerance levels were high (> .527) at all steps.

Age, gender, sport type, and self-reported past and current doping behavior were included on the first step, and all of them, except sport type, significantly predicted intentions to engage in doping. Attitudes, subjective and descriptive norms, and perceived behavioral control were added on the second step and significantly increased predicted variance by 15.2%, $F_{change}(4, 692) = 60.01$, $p < .01$, turned the effects of age and gender nonsignificant, and attenuated the effect of self-reported doping use. Finally, situational temptation was entered on the third step and turned the effect of descriptive norms nonsignificant, and had the strongest predictive effect on intention. In fact, the addition of situational temptation increased predicted variance by 13.1%—an effect size similar to that produced by all TPB variables together. The predictors of intentions to use prohibited PEDs on each step are shown in Table 2.

Table 2 Psychosocial Predictors of Doping Intentions

Step	Predictors	β	R^2
1	Age	–.05*	.40
	Gender	–.06*	
	Type of sport	.04	
	Past and current behavior	.62**	
2	Age	–.01	.56
	Gender	–.01	
	Type of sport	–.01	
	Past and current behavior	.38**	
	Attitudes	.28**	
	Subjective norms	.11**	
	Descriptive norm	.12**	
	Perceived behavioral control	–.19**	
3	Age	–.01	.69
	Gender	.02	
	Type of sport	–.01	
	Past and current behavior	.25**	
	Attitudes	.16**	
	Subjective norms	.05*	
	Descriptive norm	–.01	
	Perceived behavioral control	–.12**	
	Situational temptation	.49**	

*$p < .05$, **$p \leq .001$.

Past and Current Behavior, Normative Processes, and Doping Intentions: Mediation Analysis

Because the effect of past and current doping behavior was significantly reduced on the final steps of the regression analysis, we used Preacher and Hayes's (2008) method to more closely examine which predictors most strongly mediated the relationship between past/current behavior and doping intentions. This method assesses the total (c) and the direct effects (c') of an independent variable (X or predictor) on a dependent variable (Y or criterion), after controlling for the effects of multiple mediators (Ms). Bias-corrected confidence intervals can also be computed with the use of bootstrapping. Finally, the Sobel statistic (z) is used to identify the significance of the total indirect effect, of the indirect effects of each hypothesized mediator, and of the difference between the emerged indirect effects.

Bias-corrected confidence intervals (95% CI) for standard errors were estimated using bootstrapping (1,000 resamples). The analysis showed that past/current behavior had a significant total effect, $\beta_c = 3.36$, $p < .05$, on doping intentions, but the direct effect was reduced, $\beta_{c'} = 1.34$, $p < .05$, suggesting partial mediation. The total indirect effect was statistically significant, $z = 13.9$, $p < .05$. Situational temptation, $z = 11.8$, $p < .05$, and attitudes toward doping, $z = 5.51$, $p < .05$, mediated the effects of past/current behavior on intentions, and temptation was significantly stronger mediator compared with attitudes, and other mediators. Subjective norms, $z = 1.99$, $p = .05$, and perceived behavioral control, $z = 1.98$, $p = .05$, also acted as mediators of past/current behavior, but their effects were weak and marginally significant. Descriptive norm was not a significant mediator of past/current behavior with intentions to engage in PED use. The effect of past/current behavior on doping intentions, therefore, was primarily mediated by situational temptation and attitudes toward doping.

Preacher and Hayes's (2004) method was also used to calculate the Sobel test to examine the second hypothesis of the study, that situational temptation will mediate the effects of social norms on doping intentions. Two separate simple mediation models were tested, including subjective and descriptive norms as independent variables respectively. The results showed that situational temptation fully mediated the effect of descriptive norm, $z = 10.7$, $p = .05$, and partially mediated the effect of subjective norms, $z = 11.9$, $p < .05$, on doping intentions.

Discussion

The present study set out to identify the psychosocial predictors of doping intentions, by using an integrated social cognition model, which accounted especially for the operation of normative processes. Firstly, the overall multivariate effect size of the model was rather high (69% of the variance) according to Cohen's (1992) recommendations. Secondly, in line with the expectations of the study, TPB variables significantly predicted doping intentions, and fully mediated the effects of age and gender. Specifically, attitudes and perceived behavioral control retained significant effects, even after controlling for the effects of other predictors, such as situational temptation. In line with previous research (e.g., Lucidi et al., 2004), the present findings suggest that attitudes play an important role in shaping pro-doping intentions. The findings also indicated that past and current doping behavior

strongly predicted doping intentions, and, therefore may be predictive of future behavior (Conner & Armitage, 1998; Sutton, 1994). This is in line with previous studies showing that past or current behavioral choices predict both intentions and future actions (see Ajzen, 2002; Armitage & Conner, 2001; Sutton, 1998; Wiefferink et al., 2008). Nonetheless, the effect of past and current behavior in the current study was largely mediated by other variables. Specifically, the findings from the multiple mediation analysis indicated that situational temptation and attitudes were the strongest mediators of past and current behavior, whereas subjective norms and perceived behavioral control had weaker and marginally significant effects ($p = .05$).

This suggests that doping intentions are not solely determined by past habits in a straightforward way. Rather, it seems that the use of PEDs leads into the formation of more favorable attitudes toward doping, as well as greater temptations to endorse doping under specific circumstances. Practically, this means that behavioral control and attitudinal beliefs can be changed accordingly to reduce future risk for doping. For instance, changing favorable attitudes to doping into unfavorable ones, and teaching athletes how to resist pressures to engage in doping under risk-conducive circumstances, may potentially lead to weaker intentions to engage in doping, even among athletes with a history of past use. Nevertheless, our findings should be treated with caution mainly due to the cross-sectional nature of the study. This could raise issues about reverse causality. However, as Kenny, Kashy, and Bolger (1998) noted this should not be a real problem if the hypothesized direction of the relationships only make sense in one direction. In our study, it is reasonable to assume that past and current behavioral choices influence intentions to use PEDs in the future, than to argue that intentions influence reports of past use.

