Are nutritional supplements a gateway to doping use in competitive team sports? The roles of achievement goals and motivational regulations

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Abstract

Objectives: The study investigated the moderating role of achievement goals and motivation regulations on the association between self-reported nutritional supplement (NS) use, doping likelihood, and self-reported doping behaviour among competitive athletes.

Method: Four hundred and ninety seven competitive team sport athletes (64% males; *M* age = 23.54 years, *SD* = 5.75) completed anonymous questionnaires measuring self-reported use of prohibited substances and licit NS; beliefs about the "gateway" function of NS; achievement goals; and motivational regulations.

Results: Hierarchical linear regression analysis showed that self-reported doping was associated (Adjusted R^2 = 33%) with NS use, a stronger belief that NS use acts as a gateway to doping, amotivation, controlled motivation, mastery approach, and performance avoidance goals. Higher likelihood to use doping substances in the future was associated (Adjusted R^2 = 41.7%) with current NS use, stronger belief that NS act as a gateway to doping, autonomous motivation, and performance avoidance goals. A series of moderated regression analyses showed that NS use significantly interacted with mastery approach, mastery avoidance, performance avoidance goals, autonomous motivation controlled motivation, and with amotivation in predicting self-reported doping. Finally, NS use significantly interacted with mastery approach goals, performance avoidance goals, and controlled motivation in predicting future doping likelihood.

Conclusions: Achievement goals and motivational regulations are differentially associated with both doping likelihood and self-reported doping, and may account for the observed association between self-reported NS use and doping substances; thus, providing an alternative explanation to the "gateway hypothesis" that emphasizes the role of motivation.

Keywords: performance enhancement; motivation; motivational regulations; drug use; gateway hypothesis.

Are nutritional supplements a gateway to doping in competitive team sports? The roles of achievement goals and self determination

Despite efforts to control doping use in sport, this behaviour represents an ongoing challenge to the spirit of sport values and fair play rules. A recent literature review showed that between 14% and 39% of elite athletes intentionally engage in doping behaviour[1], whereas research using indirect questioning methods has shown that doping prevalence in elite athletes can range between 43.6% to 57.1%[2]. Reviews and meta-analytic studies of the risk factors for doping use have shown that using legal nutritional supplements (NS) is one of the most important risk factors for doping intentions and actual use[3]. Prevalence studies have shown that more than 60% of competitive athletes use NS routinely as a performance enhancement aid[4]. However, Ntoumanis et al.'s meta-analysis showed that NS users were at much higher risk for doping than non-users[5], and other studies have demonstrated that doping was 3.5 times more prevalent among competitive athletes who used NS[6], suggesting that NS acts as a gateway to doping.

Petroczi et al. argued that the association between NS and doping use can be explained by a "shared mental representation", that is, a common mental representation for chemically-assisted performance enhancement that familiarises users with the concept and practice of doping[7]. Barkoukis et al. provided an alternative explanation of this process, by arguing that the association between NS use and doping is not necessarily direct, and that psychological (e.g., cognitive, emotional, motivational) processes may intervene to increase the risk for doping use[8]. In support of this hypothesis, they found that adolescent competitive athletes who used NS reported more favourable attitudes and beliefs towards doping, stronger intentions to engage in doping in the future, and were twice as likely to self-report doping use in the past compared to non-users of supplements. Therefore, it is plausible that mental processes can explain the association between NS use and doping, but more research is needed to determine the type and nature of those processes. A focus on motivational processes, such as motivational regulation and achievement goals, can be particularly relevant here for the following reasons. Theoretical models of doping have emphasized the relevance of motivation and achievement goals on the decision to engage in doping. For instance, the life-cycle model[9] and the Sport Drug Control Model[10] posit that athletes' goals towards success and achievement represent

systemic factors that influence their decision-making process and goals relevant to performance enhancement substance. Hence, athletes may be motivated by external rewards, such as anticipated glory, fame and monetary rewards, as well as "legitimate" and intrinsic rewards, such as the goal to becoming the best one can be. Furthermore, NS use reflects the goal to enhance performance through substance use[7]. This goal originates in the need to improve performance either for intrinsic and task-oriented or for extrinsic and ego-oriented reasons. In this respect, achievement goals and reward expectations represent the motivational engine that directs effort, persistence and behaviour towards a specific direction: performance enhancement. This argument implies that NS do not represent a gateway to doping behaviour, but rather, gateway psychological processes (in this case motivational processes) can explain the or co-occurrence of NS and doping use.

