

RESEARCH ARTICLE

Doping-related attitudes and intentions among Croatian athletes: Examining theory of planned behavior constructs and broader psychosocial correlates

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Abstract

Background: Doping continues to pose persistent challenges in competitive sport. Although prior studies have investigated Theory of Planned Behavior (TPB) constructs together with a range of psychosocial correlates of doping, evidence from large and heterogeneous athlete samples remains limited.

Objective: This study provides a large-sample contextual replication and extension of previous TPB-based doping research by examining associations among TPB constructs, performance-enhancement attitudes, self-esteem, achievement goal orientation, sport motivation, descriptive norms, and self-reported use of prohibited substances for performance enhancement in 988 Croatian athletes from team and individual sports.

Methods: Analyses included psychometric evaluation, descriptive statistics, bivariate correlations, group comparisons, and hierarchical multiple regression.

Results: Overall, 7.6% of participants reported prohibited substance use at least once during their sporting careers. Male athletes reported more favorable doping-related and performance-enhancement attitudes and stronger behavioral intentions. Individual-sport athletes and athletes in the lower competition-level group more frequently reported lifetime prohibited-substance use. Higher self-esteem, stronger task orientation, and greater intrinsic motivation were associated with less favorable doping-related and performance-enhancement attitudes and weaker behavioral intentions, whereas lower self-esteem, ego orientation, extrinsic motivation, and amotivation were associated with more permissive attitudes and stronger behavioral intentions. Attitudes toward doping showed the strongest unique association with behavioral intention, followed by performance-enhancement attitudes and subjective norms. The findings replicate previously established associations between TPB constructs and doping intention while extending the evidence base by demonstrating systematic associations with a broader set of psychosocial characteristics in a large sample of Croatian athletes.

Conclusion: These findings provide context-specific evidence that may inform future longitudinal research and the development of psychosocially informed anti-doping interventions.

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1. Introduction

1.1. Doping as a contemporary challenge in sport

The use of prohibited performance-enhancing drugs, commonly referred to as doping, has long been present in competitive sport.^{1,2} Although anti-doping policies have evolved considerably, doping remains one of the most persistent challenges in contemporary sport.^{3,4} Beyond compromising the principles of fair competition, doping threatens the physical and psychological well-being of athletes, undermines the integrity of sport, and erodes public trust in sporting institutions. Recognizing these consequences, the World Anti-Doping Agency (WADA) has established a comprehensive regulatory framework through the World Anti-Doping Code, which defines doping as the occurrence of one or more anti-doping rule violations, including the presence or use of prohibited substances or methods, sample manipulation, refusal to submit to testing, trafficking, and other prohibited activities.⁵ Despite advances in analytical testing, intelligence-led investigations, and the international harmonization of anti-doping policies, doping remains a substantial concern across sports and competition levels.

Estimating the true prevalence of doping is a major scientific and practical challenge because doping is an inherently concealed behavior. While biological testing identifies only approximately 1–2% of athletes as having committed an anti-doping rule violation, self-report studies and indirect estimation methods consistently suggest substantially higher prevalence rates. Existing estimates range from 14% to 39% among adult athletes,⁶ whereas broader reviews have reported prevalence estimates ranging from 0% to 73%, largely reflecting methodological differences across studies.⁷ The substantial variation across these estimates highlights the methodological difficulties involved in determining the prevalence of a concealed and socially sensitive behavior and cautions against interpreting detection statistics as direct estimates of underlying doping prevalence.

Estimating the prevalence of doping is distinct from understanding why athletes differ in their attitudes toward doping, intentions to dope, and self-reported doping behavior. Understanding these differences requires examining the psychological and social factors associated with doping-related cognitions and behavior. Previous research has identified several relevant correlates, including

attitudes and perceived social norms,³ performance-enhancement attitudes,⁸ motivational orientations,⁹ achievement goals,^{10–12} and self-esteem.^{13–16} Examining these factors may help clarify psychosocial patterns associated with doping-related attitudes and intentions across different sporting and national contexts and inform future anti-doping prevention and intervention research.

