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Linking Coach Interpersonal Style with Athlete Doping Intentions and Doping Use: A Prospective Study

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Abstract

We brought together various lines of work on motivation, morality, and doping by testing a theory-based model linking prospectively contextual and personal motivational variables, moral attitudes, moral disengagement in doping, doping intentions, and doping use. Participants were 256 Greek athletes who completed a questionnaire pack at the beginning of a sport season. In the case of doping use we also obtained data close to the end of the same season. The model showed that perceptions of controlling coach behaviors predicted athlete need frustration, which in turn predicted low moral functioning and doping intentions/doping use. The findings highlight pathways (direct and indirect) by which the social environment may impact on athletes' intentions and decisions to engage in doping and could pave the way for future anti-doping interventions aimed at improving coaching interpersonal style.

Keywords: cross-cultural, psychological needs, coach behaviors, moral disengagement, moral attitudes, doping behavior, self-determination theory

A recent meta-analysis of the psychological literature on doping (Ntoumanis, Ng, Barkoukis, & Backhouse, 2014) showed that researchers have focused primarily on the role of personal variables (e.g., attitudes, beliefs, perfectionism) in predicting doping intentions and doping use. The research evidence on socio-contextual factors is comparatively less extensive and has focused primarily on the role of prevailing social norms (cf. theory of planned behavior; Ajzen, 1991) in condoning or sanctioning doping behavior (e.g., Lazuras, Barkoukis, Rodafinos & Tsorbatzoudis, 2010; Lucidi et al., 2008). However, this work, although important in identifying the influence of the social environment in condoning or disapproving doping, has somewhat limited applied use. This is because such research does not highlight the behaviors and processes (direct and indirect) by which the social environment impacts on athletes' intentions and decisions to engage or not in doping. The aim of this study is to propose and test a model linking prospectively different types of a coach motivational style with doping intentions and doping behavior via a number of motivation and morality-related variables.

Coach Interpersonal Styles

Although there are various influential social factors in sport, undoubtedly coaches play the most important role in shaping the psychological experiences and behaviors of their athletes (Bartholomew, Ntoumanis, Thøgersen-Ntoumani, 2009; Mageau & Vallerand, 2003). In fact, conceptual models of doping behavior (e.g., Johnson, 2012; Petróczi & Aidman, 2008) acknowledge the important role of the motivational atmosphere created by coaches. Coaches instruct and try to motivate their athletes in ways in which they see as most appropriate and effective, or perceive as culturally sanctioned (e.g., being distant and assertive, demanding obedience) and indicative of competent and authoritative instruction (Reeve, 2009). However, research has shown that not all coach behaviors are adaptive. Many researchers have utilized self-determination theory (SDT; Deci & Ryan, 2002), one of the most widely applied theories of motivation in sport settings (for a review, see Ntoumanis, 2012), to differentiate between adaptive and maladaptive coach interpersonal styles, and to investigate the effects of these styles on athlete motivation, psychological well-being, and behavior.

In SDT research, a broad distinction has been made between autonomy/need supportive interpersonal style and controlling interpersonal style. An autonomy-supportive style supports self-

initiated strivings and creates conditions for athletes to experience a sense of volition, choice, and self-endorsement. Examples include provision of choice, rationale, and opportunities for initiative and independent work, taking others' perspective into account, and acknowledging their feelings (Reeve, 2009). Such behaviors result in increased athlete motivation, psychological well-being, and prosocial behavior (Hodge & Lonsdale, 2011; Ntoumanis & Standage, 2009). Despite the label, an autonomy-supportive style is theorized and has been empirically shown (cf. Ntoumanis, 2012) to predict the satisfaction of not just the basic need for autonomy (feeling control over one's behavior), but also the basic needs for competence (feeling effective in producing desired outcomes) and relatedness (feeling connected with and accepted by others).

In contrast, a controlling interpersonal style is in operation when coaches behave in a coercive, pressuring, and authoritarian way in order to impose a specific and preconceived way of thinking and behaving upon their athletes. As a consequence, athletes often comply but do not endorse the requested behaviors. Sometimes, coach control can be more subtle, for example, by showing affection and support only when athletes behave in ways in which conform to coaches' expectations, and by showing indifference or being cold when athletes do not behave in such ways. Bartholomew et al. (2009) were the first to systematically review the various facets of a controlling interpersonal style and its potential applications in sport in terms of explaining certain types of coach behavior. Bartholomew et al. (2010, 2011) subsequently showed that controlling coaching environments can frustrate athletes' psychological needs, and predict in negative emotions, feelings of burnout, and disordered eating. The link between coach autonomy supportive and controlling interpersonal styles with athletes' perceptions of need satisfaction and frustration is important, because according to Basic Needs Theory, a mini-theory of SDT, psychological well-being and optimal functioning are dependent on the satisfaction of the three aforementioned needs. Hence, contexts that support versus frustrate these needs should invariantly affect psychological and physical wellness. For example, self-destructive behaviors are evident when individuals' experience hostile social environments that frustrate their needs (Deci & Ryan, 2002). Although there is limited evidence (e.g., Barkoukis, Lazuras, Tsorbatzoudis, & Rodafinos, 2011) to suggest that self-

endorsed types of personal motivation are negatively related to doping intention and use, there is no research that has examined the role of coach interpersonal styles (adaptive and maladaptive) that predict, directly or indirectly via personal motivational factors, substance abuse, such as doping.

Moral Attitudes to Decision Making

Motivation variables can also predict doping-related variables via the promotion of prosocial or antisocial moral attitudes and behaviors. Ntoumanis et al.'s (2014) meta-analysis found moderate effect sizes linking moral attitudes and beliefs with doping intention and use. Ntoumanis and Standage (2009) tested a SDT-based model of morality which showed that autonomy supportive coaching and satisfaction of athletes' psychological needs were positively related to self-determined motivation and prosocial moral attitudes (e.g., sportspersonship), and were negatively related to the endorsement of cheating as well as the violation of unwritten rules and ethical codes (i.e., endorsement of gamesmanship). 'Endorsement of cheating' (i.e., breaking the written rules of the game) and 'endorsement of gamesmanship' (i.e., breaking unwritten rules of the game or common etiquette) are two of the three moral attitudes to decision making proposed by Lee, Whitehead, and Ntoumanis (2007). The third variable is 'keeping winning in proportion'. This variable represents the attitude that winning should not be achieved by any means and that losing and winning are part of life. Lee et al. (2007) showed that higher scores on this variable were positively associated with more sportspersonship behaviors (e.g., respect for conventions and rules).

Moral Disengagement and Doping

Moral disengagement in doping has been recently investigated in the doping literature. This variable refers to cognitively restructuring and discounting doping and its consequences. Using a longitudinal design, Lucidi et al (2008) demonstrated that high school students' moral disengagement in doping moderately and positively predicted both intention to dope at time 1 and self-reported doping use at time 2. Similar findings were also reported by Kavussanu, Hatzigeorgiadis, Elbe, and Ring (2016). However, the motivational predictors of moral disengagement in doping were not examined in these studies. In contrast, Hodge, Hargreaves,

Gerrard, and Lonsdale (2013) examined such motivational predictors but of general moral disengagement in sport (not specific to doping). Hodge et al. reported that this variable was correlated with more pro-doping attitudes and susceptibility to doping, as well as with controlling coach and teammate behaviors. We believe that a more specific mediator (i.e., moral disengagement with respect to doping) should be a better alternative to a more generic measure of moral disengagement in sport when assessing doping-related outcomes. Attitudes to moral decision making (i.e., endorsement of cheating, gamesmanship, and keeping winning in proportion) and moral disengagement in doping are expected to covary, although such association has not been previously tested. Including both sets of variables in the same study can provide a more comprehensive understanding of the different belief systems and morality discounting decisions underpinning intentions to engage in doping.

In sum, research has provided pieces of evidence (albeit largely cross-sectional) and theoretical support for the relations between coach interpersonal styles, psychological needs, morality-related variables, and doping intention. However, such relations have not been previously examined in an integrative fashion in the context of doping in sport. Further, no research has tested how motivation and moral variables predict prospectively doping use. In this study we were interested in examining predictors of continued and new doping use in competitive sport, by obtaining self-reports of doping use at the beginning (time 1) and end (time 2) of the competitive season.