Self-Determination, Achievement Goals, and Doping

Self-determination theory is based on the distinction between intrinsic and extrinsic motivation, whereby intrinsic motivation is characterized by personal interest, enjoyment, satisfaction and a sense of choice or autonomy, and extrinsic motivation is characterized by external rewards and other external contingencies. Intrinsically motivated behaviours are performed spontaneously when situations arise, and do not require any external reinforcements, whereas extrinsically motivated behaviours are driven by the need to seek approval and rewards, rather than self-actualization[11]. Meta-analyses have illustrated that intrinsic motivation is associated with more adaptive behaviours in sports, including increased effort, persistence, and satisfaction[12, 13]. In the context of doping in sports, past evidence showed that athletes with higher scores in intrinsic motivation reported significantly lower intentions for doping, and lower past use of doping substances, as compared to extrinsically motivated athletes[14]. Also, low self-determination was positively associated with more favourable attitudes and greater susceptibility towards doping[15, 16]. Chan et al. demonstrated that self-determined motivation was positively associated with doping-avoidance behaviour in a decision-making task[17].

Research using the achievement goal theory (AGT) has provided further insights about the role of motivational processes in doping behaviour[18]. The AGT distinguishes between task and ego goal orientations. Goal orientations answer to the question of *what* a person wants to achieve in an achievement environment[18], whereas motivational regulations to *why* a person engages in a

behaviour[11]. Individuals with task orientation are likely to engage in an activity to achieve mastery and personal improvement, and they tend to use self-referenced criteria to judge their goal pursuit ability and resultant success. On the other hand, individuals with ego orientation engage in activities to outperform others and to demonstrate comparatively superior ability, using normative or comparative criteria to judge their perceived ability[18]. Task orientation has been associated with more adaptive motivational outcomes in sports, such as greater effort and persistence, fair play, greater enjoyment, and lower anxiety[18,19]. Elliot and McGregor[20] further extended this approach by suggesting the distinction of goals based on the valence and definition of competence. According to this model, competence can be defined as mastery or performance-oriented whereas competence can be valenced as being focused on either desirable/positive or undesirable/negative outcomes (i.e., approach vs. avoidance goals respectively). This distinction resulted in a 2×2 achievement goal model consisting of mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals. Research has shown that mastery-avoidance goals in this model were associated with negative responses; thus, mastery-avoidance goals reflect an avoidance orientation[20].

Using the 2×2 model, Barkoukis et al. reported that mastery oriented elite athletes revealed significantly lower scores on self-reported past use of doping substances and future doping intentions, as compared to athletes with performance-oriented goals[14]. Barkoukis et al. further utilized the 2×2 achievement goal theory and showed that performance-avoidance (positively) and mastery-approach goals (negatively) predicted intentions towards doping in a sample of athletes who did not report past use of doping substances[21]. In contrast, doping users with high mastery-avoidance goals reported stronger intentions to use prohibited PEDs in the future. Furthermore, a study with adolescent competitive athletes showed that mastery-approach goals (negatively) and performance approach goals (positively) predicted intentions to use prohibited PEDs[22].

The Present Study

Taken together, the aforementioned studies indicated that different types of motivational regulations and achievement goals are associated with doping-related attitudes, intentions, and self-reported doping use. Based on this evidence, it is theoretically plausible that self-determined motivation and achievement goals may also explain the association between NS use and doping.

Barkoukis et al. showed that NS use was associated with cognitive processes in favour of doping use[8]. The present study aims to extend those findings by examining if maladaptive motivational processes, such as extrinsic motivation and performance-oriented achievement goals, moderate the association between NS and doping likelihood and use in team sport athletes.

Our contention is that the association between NS and doping (and concomitant likelihood) can be moderated by the motivational variables described in the achievement goal and self-determination theories. More specifically, maladaptive motivations (i.e., performance approach, performance avoidance, mastery avoidance, controlled motivation, and amotivation) will interact positively with NS use and strengthen the association between using NS and self-reported doping and likelihood. In other words, athletes who use NS will be more likely to report doping (and concomitant likelihood) to the extent that they are driven by maladaptive motivations. Likewise, the association between NS and doping (and likelihood) should be attenuated by higher scores in adaptive motivations, such as performance approach goals and autonomous motivation. Moderation (instead of mediation) effects were expected for the following reasons. First of all, the association between NS use and doping has been already documented in the previous literature[5,6]. In our study, we wanted to assess whether the strength of this association is related to individual differences in motivation, that is, whether NS and self-reported doping use are more (or less) strongly associated in athletes with certain motivational profiles. Secondly, previous research in other behavioural domains has shown that past behaviour is more strongly associated with future intentions and behaviour, and with future habitual behaviour depending on the levels of self-determination - in other words, self-determined motivation moderates the association between past behaviour and the frequency/habitual performance of related behaviours in the future[23,24]. Extending these findings in the context of the present study, it is theoretically plausible that the levels of self-determined motivation moderate the association between NS use and self-reported doping and future doping intentions.