1.2. Psychosocial correlates of doping-related intentions and behavior

Alongside advances in detection and enforcement, contemporary anti-doping strategies have increasingly emphasized prevention through education, ethical decision-making, and values-based interventions.^{17–20} This shift toward prevention has increased research attention to the psychological and social factors associated with doping-related attitudes, intentions, and behavior. Psychosocial research has therefore focused on identifying factors associated with susceptibility to doping and on examining how established psychological and social constructs relate to doping-related intentions and behavior.

Research in this area has consistently identified behavioral intention as one of the strongest proximal predictors of doping behavior, with longitudinal and meta-analytic evidence showing that stronger intentions are associated with subsequent doping-related behavior across sporting contexts.^{21–25} Behavioral intention is therefore a central construct in psychosocial anti-doping research, linking doping-related cognitions with subsequent behavior. Examining factors associated with stronger doping intentions may help clarify relevant psychosocial risk and protective factors and inform the development of targeted prevention strategies.

1.3. Theory of planned behavior and broader psychosocial correlates of doping

Behavioral intentions are shaped within a broader psychological and social context.^{24,25} The theory of planned behavior (TPB) has contributed substantially to understanding doping intentions by identifying attitudes, subjective norms, and perceived behavioral control as proximal predictors of behavioral intention.³ Research has also examined doping-related cognitions in relation to a broader range of psychosocial characteristics^{26–28} and sporting contexts.^{29,30} Motivational orientations, achievement goals, self-esteem, perceived social norms, and sociocultural environments have all been associated

with attitudes toward doping, doping intentions, or self-reported behavior.^{3,8,11,31-33} Taken together, these findings support examining TPB constructs alongside broader psychosocial correlates when investigating individual differences in doping-related attitudes and intentions.

Recent research has reinforced the importance of psychosocial factors in doping while also highlighting substantial heterogeneity across studies. A meta-analysis by Ntoumanis *et al.*²⁵ identified attitudes and social-normative influences as important correlates of doping-related outcomes and emphasized the need for more prospective longitudinal research. Other studies have examined values and moral orientations,¹⁹ broader psychosocial profiles, and differences across sporting populations.^{28,30} Together, these findings indicate the importance of examining whether established psychosocial associations are consistently observed across different athlete populations and sporting contexts.

Accordingly, the present study examines established TPB constructs alongside a broader range of psychosocial characteristics in a large and heterogeneous sample of Croatian athletes. It assesses whether previously reported TPB associations are also observed in this context and additionally examines performance-enhancement attitudes, self-esteem, achievement goal orientation, sport motivation, descriptive norms, and selected athlete and sport characteristics.

1.4. National context and contextual replication

National and sporting contexts are important when interpreting doping-related attitudes, norms, and behaviors. Studies across countries have reported variation in doping-related attitudes, perceived social norms, ethical evaluations, and other psychosocial characteristics associated with doping.^{11,27,29,33} Such variation cautions against assuming that associations observed in one national or sporting context generalize to another. However, valid cross-national comparisons require evidence that the constructs under investigation are measured equivalently across populations. Without such evidence, differences between national samples should be interpreted as context-specific findings rather than as direct evidence of cross-cultural variation.

Examining psychosocial factors previously associated with doping across national settings remains important. Contextual replication can determine whether associations identified in previous research are also observed in other settings, thereby strengthening evidence for their cross-context replicability. This is especially relevant in understudied national and sporting contexts that are underrepresented in the existing literature.

Croatia is an understudied setting for examining whether previously reported psychosocial associations are also observed among competitive athletes. Empirical research on doping-related attitudes, intentions, and associated psychosocial factors among Croatian athletes remains limited. Examining these associations in a large and diverse Croatian sample can therefore contribute context-specific evidence on their reproducibility across sporting settings without implying the existence of uniquely Croatian psychosocial mechanisms. The findings may also inform future anti-doping research, prevention, and education in Croatia.