Study Aims and Hypotheses

The aim of this study was to bring together various lines of work on motivation, morality, and doping and examine a model (Figure 1) linking prospectively contextual and personal motivational variables, moral attitudes, moral disengagement, doping intentions (all measured at time 1), and doping use (measured at time 1 and 2). We proposed that perceptions of a coach autonomy supportive style would positively predict athletes' psychological need satisfaction (Hypothesis1) and negatively predict psychological need frustration (H2). In contrast, it was expected that a coach controlling style would negatively predict psychological need satisfaction (H3) and positively

predict need frustration (H4). These predictions are based on theoretical tenets (see introduction) and prior empirical evidence in sport (e.g., Bartholomew et al., 2011).

Endorsement of cheating and gamesmanship as well as moral disengagement in doping were expected to be positively predicted by need frustration (H5-H7), and negatively predicted by need satisfaction (H7-H9). The moral attitude of keeping winning in proportion was hypothesized to be positively predicted by need satisfaction (H10) and negatively by need frustration (H11). These predictions are partly based on Ntoumanis and Standage's (2009) study in which autonomy support and need satisfaction were positive predictors of sportspersonship and negative predictors of antisocial moral attitudes. Endorsement of antisocial attitudes and behaviors in sport are more likely to occur when athletes feel that their psychological needs are frustrated by pressuring coaching environments. In such situations athletes often think and act in non-agentic ways which reflect compensatory mechanisms and goals to provide 'collateral satisfaction' (Deci & Ryan, 2000), such as approval from others, even at the expense of one's health.

We also expected that cheating, gamesmanship and moral disengagement in doping would be positive predictors of doping intention (H12-H14). In contrast, keeping winning in proportion was expected to negatively predict doping intentions (H15). These predictions were based on past work in the doing literature linking sportspersonship and general moral disengagement (not specific to doping) to doping intentions (e.g., Hodge et al., 2013; Lazuras, Barkoukis & Tsorbatzoudis, 2015). Doping intentions are more likely to be salient when athletes endorse cheating and gamesmanship, believe that winning is all that matters in sport, and disregard or trivialize any moral codes associated with doping behavior. Given that intentions predict behavior (albeit not always strongly; Sheeran, 2002), we predicted that doping intentions would negatively predict new users (i.e., doping users at time 2 but not time 1; H16) and positively predict continued users (doping users at both time points; H17)[1].

Method

[1] We also obtained data from 211 Australian athletes at time 1. However, only 39 of them provided data on doping behavior at time 2 (i.e., 18.48% retention). The primary reasons for dropout included refusal by the coach to grant access again to their team and to a far lesser extent athletes being inaccessible to complete the questionnaire at time 2. Given the substantial attrition rate, and also following reviewer feedback, we do not present the Australian longitudinal data here, however, we report in a supplementary file the invariance testing of Greek and Australian time 1 data.

Participants

The sample (n = 257) comprised 159 male and 98 female Greek athletes aged between 15 and 36 years (M = 21.79, SD = 3.84). The primary sports represented in this sample included football/soccer (32.3%), rowing (19.5%), handball (13.2%), volleyball (10.9%), and swimming (9.3%). Demographic information captured athletes' time in their sport (M = 9.33 years, SD = 4.18), on their current team or squad (M = 4.32 years, SD = 3.35), and with their current coach (M = 2.76, SD = 2.32). At the time of completing the survey, athletes reported spending between 0.5 and 35 hours per week training for their sport (M = 14.74, SD = 6.12), and were primarily engaged in competitions at national (79%) or international (18.3%) levels.

Measures

With the exception of doping intentions, for all 7-point scales listed below the following anchors were used: 1 (*strongly disagree*), 2 (*disagree*), 3 (*slightly disagree*), 4 (*neutral*), 5 (*slightly agree*), 6 (*agree*), and 7 (*strongly agree*).

Autonomy-supportive style. Athletes' perceptions of autonomy support provided by their coach was assessed using the 6-item Health Care Climate Questionnaire (Williams et al., 1996); the original items were adapted to capture the coach as the key social agent (e.g., "I feel that my coach provides me choices and options"). Despite its label, the questionnaire includes items that also capture competence and relatedness support.

Controlling style. Athletes' perceptions of their coach's controlling use of rewards (e.g., "My coach tries to motivate me by promising to reward me if I do well"), negative conditional regard (e.g., "My coach is less supportive of me when I am not training and competing well"), intimidation (e.g., "My coach threatens to punish me to keep me in line during training"), and excessive personal control (e.g., "My coach expects my whole life to center on my sport participation") were captured using the 15-item Controlling Coach Behaviors Scale (Bartholomew et al., 2010).

Psychological needs satisfaction. Items were collated from three surveys to assess athletes' perceptions of the degree to which they experienced satisfaction of the three psychological needs of autonomy (5 items, e.g., "I have some choice in what I want to do in my sport"; Standage et al., 2003), competence (5 items, e.g., "I think I am pretty good at my sport"; McAuley et al., 1989) and

relatedness (5 items, e.g., "When participating in my sport I feel supported"; Richer & Vallerand, 1998) within their sport.

Psychological needs thwarting. The 12-item Psychological Need Thwarting Scale (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011) was used to assess athletes' perceptions of the degree to which they experienced frustration of the three psychological needs of autonomy (e.g., "I feel forced to follow training decisions made for me"), competence (e.g., "There are times when I am told things that make me feel incompetent") and relatedness (e.g., "I feel I am rejected by those around me") within their sport.

Attitudes to moral decision-making. Athletes' attitudes towards the acceptance of cheating (e.g., "I would cheat if I thought it would help me win"), keeping winning in proportion (e.g., "Winning and losing are a part of life"), and acceptance of gamesmanship (e.g., "I sometimes try to wind up the opposition) were tapped using an 9-item scale of attitudes to moral-decision making (Lee et al., 2007). Responses were rated on a 5-point scale with the following anchors: 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*).

Moral disengagement in doping. The degree to which athletes' endorse psychological mechanisms designed to disengage from moral self-sanctions associated with doping behavior were captured using a 6-item scale (e.g., "Doping is alright because it helps your team"; Mallia et al., 2016).

Doping intentions. Athletes' intentions to use prohibited substances during the upcoming season were captured using a 3-item scale (e.g., "I intend to use prohibited substances to enhance my performance during this season"; Barkoukis et al., 2013). Responses were recorded using a 7-point scale with the following anchors: 1 (*extremely unlikely*), 2 (*very unlikely*), 3 (*unlikely*), 4 (*neutral*), 5 (*likely*), 6 (*very likely*), and 7 (*extremely likely*).

Doping behavior. Following the procedure by Lucidi et al. (2008), we presented athletes with a list of substances, including five of the most common legal nutritional supplements (i.e., protein and aminoacids, vitamins and minerals, gloutamine, creatine, and Tribulus, ZMA, HMB or other testosterone boosters) and five of the most common doping substances (i.e., testosterone and by-products, growth hormone and IGF-1, beta blockers, erythropoietin, and anabolic steroids). Participants responded in a yes-no format as to whether or not they had used each of these substances in the past six months with the intention of improving their performance. We asked

athletes to report on the use of both legal and illegal substances in an effort to minimize social desirability in reporting. However, for the purposes of this study, we included only the data regarding illegal substances. In Table 1 we present two binary doping behavior variables, one for each time point, to classify athletes who reported using at least one illegal substance at each time point (0 = non-user, 1 = user). In the same table we also report two new variables based on athletes' responses to their use of illegal substances at times 1 and 2: (i) 'new user' represented athletes who had reported using illegal doping substances at time 2 but not time 1 (0 = no, 1 = yes); and (ii) 'continued user' encompassed athletes who reported using illegal doping substances at both times 1 and 2 (0 = no, 1 = yes). Alternative operationalizations of doping behavior are detailed in the supplementary material.

Procedures

The recruitment of athletes occurred after permission was obtained from team managers and coaches. Athletes were informed about the aim and procedures of the study. They were reassured about the anonymity of their responses and that the surveys will be used solely for research purposes. Participation in the study was voluntary and athletes were informed that they could withdraw any time they wish. The order of the survey scales was counterbalanced and administrated to the athletes at the training courts immediately before or immediately after a training session by trained personnel. Completion of surveys lasted approximately 25 minutes. All questionnaires were completed at the beginning of the competitive season. Doping behavior was assessed at the beginning and close to the end of the competitive season.