Based on previous research about the association between motivation and doping behaviour and intentions[14, 15, 21], we formed the following hypotheses: a) mastery approach goals (positively) and mastery avoidance, performance approach, and performance avoidance goals will be associated (negatively) with self-reported doping and likelihood, over and above the predictive effect of NS use

(Hypothesis 1); b) performance approach and avoidance goals, and mastery avoidance goals will positively moderate the relationship between NS use and self-reported doping use and future likelihood (Hypothesis 2); c) mastery approach goals will have negatively moderate the relationship between NS use and self-reported doping use and future likelihood (Hypothesis 3); d) autonomous motivation (negatively) and controlled motivation and amotivation will (positively) moderate the association between NS use and self-reported doping use and future likelihood (Hypothesis 4).

Method

Six hundred and fifty team sport competitive athletes were approached and 497 athletes (76.4% response rate) agreed to participate and provided valid data. The mean age of the athletes was 23.54 years old (*SD* = 5.75, 64% males), and were recruited from football (*n* = 66), volleyball (*n* = 110), basketball (*n* = 138), handball (*n* = 44), and water polo (*n* = 42), and 97 athletes did not report their sport. All participants were training in professional teams competing at national championships and were training systematically in their sport for at least 5 years prior to study. According to Shieh[25], a sample size of 226 participants is required to detect a small moderation effect size (f_{xz}) with statistical power set at 0.95 in a moderated regression analysis with binary predictor and mean-centred continuous moderator variables.

Demographic variables: They were assessed with questions about participants' age (reported in years), gender, type of sport, and years of participation in the sport.

Achievement goals: The Approach and Avoidance Achievement Goal Questionnaire (AAAGQ) developed for sports[26] was used to measure athletes' achievement goals. The scale assesses mastery-approach, mastery-avoidance, performance-approach and performance-avoidance goals (three items for each subscale). Responses were given on a 7-point scale ranging from 1 (*not at all like me*) to 7 (*completely like me*). Internal consistency reliability was adequate for the total scale (Cronbach's α = .74) and satisfactory for all the four sub-scales (ranging from 0.62 to 0.79). Each of the AAAGQ sub-scales include three items, and internal consistency reliability scores above .60 are considered acceptable and satisfactory for measures/sub-scales with less than four items.

Motivational regulations: The Sport Motivation Scale (SMS)[27] was used to assess motivational regulations reflecting intrinsic and extrinsic motivation and amotivation according to the theory of

self-determination. This scale included 28 items, which were scored on a 7-point scale (1 = *doesn't correspond at all*, 7 = *corresponds exactly*). In accordance with self-determination theory[28] and in order to test a more comprehensive and theoretically driven description of athletes' motivational profile in our study we computed the scores for the sub-scales of autonomous motivation (i.e., intrinsic motivation subscales and identified regulation; Cronbach's α = .89), controlled motivation (i.e., introjected and external regulations; Cronbach's α = .80), and amotivation (Cronbach's α = .72).

Doping Likelihood: In order to avoid social desirability and other reporting bias that may be common with the use of direct intentionality items[29, 30], in the present study we assessed intentionality with the mean of three doping likelihood items (i.e., "*How likely is to use doping substances to improve your athletic performance?*", "*Do you believe you will use doping substances to improve your performance in the future?*", and "*How likely is to use a doping substance that would improve your athletic performance, would be offered to you free or at low cost, and you would be re-assured that it can't be identified in a doping control?*"). For this reason, we report doping likelihood scores in the analysis and discussion sections reported below. Scores in this measure were given on a 7-point scale (1 = *not likely at all*, 7 = *very likely*), with higher scores denoting stronger likelihood to use prohibited PEDs (Cronbach's α = .74).