Interestingly, the observed associations were not affected by social desirability. According to the findings from the variance reduction rate analysis, social desirability can hardly serve as a confounder in the relationship between self reported intentions to engage in doping, related attitudes, normative and behavioral control beliefs, and past and current behavior (see Table 3). Nonetheless, although the effect size was a small one ($r = –.16$), the correlation of social desirability with doping intentions and their predictors was significant, which highlights the need to account for the effects of social desirability in future studies of doping behavior in professional athletes.

Furthermore, in line with the study's hypotheses and with previous research on doping behavior (e.g., Wiefferink et al., 2008), descriptive norms significantly predicted intentions. This shows that the predictive effect of descriptive norms can be extended to the study of doping among professional athletes, and capture an important element of normative beliefs and processes not accounted for by more traditional measures of normative influence, such as subjective norms. Moreover, another important finding of the study was that participants gave high estimates of doping prevalence among Greek elite-level athletes. Apparently, athletes in the particular country view doping as rather common practice among their colleagues. In addition, participants who reported using doping reported higher prevalence estimates, as compared with nonusers. This can be explained in terms of false consensus mechanisms, where judgment biases reveal personal involvement with doping (e.g., Petroczi, Mazanov, et al., 2008). Still, any conclusion about false consensus effects should be tentative, mainly because causal relationships can be bidirectional, with biased judgments of other people's behavior serving as predecessors of personal involvement (e.g., Lai et al., 2004; Unger & Rohrbach, 2002).

Table 3 Intercorrelations, Means, Standard Deviations, and Internal Consistency Scores

		1	2	3	4	5	6	7	8	9	10
1	Doping intentions	—	.60*	.47*	–.27*	.28*	.75*	.63*	–.03	–.08*	–.16*
2	Attitudes		—	.45*	–.20*	.20*	.53*	.53*	–.12*	–.14*	–.14*
3	Subjective norms			—	–.07*	.23*	.44*	.48*	.01	–.02	–.14*
4	Descriptive norms				—	.03	.39*	.21*	–.02	.01	–.08*
5	Perceived behavioral control					—	–.21*	–.07*	–.01	.07*	.12*
6	Situational temptation						—	.51*	–.01	–.13*	–.27*
7	Past and current behavior							—	.03	–.04	–.11*
8	Age								—	–.15*	.09*
9	Gender									—	.07*
10	Social desirability										—
	M	1.66	1.72	1.45	54.4	5.88	1.82	1.09	25.0	1.36	5.62
	SD	1.56	1.25	1.05	32.2	1.80	1.03	0.29	5.89	0.48	1.90
	Cronbach's α	.97	.77	.84	—	.76	.86	—	—	—	.63

Note. Past and current behavior was coded as 1 = never users, 2 = ever users; gender was coded as 1 = male, 2 = female.

*$p < .05$.

In addition, our study revealed the powerful role of external control mechanisms, more specifically of situational temptation, in predicting doping intentions. This is in contrast to Wiefferink et al.'s (2008) findings, according to which efficacy to use steroids in risky situations was not a significant predictor of intentions. Nevertheless, it is hard to draw direct comparisons between the two studies for the following reasons. Firstly, Wiefferink et al. were not concerned directly with situational temptation and its effects on doping use. Secondly, they used a single-item measure to capture an aspect of self-efficacy to resist doping use in risky situations—which is conceptually similar, but methodologically different to our measure of situational temptation.

Furthermore, in line with the study's hypothesis we found that situational temptation significantly mediated the effects of normative influences on doping intentions. In particular, the effect of perceived prevalence of doping in other elite-level athletes (i.e., descriptive norms) on doping intentions was fully mediated by situational temptation, whereas the effect of subjective norms was partially mediated. These findings indicate that normative beliefs may not necessarily lead to pro-use intentions directly. Instead, they may lead athletes to believe they cannot resist engaging in a behavior most other athletes are involved with, and, as a result, are more likely to intend to use PEDs themselves. This is in line with the process described by Lazuras et al. (2009) within the context of adolescent smoking.

Overall, the findings of the current study identify interesting processes underlying doping intentions and behavior. Still, there are some limitations that should be addressed. Firstly, doping use and intentions were self-reported and this has inherent limitations relating to social desirability and underreporting. Nonetheless, several safeguards were used during the data collection to overcome this limitation, such as controlling for social desirability effects, using anonymous questionnaires, and requiring athletes to complete questionnaires alone and return them in sealed envelopes carrying no identification marks or signs. Besides, we did not aim to accurately describe doping prevalence in sports, but rather study associations among different variables that may increase the risk for doping use. Based on the variance reduction rate analysis, these associations were hardly affected by social desirability. Secondly, the cross-sectional nature of the study does not allow safe causal inferences among the study variables (e.g., whether pro-use attitudes are the result of past behavior or a potential risk factor for future doping). Thirdly, as Webb and Sheeran (2006) noted, although intentions are valid predictors of future actions, in many cases the intention–behavior relationship can be weak, and other variables may predict future behavior more strongly. Lastly, additional measures of variables that may influence the formation of normative beliefs on a personal level could be used (e.g., exposure to media coverage of doping scandals) to examine their effect on prevalence estimates of doping. This would help disentangle between the false consensus mechanism and other processes described by other researchers (e.g., Unger & Rohrbach, 2002).

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