Data Analyses

Due to a disproportionate ratio of sample size to the number of multi-item latent factors, item parcels were used as manifest indicators of several latent variables to reduce the number of parameters estimated and, therefore, model complexity. When compared with individual items, item parcels produce more reliable latent variables, greater communality, and minimize distributional violations, sources of sampling error, and likelihood of correlated residuals (Little, Cunnnigham, Shahar, & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013). Parcels were created using two different methods so that each latent factor was defined by at least three parcels (Little, 2013); readers are referred elsewhere for reviews of alternative strategies for constructing item parcels (e.g., random sampling, item-to-construct balance based on factor analyses), including

discussions on their strengths and weaknesses (Little et al., 2002, 2013). For the unidimensional constructs of autonomy-supportive style and doping moral disengagement, we considered shared item content to maximize conceptual coherence and ordering within the questionnaire package so that items adjacent to each other were not parceled together thereby minimizing methodological artifacts. Factor analyses of the controlling style, psychological needs satisfaction, and psychological needs frustration scales indicated that the subcomponents of each construct were highly correlated and that a general factor provided an adequate representation of the data. Akin to the internal consistency approach proposed by Kishton and Widaman (1994), we created a single parcel to represent each facet of these latent variables whereby the controlling style latent factor was defined by four parcels, and both needs satisfaction and frustration were each represented by three parcels. Attitudes to moral decision-making and doping intentions were modeled using their original items to preserve the recommendation of at least three indicators per latent factor.

We performed the analyses with M*plus* 7.4 (Muthén & Muthén, 1998-2015) using a maximum likelihood estimator with bootstrapping, which is a nonparametric resampling procedure that does not rely on a normal distribution (Preacher & Hayes, 2008)[2]. Bias-corrected bootstrapped 95 % confidence intervals of the indirect effects were constructed from 5,000 resamples (Preacher & Hayes, 2008). An indirect effect differs significantly from zero when its 95% confidence interval does not encompass zero. Latent factor reliability estimates were computed using McDonald's (1970) omega (ω), which takes into account the magnitude of the association between constructs and their indicators as well as measurement error of items.

Results

Preliminary Analyses

From the 257 participants who completed the questionnaire at time 1, 166 completed the measure of doping behavior at time 2 (i.e., 64.59% retention)[3]. In total, 16 athletes (10%) were classified as a new user, whereas 12 athletes (7.23%) were classified as a continued user.

[2] Due to a disproportionate ratio of clusters (i.e., teams) to parameters in the model, the TYPE = COMPLEX function in Mplus did not allow us to adjust the standard errors and, therefore, minimize the influence of this non-independence in the data (i.e., non-positive definite matrix).

[3] When compared with participants who completed assessments at both time points, athletes who dropped out of the study after time 1 were more experienced ($M_{dropout}$ = 10.39 years, SD = 4.93; $M_{retained}$ = 8.73 years, SD = 3.58; $F_{1, 246}$ = 9.32, p = .003), had been with their current team for a shorter amount of time ($M_{dropout}$ = 3.42 years, SD = 3.30; $M_{retained}$ = 4.83 years, SD = 3.28; $F_{1, 250}$ = 10.59, p = .001), spent less time training per week ($M_{dropout}$ = 12.37 hours, SD = 4.46; $M_{retained}$ = 16.07 years, SD = 6.52; $F_{1, 249}$ = 22.94, p <.001), and reported lower doping intentions at time 1 ($M_{dropout}$ = 1.60, SD = 1.27; $M_{retained}$ = 2.16, SD = 1.48; $F_{1, 255}$ = 9.03, p = .003)

Descriptive statistics, internal reliability estimates and bivariate correlations for all study variables at times 1 and 2 are provided in Table 1.

Longitudinal Analysis of the Theoretical Sequence

Model fit indices are unavailable when the logit link function is used alongside maximum likelihood estimation. The logit link function was applied due to the binary scale (categorical nature) of the dependent variables of 'continued users' and 'new users'. However, when tested separately, the cross-sectional part of the model (which included all other variables apart from the two categorical ones) showed a good fit: χ^2 (349) = 694.58, p <.001, Comparative Fit Index = .935, Tucker-Lewis Index = .924, Root Mean Square Error of Approximation = .062 (90% CI = .055 to .069).

An overview of standardized parameter estimates of direct paths is provided in Table 2. An autonomy supportive coaching style positively predicted athlete psychological need satisfaction, whereas a controlling style positively predicted psychological need frustration. Need frustration was a positive predictor of moral disengagement in doping, endorsement of cheating, and gamesmanship. Need satisfaction positively predicted the attitude of keeping winning in proportion, and unexpectedly, gamesmanship (the latter effect was probably due to net suppression as the correlation between need satisfaction and gamesmanship was almost zero). Doping intentions were positively predicted by moral disengagement in doping and endorsement for cheating, but not by endorsement for gamesmanship. Keeping winning in proportion was a negative predictor of doping intentions. Doping intentions were a predictor of new users (β = -.45, p <.001, 95% CI = -.76, -.20, Odds Ratio [OR] = .60) and continued users (β = .55, p <.001, 95% CI = .40, .70, OR = 1.95). The amount of variance explained in the latent variables were as follows: needs satisfaction (r^2 = .16), needs frustration (r^2 = .46), doping moral disengagement (r^2 = .23), acceptance of cheating (r^2 = .11), keeping winning in proportion (r^2 = .12), acceptance of gamesmanship (r^2 = .2), and doping intentions (r^2 = .68).

There was a specific indirect effect of autonomy support to new users via needs satisfaction, keeping winning in proportion, and doping intentions (β = .011, 95% CI = .003, .032). This effect was positive because it was partly composed of two negative indirect effects: winning → intentions (β = -.18) x intentions → new users (β = -.45). The total effect of controlling coaching on new users (β = -.115, 95% CI = -.246, -.038) encompassed two specific indirect effects: controlling coaching

→ needs frustration → moral disengagement → doping intentions → new user (β = -.093, 95% CI = -.204, -.026); and controlling coaching → needs frustration → acceptance of cheating → doping intentions → new users (β = -.025, 95% CI = -.077, -.005). With regard to continued users, there was a specific indirect of autonomy support via needs satisfaction, keeping winning in proportion, and doping intentions (β = -.013, 95% CI = -.039, -.005). The total effect of controlling coaching was significant (β = .138, 95% CI = .059, .224), and included two specific indirect effects: controlling coaching → needs frustration → moral disengagement → doping intentions → continued user (β = .113, 95% CI = .045, .196); and controlling coaching → needs frustration → acceptance of cheating → doping intentions → continued user (β = .030, 95% CI = .008, .084).

Discussion

The purpose of this study was to test a model linking contextual and personal motivational variables, moral attitudes, moral disengagement in doping, and doping intentions, with doping behavior over a sports season. Such relations have not been previously examined in an integrative fashion using a prospective design.

Predicting Doping Behavior

We were interested in identifying athletes who would report at the beginning and close to the end of the sport season that they had recently taken banned substances (‘continued users’); we were also interested in identifying athletes who reported taking a banned substance only at the latter time point (‘new users’). Such longitudinal effects have not been tested previously and can provide insight into the uptake and maintenance of doping behavior. The findings showed doping intentions to directly predict the continued use of doping in a positive fashion. Continued use was also predicted indirectly and in a negative fashion by perceptions of autonomy support via the moral attitude of ‘keeping winning in proportion’. In contrast, perceptions of controlling coaching were positive indirect predictors of continued doping use via psychological need frustration, moral disengagement in doping, and endorsement of cheating. These results indicate that controlling coaching environments that frustrate athletes’ psychological needs have the potential to foster low moral functioning and positive intentions toward doping, which in turn can result in sustained doping behavior.