Gateway belief: A single item was used to assess participants' belief about whether nutritional supplements serve as a gateway to doping ('Do you believe that frequent use of licit nutritional supplements can lead an athlete into doping?'). Responses were anchored on a 5-point Likert scale ranging from 1 (*definitely no*) to 5 (*definitely yes*).

Doping: Past and current use of doping substances and methods were assessed with a single question (Have you ever used prohibited substances or methods to enhance your performance?), followed by four different response options (1 = *No, I have never used prohibited substances to enhance my performance*; 2 = *Yes, I have 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*). This question was preceded by a short description of doping substances and methods based on the updated anti-doping code by WADA. For reasons of subsequent analyses (i.e., differences between dopers and never-

dopers), scores in these variable were used to create two main categories of never dopers (i.e., athletes reporting they never used doping), and ever dopers (i.e., athletes reporting the use of doping at least once in their lifetime).

Nutritional supplement use: Participants' use of NS was measured with a single question (How often do you use licit nutritional supplements?), followed by six different response options (1 = *Never*; 2 = *Rarely*; 3 = *Sometimes*; 4 = *Often; 5 = Very often; and 6 = Systematically*).

The study design was in line with the Aristotle University of Thessaloniki, Greece, Code of Ethics in Research. Sports clubs were contacted and the aim of the project was described to the administrative boards and coaches. Following obtaining permission from the club officials, athletes were briefed about the project, and informed consent was requested from those wishing to participate. The athletes completed the questionnaire anonymously in the locker rooms. Athletes were asked to return the completed surveys in envelopes, and put the envelopes in a box to ensure confidentiality. Both oral and written instructions were given to participants regarding the completion of the questionnaire. Moreover, the athletes were reassured about voluntary participation, anonymity, and confidentiality of their responses, and encouraged to ask any questions regarding the understanding/comprehension of the questionnaire items.

SPSS 25 was used to conduct the analyses. Hierarchical regression analyses was used to assess the association between self-reported NS use, achievement goals and motivation types, and gateway beliefs. Moderated regression analyses were further used to examine whether achievement goals and motivation moderated the association between NS use, doping likelihood and self-reported doping behaviour[31].

Results

Means and standard deviations scores, internal consistency reliability, and intercorrelations are presented in Table 1 (see supplementary file). In this section we describe a) the hierarchical regression analyses indicating the significant predictors of doping likelihood and behavior (i.e., the variables that should be mean-centred to test for moderation) and b) the moderated regression analyses with the moderation effects that significantly predicted doping likelihood and behavior. In the figures, we present the simple slope analyses that illustrate the reported moderation effects.

Hierarchical regression analysis was completed in two steps. Age, gender, NS use and "gateway" belief were entered at Step 1, and achievement goals (i.e., mastery/performance approach; mastery/performance avoidance), and types of motivation (i.e., autonomous and controlled motivation, and amotivation) as predictor variables were entered at Step 2. Self-reported doping was the dependent/criterion variable. The overall model predicted 33% of the variance (Adjusted R^2, F = 18.96, $p < .001$) in self-reported doping. In the first step of the analysis, only self-reported use of NS and gateway belief were associated with self-reported use of doping substances. The addition of achievement goals and motivation types in the second step significantly increased predicted variance in self-reported doping (ΔR^2 = 9.3%, F_{change} = 7.98, $p < .001$). The significant correlates of self-reported doping in the last step of the analysis included NS use (β = .347, $p < .001$), "gateway" belief (β = .307, $p < .001$), amotivation (β = .167, $p < .001$), controlled motivation (β = -.204, p = .001), mastery approach (β = -.173, $p < .001$), and performance avoidance (β = .134, p = .013). The findings from the regression analysis are summarized in Table 1.

A second hierarchical regression analysis was completed to assess the association of self-reported use of NS and doping likelihood in the future, after controlling for self-reported use of doping, the "gateway" belief, achievement goals, and types of motivation. The analysis was completed in two steps and the overall model predicted 41.7% of the variance (Adjusted R^2, F = 24.98, $p < .001$) in doping likelihood. Step 1 included age and gender, self-reported use of doping substances, use of NS, and the "gateway" belief as predictor variables, and all the predictors were significantly associated with likelihood except the "gateway" belief. Adding achievement goals and motivation types in the second step of the analysis significantly increased predicted variance in likelihood by 3.4% (F_{change} = 24.98, $p < .001$). Significant predictors of likelihood to use doping substances in the future at the last step of the analysis included age (β = -.161, $p < .001$), gender (β = -.167, p = .001), use of NS (β = .156, p = .001), self-reported doping (β = .474, $p < .001$), autonomous motivation (β = -.124, p = .027), and performance avoidance goals (β = .100, p = 0.47). The findings from the regression analysis are summarized in Table 1.