A number of interesting indirect effects also emerged. Perceptions of autonomy support were negative predictors of continued users via psychological need satisfaction, keeping winning in

proportion, and doping intentions. In contrast, perceptions of controlling coaching were positive predictors of continued users via psychological need frustration, acceptance of cheating, and moral disengagement in doping. Taken together, these findings are in line with past work linking coaching behaviors with athletes' moral functioning and doping. Such work has shown that environments characterized by pressure, contingent approval, preoccupation with winning, and low inclusion and caring for athletes can facilitate moral disengagement in sport, low sportspersonship, and willingness to cheat in order to achieve desired outcome (Hodge & Lonsdale, 2011; Ommundsen Roberts, Lemyre & Treasure, 2003; Yukhymenko-Lescroart, Brown, & Paskus, 2015). Our findings support and extend this past work by showing that such effects of the social environment are mediated by perceptions of athletes' psychological needs frustration in these environments.

With regard to predicting new doping use, our findings suggest that even athletes who reported at the beginning of the season low doping intentions and no doping use may be involved in doping use later on in the season. This finding was unexpected but can be explained. During a competitive season there are many situations that could predispose an athlete in favor of doping use, such as injuries or failure to achieve important goals. When these situations are experienced, particularly when athletes are placed in a controlling coaching environment which motivates by pressure and guilt, athletes might endorse cheating and moral disengagement in doping (see indirect effects in the Results). Hence, athletes with initially low intentions to dope may eventually engage in this behavior to achieve desired objectives. Alternatively, it is possible that some of the new users might have taken a banned substance by accident for a variety of reasons (cf. the work of Chan et al., 2016, on the psychology of the avoidance of unintentional doping). The latter possibility is also a possible explanation for the unexpected correlations involving the variable of 'new user' with need frustration and moral disengagement in doping in Table 1.

Predicting Doping Intentions

Favorable attitudes toward cheating were a positive predictor of doping intentions, whereas the attitude of keeping winning in proportion was a negative predictor. These findings are in line with the Sport Drug Control Model which postulates personal morality as an antecedent of doping intentions (Donovan, Egger, Kapernick, & Mendoza, 2002). They also corroborate previous evidence linking positive attitudes (moral and non-moral specific) toward doping and endorsements of scenarios describing doping use (Lucidi et al., 2008; Vargo et al., 2014). Our findings also

provide support for Barkoukis et al.'s (2013) argument that interventions for clean athletes should foster attitudes about the unethical nature of doping use. The moral attitude of gamesmanship was not a significant predictor of doping intentions. This finding is probably because gamesmanship refers to situations in which athletes break the spirit of the game (e.g., winding up the opposition) but not the rules, hence, gamesmanship might not be a direct predictor of doping-related cognitions.

Moral disengagement in doping was also a strong positive predictor of doping intentions, much stronger than moral attitudes were. The findings pertaining to moral disengagement are in line with past evidence suggesting that moral disengagement (specific to doping but also more generally with regard to sport participation) is an important antecedent of doping intentions (Kavussanu et al., 2016; Lucidi et al., 2008). Thus, cognitive and affective disengagement from the moral, health and interpersonal consequences of antisocial behavior in general as well as doping use in particular, can be precursors of athletes' intentions to act in a self-serving manner by taking illegal performance enhancing substances.

Predicting Moral Attitudes and Moral Disengagement in Doping

Athletes' need frustration was a positive predictor of favorable attitudes toward cheating and gamesmanship, as well as higher levels of moral disengagement in doping. Taken together, these findings indicate that when athletes experience frustration of their basic psychological needs, they are more likely to endorse more dysfunctional moral attitudes and cognitions. There is increasing empirical evidence documenting the maladaptive correlates of need frustration in athletes and other populations (e.g., Ntoumanis, 2012; Vansteenkiste & Ryan, 2011). Our study is the first to show that need frustration might have implications for moral functioning, both in terms of sport participation and specifically with respect to doping. As expected, psychological need satisfaction was a positive predictor of the attitude of keeping winning in proportion, but it did not predict cheating, gamesmanship or moral disengagement in doping. Similar null findings between need satisfaction and anti-social moral variables have also been reported by Hodge and Gucciardi (2015). Interestingly, Hodge and Lonsdale (2011) and Hodge et al. (2013) also found non-significant relations between autonomous motivation (an outcome of need satisfaction) and antisocial moral variables. These findings, viewed in conjunction with our findings for need frustration, provide further support to arguments made by Bartholomew et al. (2011a, b) that to understand from a SDT

perspective diminished or compromised functioning (moral, in the case of our study), measures of need frustration hold greater explanatory capability than measures of need satisfaction.

Study Limitations, Future Research Directions, and Implications

This study had a number of limitations. For example, the dropout in the Australian sample prevented us from testing the longitudinal aspect of the study across both cultures. The primary obstacle we faced was the refusal of coaches to grant us access again for data collection purposes, which we suspect was because of the emphasis of the survey on the reporting of doping substance use at a time when a high profile doping case in the Australian Football League captured the media attention for several weeks ("Essendon drug scandal"). Another limitation of our study was that we had only two time points for measurement and most variables were measured only once. We could have potentially included more assessments of all variables throughout the competitive season to capture more accurately changes (both linear and non-linear) in doping intention and behavior, however, this was not deemed pragmatic in terms of obtaining sport clubs' approval. A third limitation of our study was that, although the list of substances and categories of drugs included in the questionnaire covered the most commonly used substances included in the World Anti-Doping Agency's list of prohibited substances, other doping substances or methods (e.g., Continuous Erythropoietin Receptor Activator/CERA, blood doping) might had been used by our participants. Therefore, in the future researchers could include a more comprehensive list of substances and methods of doping. In addition, given that peer influence is potentially important in terms of doping-related cognitions (Hodge & Gucciardi, 2015), future research could include measures of peer autonomy support and control.

Lastly, our findings could have been affected by social desirability, given that we used self-reports for doping-related variables. With regard to the more "sensitive" variable of doping use, we asked athletes to report on the use of both legal and illegal substances in an effort to somewhat counter social desirability in reporting (i.e., we did not explicitly tell the athletes which substances were illegal, and we also did not tell them that we would include in our analyses the illegal ones only). Currently, self-reports are the most realistic means to measure doping use in psychological research. Interestingly, self-reports provide higher prevalence of doping use when compared to doping controls. Only 2% of positive samples are reported according to WADA statistics, whereas doping prevalence exceeds 10% in self-reports (see Lazuras et al., 2010). In addition, self-reports

can capture retrospective use and are cost-effective whereas doping controls can capture current use only and are expensive.

Despite these limitations, the present study offers several unique contributions to the literature by bringing together independent but complementary lines of work on motivation, moral attitudes, and doping in sport in an integrative model. We added to the SDT literature (sport-specific and wider) by showing how controlling styles and need frustration can predict low moral attitudes and moral disengagement in doping. Such links have not been previously tested. We also contributed to the doping literature by testing longitudinally predictors of continued and new doping use, and by examining behaviors and processes (direct and indirect) by which the social environment impacts on athletes' intentions and decisions to engage or not in doping. Such findings are also novel. This project serves the basis for developing anti-doping education programs for coaches (who are often absent from such programs) with the aim of training them in more need supportive and less controlling behaviors in general, but also specifically training coaches to communicate to athletes information about doping using a more need supportive style. Our findings suggest that such programs should focus primarily on reducing experiences of psychological need frustration and tackling moral disengagement in doping.