Eight moderated regression analysis models were computed to respectively assess the interaction between performance approach/avoidance goals and use of NS, and mastery

approach/avoidance goals and use of NS in predicting self-reported doping and likelihood. To avoid multicollinearity, the predictor variables were mean-centred[31], and an interaction term was computed (independent variable × moderator) for each pair of associations, and each moderated regression analysis was completed in two steps. The first step included the main effects of the independent variable and the moderator, and the second step included their interaction term. Unstandardized beta weights (B) and 95% confidence intervals (CIs) were used.

The results of the analyses testing the moderating role of achievement goals showed that the interactions of NS use with: mastery approach ($B_{\text{supplement use} \times \text{mastery approach}} = -.115$, $\beta = -.247$, $p < .001$, 95% CI for B = -.153 to -.078), mastery avoidance ($B_{\text{supplement use} \times \text{mastery avoidance}} = -.026$, $\beta = -.099$, $p = .021$, 95% CI for B = -.048 to -.004), and with performance avoidance ($B_{\text{supplement use} \times \text{performance avoidance}} = .042$, $\beta = .219$, $p < .001$, 95% CI for B = .026 to .058) significantly predicted self-reported doping (Figure 1). Furthermore, the interactions of NS use with: mastery approach ($B_{\text{supplement use} \times \text{mastery approach}} = -.169$, $\beta = -185$, $p < .001$, 95% CI for B = -.244 to -.094, and performance avoidance ($B_{\text{supplement use} \times \text{performance avoidance}} = .046$, $\beta = .122$, $p = .003$, 95% CI for B = .015 to .077; Figure 1) significantly predicted future doping likelihood (Figure 2).

Six moderated regression analysis models were computed to respectively assess the moderating role of autonomous and controlled motivation, amotivation, on the effect of NS use in predicting self-reported doping and likelihood. The results showed that the interactions of NS use with: autonomous motivation ($B_{\text{supplement use} \times \text{autonomous motivation}} = -.034$, $\beta = -.129$, $p = .004$, 95% CI for B = -.058 to -.011), controlled motivation ($B_{\text{supplement use} \times \text{controlled motivation}} = -.035$, $\beta = -.140$, $p = .001$, 95% CI for B = -.056 to -.014), and with amotivation ($B_{\text{supplement use} \times \text{amotivation}} = .052$, $\beta = .224$, $p < .001$, 95% CI for B = .033 to .072) significantly predicted self-reported doping(Figure 1). Further analysis showed that the interactions of NS use and controlled motivation ($B_{\text{supplement use} \times \text{controlled motivation}} = -.068$, $\beta = -.140$, $p = .001$, 95% CI for B = -.110 to -.027) significantly predicted future doping likelihood (Figure 2).

Discussion

The present study investigated the moderating effect of motivational regulations and achievement goals on the association between NS use and self-reported doping use and future

likelihood among a large sample of competitive team sport athletes. First of all, and in support of the first hypothesis of the study, motivational variables derived from both self-determination and achievement goal theories were associated with both self-reported doping use and doping likelihood, over and above the effects of NS use. More specifically, amotivation and performance avoidance (positively) and controlled motivation and mastery approach (negatively) were associated with self-reported doping. Accordingly, autonomous motivation (negatively) and performance avoidance goals (positively) predicted doping likelihood. Taken together, our findings are in line with previous research that has emphasized the role of achievement goals and motivational regulations on doping behaviour[14, 15, 21, 22].