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Table 1

Descriptive Statistics, Internal Reliability Estimates and Bivariate Correlations among Study Variables

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Autonomy supportive style	(.88)												
2	Controlling style	-.23**	(.87)											
3	Needs satisfaction	.43**	-.12	(.83)										
4	Needs frustration	-.23**	.58**	-.10	(.87)									
5	Doping moral disengagement	-.04	.43**	-.03	.42**	(.90)								
6	Cheating	.03	.18**	-.01	.20*	.54**	(.84)							
7	Winning	.06	-.34**	.23**	-.18**	-.11	-.08	(.92)						
8	Gamesmanship	.04	.07	.02	.15*	.36**	.47**	.23**	(.79)					
9	Doping intentions	-.06	.38**	-.07	.39**	.69**	.51**	-.27**	.25**	(.97)				
10	Doping behavior (time 1)	-.06	.19*	-.06	.08	.42**	.30**	-.08	.23**	.47**	-			
11	Doping behavior (time 2)	.00	-.01	-.05	-.10	.05	.17*	.00	.17*	.14	.31**	-		
12	New user	.19	-.14	-.08	-.31*	-.38*	-.04	.17	.04	-.41	-51**	.72**	-	
13	Continued user	-.20	.13	-.04	.08	.42*	.45*	-.19	.44*	.56*	.67**	.67**	-.22	-
	M	5.05	3.33	4.86	3.61	2.31	2.08	3.93	2.57	1.96	-	-	-	-
	SD	1.02	1.08	.78	1.04	1.24	.94	1.20	.90	1.44	-	-	-	-

Note: * $p < .05$; ** $p < .001$. Doping behavior: 0 = non-user, 1 = user; New user ($n = 16$) and continued user ($n = 12$): 0 = no, 1 = yes. Internal reliability coefficients are presented in brackets

Table 2

Standardized Parameter Estimates of the Hypothesized Model

Structural Paths	β	95% CI	*p*
Autonomy Supportive Style→ Needs satisfaction	.40	.20, .58	<.001
Controlling Style → Needs satisfaction	-.03	-.25, .21	.81
Autonomy Supportive Style → Needs frustration	.01	-.12, .15	.85
Controlling Style → Needs frustration	.69	.48, .80	<.001
Needs satisfaction → Doping moral disengagement	.09	-.06, .25	.29
Needs frustration → Doping moral disengagement	.48	.27, .62	<.001
Needs satisfaction → Cheating	.10	-.07, .32	.35
Needs frustration → Cheating	.33	.12, .49	.001
Needs satisfaction → Winning	.34	.16, .51	<.001
Needs frustration → Winning	-.05	-.19, .10	.56
Needs satisfaction → Gamesmanship	.21	.05, .40	.02
Needs frustration → Gamesmanship	.29	.02, .48	.01
Doping moral disengagement → Doping intentions	.62	.40, .82	<.001
Cheating → Doping intentions	.25	.10, .50	.02
Winning → Doping intentions	-.18	-.32, -.08	.004
Gamesmanship → Doping intentions	-.07	-.22, .10	.46
Doping Intentions-New User	-.45	-.76, -.20	.002
Doping Intentions-Continued User	.55	.40, .70	<.001
Autonomy Supportive Style ↔ Controlling Style	-.30	-.53, -.14	.002
Needs satisfaction ↔ Needs frustration	-.04	-.26, .18	.75
Doping moral disengagement ↔ Cheating	.69	.55, .80	<.001
Doping moral disengagement ↔ Winning	-.09	-.24, .06	.25
Doping moral disengagement ↔ Gamesmanship	.36	.12, .52	<.001
Cheating ↔ Winning	-.10	-.29, .06	.27
Cheating ↔ Gamesmanship	.48	.31, .63	<.001
Winning ↔ Gamesmanship	.23	.01, .46	.04

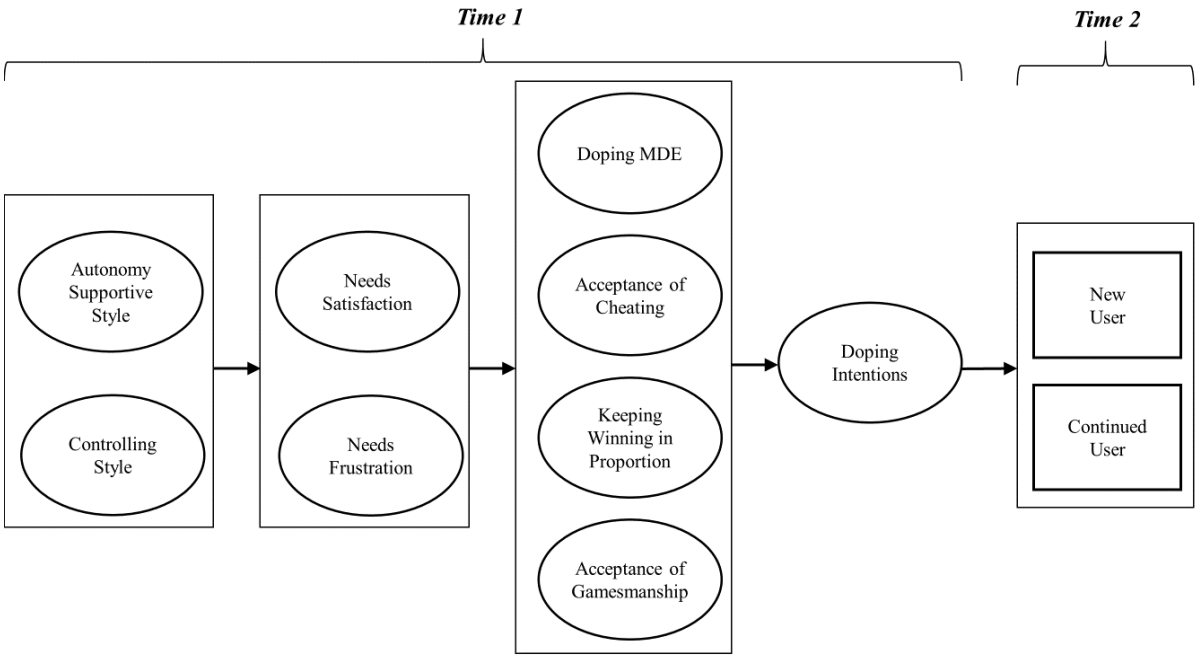

Figure 1. Visual display of hypothesized theoretical sequence for time 1 and 2 data. Rectangles encompass latent variables that are correlated with each other. Parcels and item indicators are excluded for visual clarity. MDE = moral disengagement.

Supplementary Material

Additional Analyses for Longitudinal Data

At the request of the reviewers, we conducted additional analyses on the longitudinal data to examine the results for alternative configurations of the dependent variable, namely self-reported doping behavior.

Doping user or non-user at time 2. We tested the theoretical sequence depicted in Figure S1, such that there was a single dependent variable that represented athletes self-report of their doping behavior at time 2 (0 = no, 1 = yes) while controlling for self-reported doping behavior at time 1. Past doping behavior reported at time 1 (β = .45, p < .001, 95% CI = .17, .62) but not doping intentions (β = -.20, p = .15, 95% CI = -.45, .11) were a significant predictor of doping behavior at time 2. None on the indirect effects from autonomy support and controlling styles to doping behavior at time 2 were significant.

Past users and clean athletes. We re-analyzed the Greek data with 4 dependent variables to capture continued and new users – as presented in the main article – alongside 'past users' (i.e., self-reported doping at time 1 but not time 2) and 'clean athletes' (i.e., self-reported no use of doping substances at either time point). A graphical overview of this model is depicted in Figure S2. Doping intentions were a predictor of new users (β = -.42, p <.01, 95% CI = -.70, -.15; OR = .62), continued users (β = .55, p <.001, 95% CI = .39, 71; OR = 1.94), clean athletes (β = -.51, p <.001, 95% CI = -.64, -.34, OR = .55), and past users (β = .67, p <.001, 95% CI = .35, .80, OR = 2.48). There were specific indirect effects of autonomy support via needs satisfaction, keeping winning in proportion, and doping intentions to new users (β = .01, 95% CI = .003, .028), continued users (β = -.01, 95% CI = -.038, -.005), clean athletes (β = .01, 95% CI = .005, .029), and past users (β = -.02, 95% CI = -.039, -.006); controlling style to new users via needs frustration, doping moral disengagement and doping intentions (β = -.09, 95% CI = -.186, -.023) and via acceptance of cheating (β = -.02, 95% CI = -.079, -.004); controlling style to continued users via needs frustration, doping moral disengagement and doping intentions (β = .11, 95% CI = .041, .189) and via acceptance of cheating (β = .03, 95% CI = .008, .096); controlling style to clean athletes via needs

frustration, doping moral disengagement and doping intentions (β = -.11, 95% CI = -.181, -.038) and via acceptance of cheating (β = -.03, 95% CI = -.080, -.005); and controlling style to past users via needs frustration, doping moral disengagement and doping intentions (β =.14, 95% CI = .039, .236) and via acceptance of cheating (β = .04, 95% CI = .006, .100).