With respect to the direction of the observed associations, adaptive types of motivation, such as autonomous motivation and mastery goals, are expected to promote adaptive beliefs and behaviours in sport settings[11]. Our findings showed that mastery approach goals and autonomous motivation were negatively associated with self-reported doping and doping likelihood respectively, whereas performance avoidance goals had a positive association with the dependent variables. This suggests that promoting positive motivation in athletes can serve as a protective factor against the decision to dope. A practical implication of this finding is that coaches should learn how to establish a culture in their teams that promotes mastery goals and foster athletes' autonomous motivation. Recent evidence has shown that this approach is effective in reducing the risk for doping among athletes[32]. Furthermore, athletes with higher scores in performance avoidance goals may feel there is no chance of success unless they engage in doping. Therefore, educating athletes on how to cope with and overcome performance plateaus in legitimate ways can potentially reduce the risk of doping use. Interestingly, our results showed that controlled motivation was negatively associated with doping behaviour and likelihood respectively. These findings are difficult to interpret as a positive association was expected[14]. A plausible for the negative association between controlled motivation and doping behaviour and likelihood may pertain to fear of sanctions resulting from (exposed) doping use. It is possible that team sport athletes with controlled motivation may choose other, less risky methods to outperform others, but more research is needed to further examine this effect[33].

Importantly, our study addressed, for the first time, the role of motivational processes in the association between NS use and self-reported doping, and the likelihood to use doping in the future. The results largely supported our hypotheses by showing that mastery approach and avoidance goals and autonomous motivation attenuated the relationship between self-reported supplement use and doping. Taken together, our findings make an important contribution to the extant literature by providing a theoretically plausible explanation about the association between NS use and doping behaviour and, therefore, an alternative to the "gateway hypothesis"[6]. Rather than attributing causal influence to specific substances and risking adopting an approach that resembles a new "war on drugs", we demonstrated that motivational processes can explain why some athletes who use NS concurrently use (or plan to use) prohibited performance enhancement substances. It is imperative, therefore, that future research on this topic is concerned with gateway mindsets, that is, cognitive, affective and motivational processes that explain how and why NS use can be associated (or lead to) the use of doping substances.

To illustrate, on the basis of our findings it appears that mastery-oriented and autonomously motivated athletes use NS in order to support their training and improve, with legitimate means, their performance according to personally referenced goals and standards. In this case, nutritional supplements serve as an aid to the athletes' effort and represent safe alternatives to the prohibited substances. On the other hand, athletes adopting performance avoidance goals are primarily concerned with avoiding displaying failure and poor performance. To this end, they may use everything that will keep them at adequate performance levels. In this respect, NS use is not necessarily a gateway to prohibited PEDs, but rather another available means to avoiding performance failure. It may actually be the case that NS are used *together* with prohibited PEDs in order to support performance during trainings and competitions (i.e., co-occurrence of NS and doping substances). From a practical point of view, a) interventions and policies aiming to reduce the onset and prevalence of doping in competitive sports should target the safe use of supplements jointly with promoting positive and adaptive motivation in athletes[34], and b) practitioners could promote nutritional supplements as an alternative to doping.

Our study is not free of limitations. First of all, a cross-sectional design was used and, therefore, causal inferences cannot be made. Secondly, the two approach goals (mastery and avoidance) showed reliability coefficients below .70. Although their reliability values are considered acceptable, future studies may utilise measures with higher internal consistency scores or different measures (such as task and ego orientation) to further examine the association observes in the present study. Thirdly, key variables of the study such as gateway beliefs, and doping and NS use were measured with single items. The use of multi-items scales would provide a more elaborated measurement of these variables in the future. Lastly, as doping is a sensitive behaviour the study would benefit from a measure of social desirability to identify and control for response bias.

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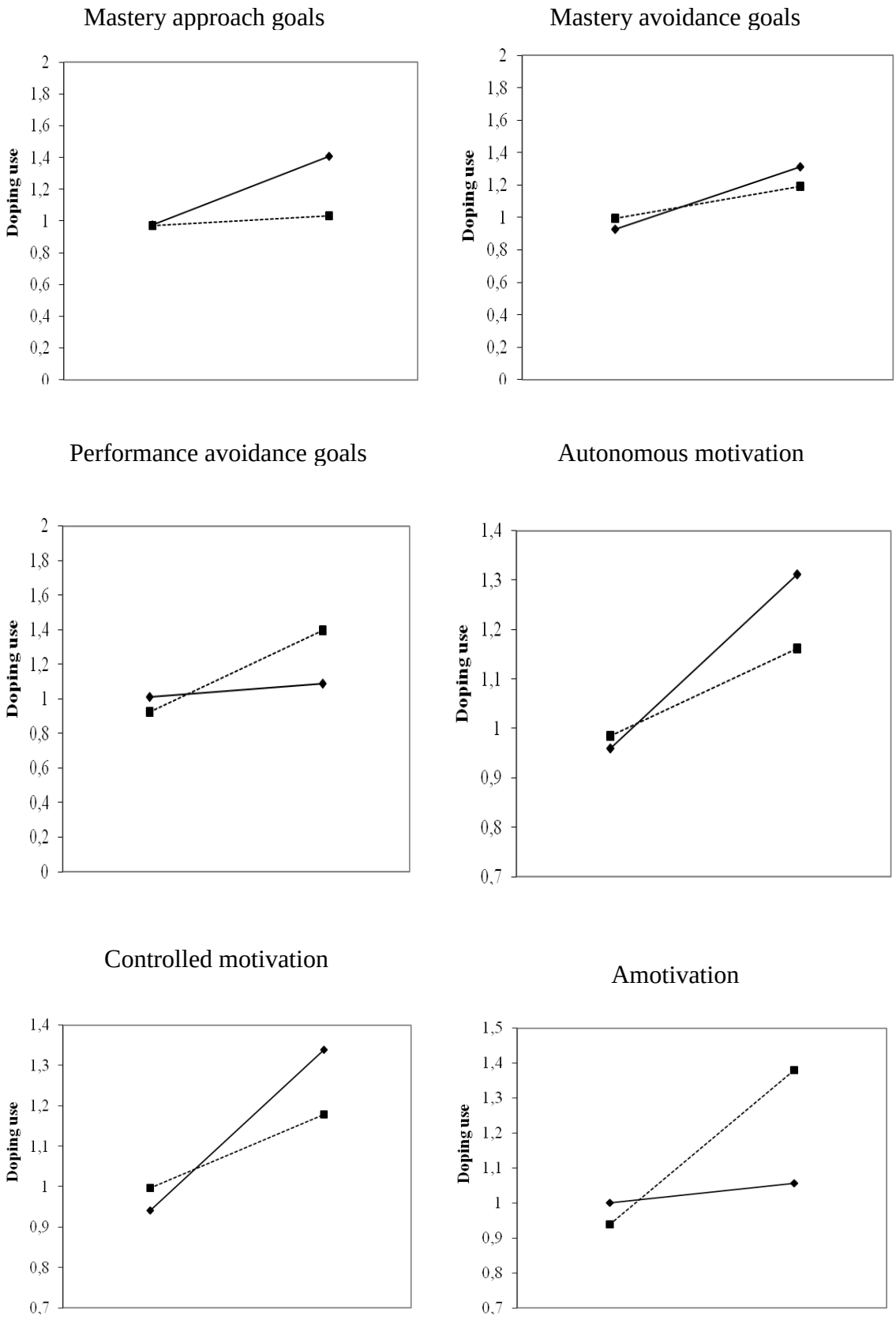
Table 1. Psychological Correlates of Self-Reported Doping Use and Doping Likelihood

	Self-Reported Doping Use				Doping Likelihood			
Predictors	Beta	β	95% CI for B	Adj R^2	Beta	β	95% CI for B	Adj R^2
Step 1				.24				.39
Age	.005	.065	-.003 - .014		-.030	-.193***	-.044 - .017	
Gender	.007	.007	-.095 - .110		-.383	-.206***	-.555 - .210	
NS Use	.125	.376*›	.094 - .157		.100	.161**	.044 - .156	
Doping use	-	-	-		.931	.498***	.765 - 1.096	
Gateway belief	.147	.332*›	.109 - .185		-.010	-.012	-.078 - .058	
Step 2				.33				.41
Age	.010	.118*	.002 - .018		-.025	-.161***	-.039 - -.011	
Gender	.036	.036	-.070 - .142		-.310	-.167**	-.496 - -.125	
NS Use	.116	.347*›	.086 - .145		.097	.156**	.042 - .153	
Doping use	-	-	-		.886	.474***	.713 - 1.059	
Gateway belief	.137	.307*›	.100 - .173		-.014	-.017	-.082 - .053	
Amotivation	.065	.167*›	.029 - .101		.013	.018	-.051 - .077	
Autonomous motivation	.016	.028	-.053 - .086		-.136	-.124*	-.257 - -.016	
Controlled motivation	-.096	-.204*›	-.150 - -.041		.045	.052	-.051 - .141	
Mastery approach	-.141	-.173*	-.216 - -.066		.057	.038	-.076 - .191	
Mastery avoidance	.009	.021	-.026 - .043		.012	.017	-.048 - .073	
Performance approach	.014	.036	-.026 - .054		.063	.088	-.007 - .133	
Performance avoidance	.041	.134*	.009 - .073		.057	.100*	.001 - .113	