To examine these alternative operationalizations of doping behavior against each other, we compared each model using the following information criteria: Akaike Information Criteria (AIC), Bayesian Information Criteria (BIC), and the sample size adjusted BIC ($BIC_{adjusted}$). Lower values provide support for the best fitting model relative to comparison models. As detailed in Table S1, the AIC, BIC and $BIC_{adjusted}$ support the model in which two doping behavior variables are modeled (continued and new users; i.e., Model 1).

Table S1

Overview of Model Fit Indices for Supplementary Analyses

	AIC	BIC	$BIC_{adjusted}$
Model 1	11620.09	11968.64	11614.04
Model 2	11781.31	12136.08	11775.14
Model 3	11851.43	12212.42	11845.15

Note: model 1 = new and continued users; model 2 = new and continued users, and clean athletes (i.e., no self-reported doping at wave 1 or 2); model 3 = new and continued users, clean athletes, and past users (i.e., self-reported doping at wave 1 but not wave 2).

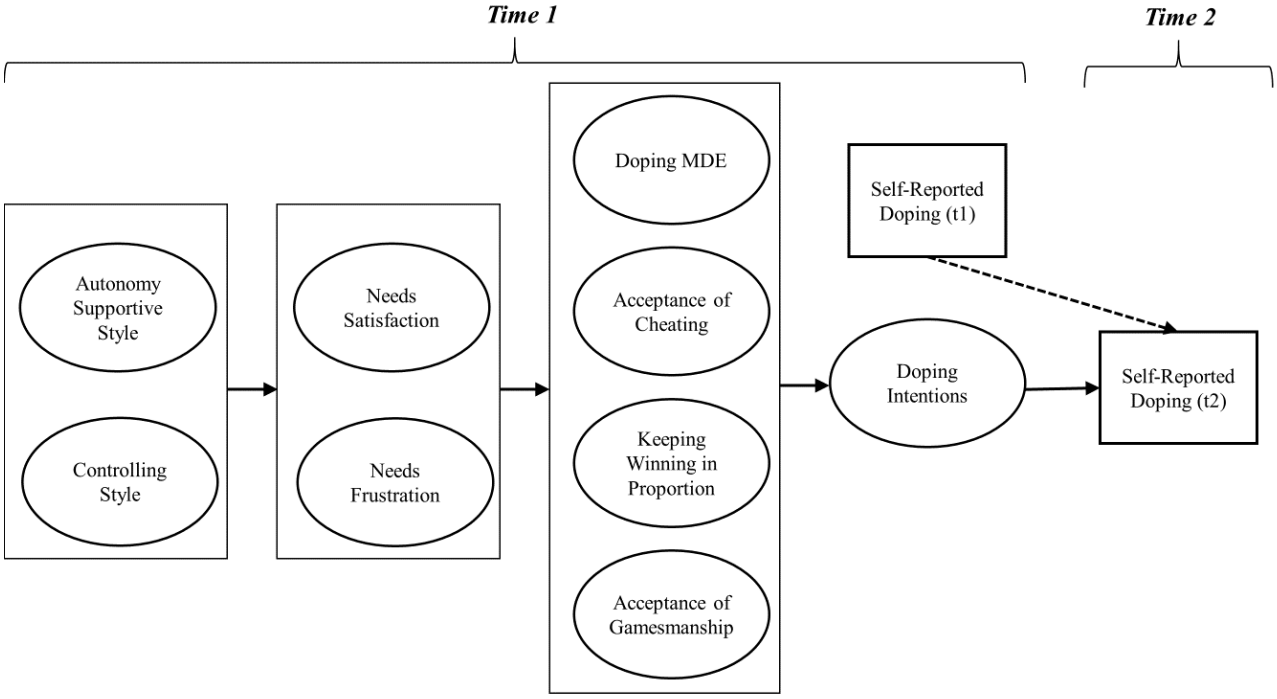

Figure S1. Visual display of hypothesized theoretical sequence for time 1 and 2 data with a single dependent variable for doping behavior. Rectangles encompass latent variables that are correlated with each other. MDE = moral disengagement.

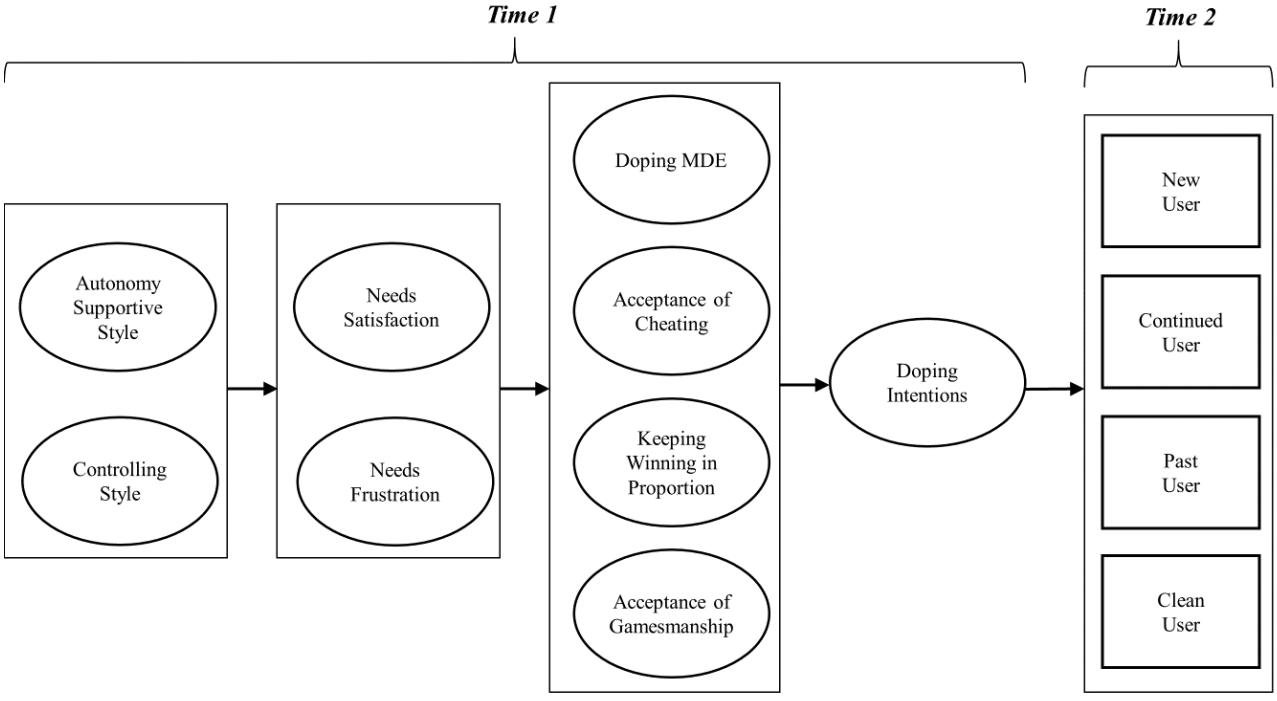

Figure S2. Visual display of hypothesized theoretical sequence for time 1 and 2 data with 4 dependent variables for doping behavior. Rectangles encompass latent variables that are correlated with each other. MDE = moral disengagement.

Cross-Sectional, Cross-Cultural Analysis of the Theoretical Sequence

One of the original aims of the study was to test the cross-cultural invariance of the hypothesized model with athletes from Australia and Greece. Given that Deci and Ryan (2002) argued for the cross-cultural generalizability of the motivational processes described in SDT that link the social environment with individuals' motivation, cognition and behavior, we consider it important to empirically test such a proposition. In both Australia and Greece there have been incidents of high profile doping scandals. In Australia there are several national and state level anti-doping education programs (primarily targeting athletes and sports medicine personnel) offered by the Australian Anti-Doping Agency. This Agency maintains a Registered Testing Pool (RTP) for the purposes of implementing, monitoring and enforcing effective doping control measure. In contrast, anti-doping education in Greece is scarce, and due to financial reasons, anti-doping controls carried out by the national anti-doping agency are scarce.

Given the attrition in the Australian data described in the first footnote of the manuscript, we tested the cross-cultural invariance of the cross-sectional part of our study. Within the context of a structural equation modeling framework, a sequential model testing approach was followed to examine the invariance of the hypothesized theoretical sequence depicted in Figure S3 between the Australian and Greek athletes (Vandenberg & Lance, 2000). First, we tested a *baseline model* separately in each sample, which is necessary prerequisite for multigroup invariance analyses. The focus at this stage was to identify a well-fitting model in each sample that would be the focus for invariance testing. Second, we analyzed a *configural invariance model* to examine if the number of factors and corresponding items per factor is the same across both groups; this model does not include any equality constraints between groups. Third, the hypothesis that the strength of association between an item indicator and its corresponding factor are the same for Australian and Greek athletes was examined; in this *metric invariance model*, factor loadings are forced to be equal across groups. Typically, scalar invariance is the next stage with invariance testing (i.e., intercepts of item indicators on their latent factor are the same across groups); however, we did not examine

this model because our primary interest related to the structural paths of the model and establishment of metric invariance is sufficient for this purpose (Dimitrov, 2010). Finally, we tested a *structural invariance model* where we forced covariances and structural paths between latent variables and the observed score for past doping behavior to be equal across both groups.

Model-data fit for all analyses was assessed using multiple indices and typical interpretation guidelines, namely the χ^2 goodness-of-fit index, comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA), with evidence of adequate fit indicated by CFI/TLI $\geq .90$ and RMSEA $\leq .08$ (Marsh, Hau, & Grayson, 2005). Given the sensitivity of χ^2 to sample size and minor model misspecifications, we prioritized approximate fit indices for interpretations regarding competing models of the sequential invariance model testing approach. Guided by commonly adopted recommendations, a reduction of .01 or less in the CFI and an increase of .015 or less in the RMSEA were used as indications that the invariance hypothesis should not be rejected (Chen, 2007).

The initial analysis of the baseline model in the Australian athletes indicated a not positive definite matrix, owing to a negative residual variance of one doping intention item ("I plan to use prohibited substances to enhance my performance during this season"); as this value was small (-.009) we forced it to zero in subsequent analyses. Single sample analyses indicated acceptable model-data fit of the baseline model with the Australian athletes, $\chi^2(350) = 575.62$, $p < .001$, CFI = .945, TLI = .936, RMSEA = .056 (90% CI = .048 to .064). Estimates of latent variable reliability for the Australian athletes were: autonomy-supportive style ($\omega = .95$), controlling style ($\omega = .85$), needs satisfaction ($\omega = .91$), needs frustration ($\omega = .90$), doping moral disengagement ($\omega = .76$), acceptance of cheating ($\omega = .86$), keeping winning in proportion ($\omega = .66$), acceptance of gamesmanship ($\omega = .87$), and doping intentions ($\omega = .92$).

Model-data fit indices supported the adequacy of the configural invariance model, $\chi^2(699) = 1270.21$, $p < .001$, CFI = .939, TLI = .929, RMSEA = .060 (90% CI = .054 to .065). The metric invariance model exhibited adequate model-data fit, $\chi^2(718) = 1380.61$, $p < .001$, CFI = .930, TLI = .920, RMSEA = .063 (90% CI = .058 to .068). Changes in approximate fit indices between the configural and metric invariance models (ΔCFI = .009, ΔRMSEA = .003) indicated that the invariance hypothesis should not be rejected. Analyses indicated acceptable model-data fit for the structural invariance model, $\chi^2(747) = 1537.57$, $p < .001$, CFI = .916, TLI = .909, RMSEA = .068 (90% CI = .063 to .073). Changes in approximate fit indices between the metric and structural invariance models indicated that the additional constraints associated with latent factor covariances and structural paths were not invariant across Australian and Greek athletes (ΔCFI = .014, ΔRMSEA = .005). As such, we released equality constraints on structural paths where there was a large difference between the groups (Byrne, Shavelson, & Muthén, 1989). The release of equality constraints for four structural parameters resulted in an acceptable model-data fit, $\chi^2(743) = 1444.84$, $p < .001$, CFI = .925, TLI = .918, RMSEA = .064 (90% CI = .059 to .069), which did not differ substantially from the fit of the metric invariance model (ΔCFI = .005, ΔRMSEA = .001). These paths included autonomy support → basic psychological need frustration, basic psychological need frustration → doping moral disengagement, doping moral disengagement → doping intentions, past doping behavior → doping moral disengagement, and the correlation between acceptance of gamesmanship and keeping winning in proportion.

An overview of standardized parameter estimates of direct paths in the final partial structural invariance model is provided in Table S2. The amount of variance explained in the latent variables were as follows: needs satisfaction (AUS $r^2 = .33$; GRC $r^2 = .32$), needs frustration (AUS $r^2 = .53$; GRC $r^2 = .42$), doping moral disengagement (AUS $r^2 = .08$; GRC $r^2 = .39$), acceptance of cheating (AUS $r^2 = .07$; GRC $r^2 = .12$), keeping winning in proportion (AUS $r^2 = .17$; GRC $r^2 = .03$), acceptance of gamesmanship (AUS $r^2 = .02$; GRC $r^2 = .07$), and doping intentions (AUS $r^2 = .08$; GRC $r^2 = .60$). Several of the indirect effects differed significantly from zero: total indirect

effect from autonomy support to doping intentions (β_{AUS} = -.029, 95% CI = -.058, -.009); total indirect effect from controlling coaching to doping intentions were (β_{AUS} = .026, 95% CI = .004, .058; β_{GRC} = .253, 95% CI = .157, .372); specific indirect effect of autonomy support to doping intentions via needs frustration and acceptance of cheating (β_{AUS} = -.007, 95% CI = -.021, -.002); specific indirect effect of autonomy support to doping intentions via needs frustration and keeping winning in proportion (β_{AUS} = -.008, 95% CI = -.026, -.001); specific indirect effect of controlling coaching to doping intentions via needs frustration and acceptance of cheating (β_{AUS} = .013, 95% CI = .003, .036; β_{GRC} = .013, 95% CI = .003, .036); specific indirect effect of controlling coaching to doping intentions via needs frustration and keeping winning in proportion (β_{AUS} = .014, 95% CI = .003, .031; β_{GRC} = .014, 95% CI = .003, .031); and specific indirect effect of controlling coaching to doping intentions via needs frustration and doping moral disengagement (β_{GRC} = .228, 95% CI = .135, .346). All other indirect effects were not significantly different from zero.

Table S2

Standardized Parameter Estimates from the Final Partial Structural Invariance Model for Australian and Greek Athletes

	Australian Athletes			Greek Athletes		
Structural Paths	β	95% CI	*p*	β	95% CI	*p*
Autonomy supportive style → Needs satisfaction	.56	.40, .70	.001	.54	.36, .68	.001
Controlling style → Needs satisfaction	-.04	-.19, .09	.59	-.05	-.22, .11	.58
Autonomy supportive style → Needs frustration	-.33	-.53, -.15	.001	-.05	-.17, .06	.40
Controlling style → Needs frustration	.52	.38, .67	.001	.62	.48, .74	.001
Needs satisfaction → Doping moral disengagement	-.02	-.18, .11	.77	-.02	-.11, .08	.76
Needs frustration → Doping moral disengagement	.15	.00, .29	.05	.51	.38, .63	.001
Needs satisfaction → Cheating	-.03	-.16, .09	.66	-.02	-.14, .08	.67
Needs frustration → Cheating	.20	.08, .32	.001	.18	.06, .31	.01
Needs satisfaction → Winning	.24	-.02, .50	.08	.11	-.01, .25	.09
Needs frustration → Winning	-.26	-.50, -.02	.04	-.13	-.24, -.01	.03
Needs satisfaction → Gamesmanship	.06	-.06, .19	.33	.08	-.07, .23	.32
Needs frustration → Gamesmanship	.11	-.02, .20	.06	.14	-.02, .28	.08
Doping moral disengagement→ Doping intentions	.01	-.15, .23	.92	.60	.48, .71	.001
Cheating → Doping intentions	.15	.02, .32	.04	.10	.02, .19	.02
Winning → Doping intentions	-.13	-.26, -.05	.02	-.16	-.25, -.07	.001
Gamesmanship → Doping intentions	-.08	-.18, .04	.18	-.03	-.08, .01	.17
Past behavior → Doping moral disengagement	.24	.15, .36	.001	.36	.23, .49	.001
Past behavior → Cheating	.16	.09, .25	.001	.30	.16, .44	.001
Past behavior → Winning	-.04	-.16, .07	.51	-.04	-.15, .06	.49
Past behavior → Gamesmanship	.08	.04, .14	.001	.23	.10, .35	.001