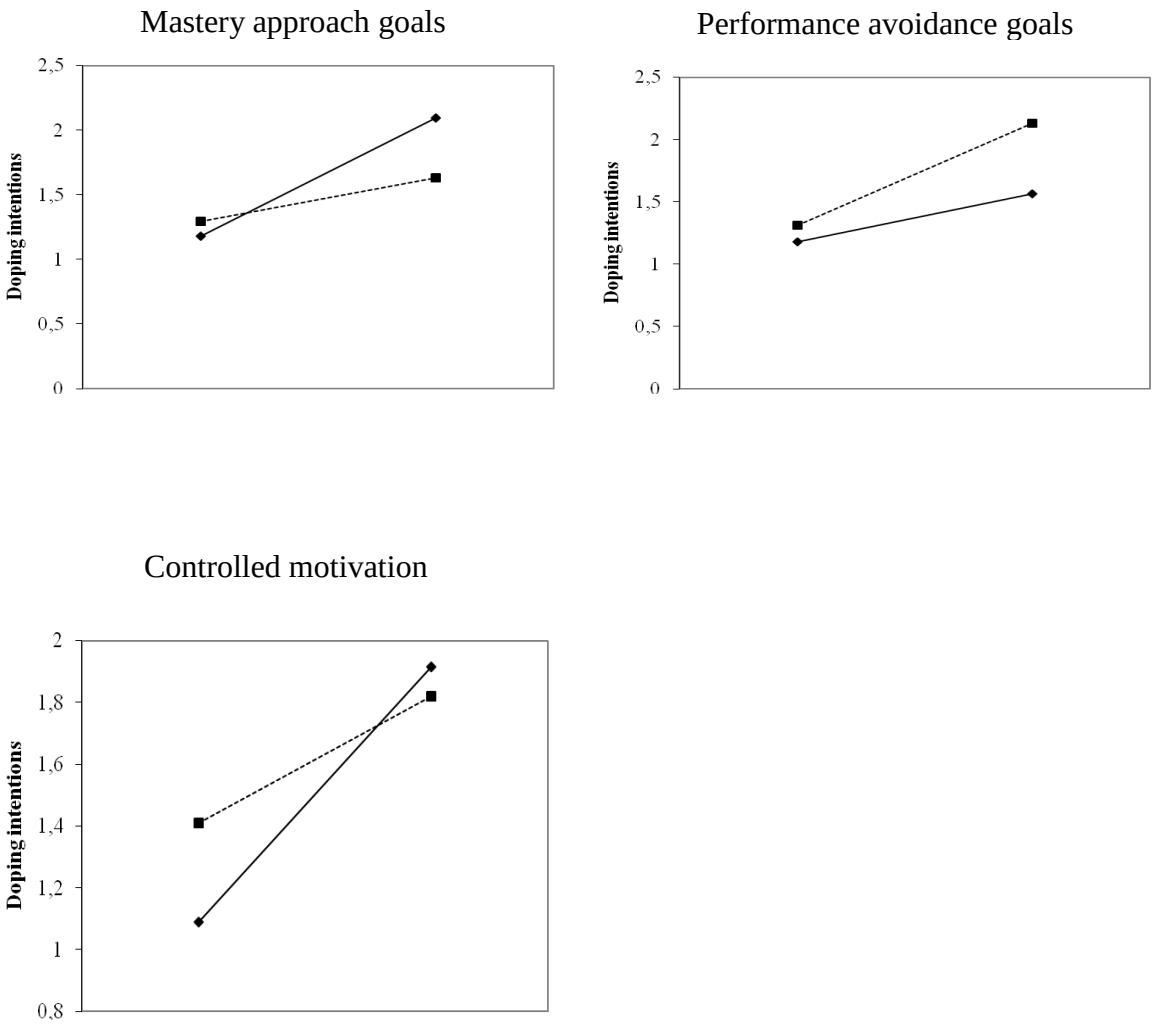
Note. *p < .05; **p < .005; ***p < .001; NS = nutritional supplements; doping use was not entered as predictor in the regression analysis of Self-Reported Doping Use

Figure 1. Interaction between NS use and motivation in predicting doping use.



Note: The dash line represents low levels of the variable, whereas the dotted line high levels

Figure 2. Interaction between NS use and motivation in predicting doping likelihood.



Note: The dash line represents low levels of the variable, whereas the dotted line high levels