Past behavior → Doping intentions	.16	.07, .33	.01	.19	.08, .31	.001
Autonomy supportive style ↔ Controlling style	-.43	-.58, -.28	.001	-.41	-.51, -.30	.001
Needs satisfaction ↔ Needs frustration	.03	-.17, .22	.76	.03	-.13, .23	.75
Doping moral disengagement ↔ Cheating	.55	.40, .70	.001	.45	.32, .59	.001
Doping moral disengagement ↔ Winning	-.08	-.30, .14	.47	-.03	-.10, .05	.41
Doping moral disengagement↔ Gamesmanship	.16	.04, .28	.01	.19	.06, .32	.01
Cheating ↔ Winning	-.11	-.38, .10	.37	-.05	-.13, .04	.28
Cheating ↔ Gamesmanship	.35	.26, .43	.001	.45	.33, .57	.001
Winning ↔ Gamesmanship	.20	-.08, .45	.16	.30	.16, .43	.001

Note: grey shade = equality constraint released in final model

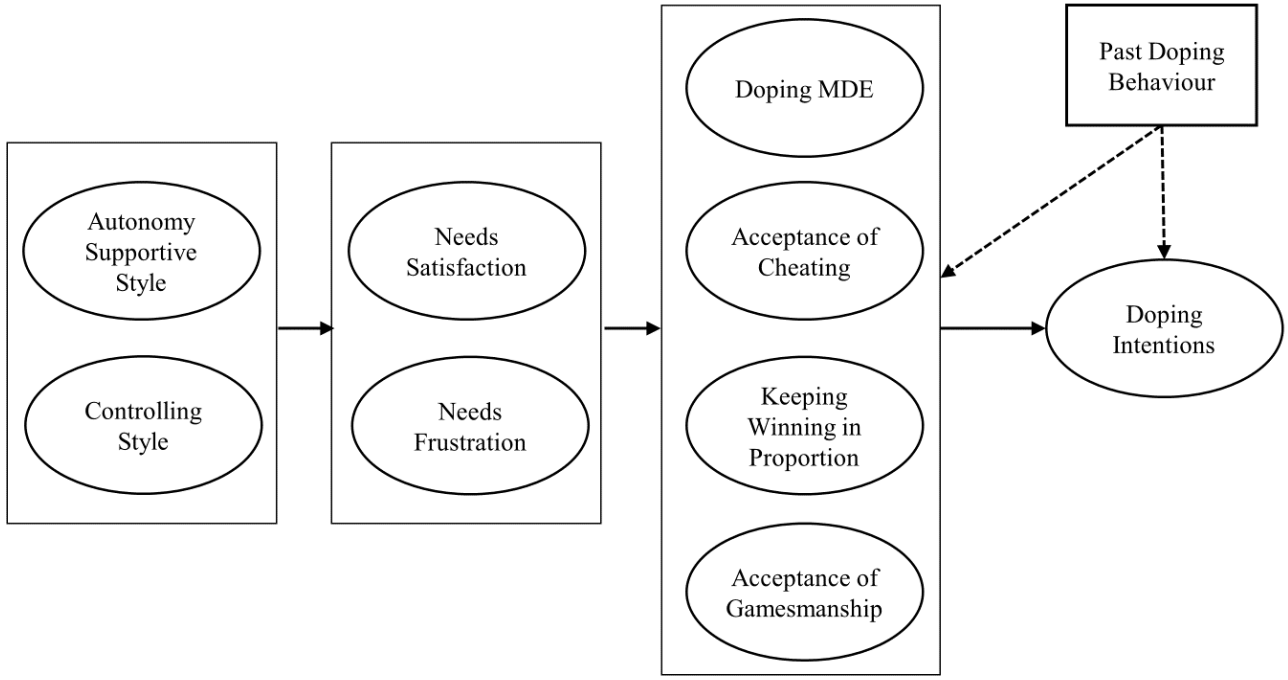

Figure S3. Visual display of hypothesized theoretical sequence for time 1 data. Dotted line represents the controlling effect of past doping behavior. Rectangles encompass latent variables that are correlated with each other. Parcels and item indicators are excluded for visual clarity. MDE = moral disengagement.

Table S3

Descriptive Statistics, Internal Reliability Estimates and Bivariate Correlations among Study Variables for Australian Athletes.

		Australian Athletes										
		1	2	3	4	5	6	7	8	9	10	11
1	Autonomy supportive style	(.95)										
2	Controlling style	-.42**	(.85)									
3	Needs satisfaction	.57**	-.31**	(.91)								
4	Needs frustration	-53**	.58**	-.31**	(.90)							
5	Doping moral disengagement	-.03	.21**	-.16*	.11	(.76)						
6	Cheating	-.09	.22**	-.16*	.17*	.25**	(.86)					
7	Winning	.25**	-.15*	.18*	-.19*	-.08	-.08	(.66)				
8	Gamesmanship	-.07	.12	.07	.09	.03	.17*	.18**	(.87)			
9	Doping intentions	-.07	.14	-.24**	.01	.13	.06	-.16*	-.10	(.92)		
10	Doping behavior (time 1)	.07	-.02	-.07	-.03	.04	.01	.00	.00	.18*	-	-
	M	5.44	2.51	5.71	2.64	1.85	1.50	4.39	3.56	1.19	-	-
	SD	1.18	1.00	.84	1.12	.91	.69	.71	1.04	.75	-	-

Note: * $p < .05$; ** $p < .0$; Internal reliability coefficients are presented in brackets

Direct effects from interpersonal styles and psychological needs. We excluded direct paths from interpersonal styles to moral variables and doping intentions; or from psychological needs to doping intentions. Our intent was to model a parsimonious theoretical structure. In the Australian athletes, the inclusion of these direct effects evidenced adequate model-data fit, $\chi^2(338) = 534.92$, $p < .001$, CFI = .952, TLI = .942, RMSEA = .053 (90% CI = .045 to .062). The direct effects model also evidenced adequate fit with the Greek data, $\chi^2(337) = 534.92$, $p < .001$, CFI = .939, TLI = .927, RMSEA = .061 (90% CI = .054 to .068). The inclusion of these direct effects improved the model-data fit in both samples. However, the inclusion of these direct effects resulted in several cases of suppression effects (see Table S4). For example, the bivariate correlations between autonomy support and several of the moral variables are small and non-significant (see Table S3), yet when factored into the structural model are moderate in size (e.g., doping moral disengagement). From a conceptual standpoint, the direct effects from autonomy supportive and controlling styles are similar in magnitude and sign, which is inconsistent with a wealth of research on these concepts. For these reasons, we retained the parsimonious model in which these direct effects are excluded within the main body of the manuscript.

Table S4.

Standardized Parameter Estimates of Additional Direct Effects

	Australian Athletes			Greek Athletes		
Structural Paths	β	95% CI	*p*	β	95% CI	*p*
Autonomy supportive style → Doping moral disengagement	.27	.04, .54	.04	.13	-.01, .27	.06
Controlling style → Doping moral disengagement	.25	-.01, .55	.06	.24	.03, .42	.01
Autonomy supportive style → Cheating	.16	-.10, .42	.23	.12	-.08, .31	.24
Controlling style → Cheating	.19	-.05, .44	.13	.15	-.03, .32	.09
Autonomy supportive style → Winning	.27	-.15, .60	.17	-.19	-.37, .01	.06
Controlling style → Winning	.13	-.35, .45	.54	-.41	-.57, -.25	<.001
Autonomy supportive style → Gamesmanship	-.13	-.42, .15	.38	.07	-.12, .27	.52
Controlling style → Gamesmanship	.35	.06, .59	.01	-.06	-.28, .16	.61
Autonomy supportive style → Doping intentions	.10	-.21, .30	.41	-.01	-.13, .11	.86
Controlling style → Doping intentions	.23	-.06, .52	.11	-.07	-.22, .09	.42
Needs satisfaction → Doping intentions	-.27	-.47, -.04	.02	.01	-.11, .14	.88
Needs frustration → Doping intentions	-.23	-.53, .04	.11	.12	-.02, .23	.07

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