1.5. The present study

Previous research has examined a range of psychosocial factors associated with doping across diverse national settings.^{3,18,21,27-31,33} Meta-analytic findings also indicate substantial heterogeneity across studies and athlete populations.^{19,25,28,30} Rather than making direct cross-national comparisons, the present study assesses whether previously reported associations are also observed among Croatian athletes. Specifically, it examines TPB constructs, performance-enhancement attitudes, self-esteem, achievement goal orientation, sport motivation, descriptive norms, and selected athlete and sport characteristics in relation to doping-related attitudes and behavioral intentions.

Based on the TPB and previous empirical findings, several hypotheses were specified a priori. More favorable doping-related and performance-enhancement attitudes and greater perceived social approval were expected to be associated with stronger intentions to dope. Higher self-esteem, stronger task orientation, and greater intrinsic motivation were expected to be associated with less favorable attitudes and weaker intentions, whereas lower self-esteem, stronger ego orientation, greater extrinsic motivation, and higher amotivation were expected to be associated with more favorable attitudes and stronger intentions. These hypotheses guided the primary analyses. Differences by gender, sport type, and competition level, together with associations not specified a priori, were examined exploratorily.

The study distinguishes hypothesis-driven from exploratory analyses and examines these associations in 988 Croatian athletes from team and individual sports. The findings are interpreted as context-specific and may provide a basis for future longitudinal research.

2. Methods

2.1. Participants

The study included Croatian athletes from a broad range

of individual and team sports and with varying levels of competitive achievement. A total of 1,114 individuals accessed the online questionnaire administered using Google Forms. Of these, 67 were excluded because they did not complete the prohibited-substance-use items, 30 because they were under 18 years of age, and 29 because they had participated in organized sport for fewer than five years. The final analytic sample comprised 988 athletes aged 18 years or older with at least five years of continuous participation in organized competitive sport. The five-year criterion was intended to ensure sufficient experience within competitive sport and exposure to its training, competitive, and social environments.

Participants had a mean age of 25.03 years ($SD = 7.15$). The sample included 631 men (64%) and 357 women (36%). Of the participants, 722 (73%) competed in team sports and 266 (27%) in individual sports.

Competition level was classified according to participation in major international competitions. Athletes who had competed in at least one European Championship, World Championship, or Olympic Games were assigned to the higher competition-level group, whereas all others were assigned to the lower competition-level group. This study-specific classification was used as an indicator of major international competitive experience and should not be interpreted as a standardized measure of athletic performance, particularly because qualification pathways vary across sports.

A total of 426 athletes (43%) had competed at the European Championships, 226 (23%) at the World Championships, and 72 (7%) at the Olympic Games. Among all participants, 175 (18%) had won a medal at the European Championships, 80 (8%) at the World Championships, and 33 (3%) at the Olympic Games.

Sports were classified as team or individual for group comparisons; the frequency distribution of sports practiced by athletes is presented in Table 1. Because these broad categories include heterogeneous disciplines with different competitive demands, performance cultures, and doping-related risk profiles, observed differences should be interpreted cautiously and may partly reflect the sports represented within each category.

2.2. Procedures

Data were collected from January to December 2021 through an online questionnaire administered in Google Forms. Participants were recruited using non-probability sampling. The survey invitation and link were distributed electronically through sports clubs and coaches to eligible athletes.

Table 1. Frequency distribution of sports practiced by athletes

Sport	<i>n</i>	%
Handball	204	21%
Basketball	153	15%
Volleyball	94	10%
Water polo	94	10%
Football	83	8%
Swimming	43	4%
Rugby	31	3%
Taekwondo	28	3%
Athletics	23	2%
Bodybuilding	20	2%
Archery	18	2%
Field hockey	18	2%
Futsal	17	2%
Powerlifting	12	1%
Boxing	11	1%
Karate	11	1%
Softball	10	1%
Wrestling	9	1%
Cycling	8	1%
Baseball	8	1%
Kickboxing	7	1%
Rowing	7	1%
Weightlifting	7	1%
Diving	7	1%
Table tennis	6	1%
Competitive freediving	6	1%
Mixed martial arts	6	1%
Ice hockey	5	1%
Gymnastics	5	1%
Spearfishing	4	<1%
Kayaking and canoeing	4	<1%
Tennis	4	<1%
Synchronized swimming	4	<1%
Judo	3	<1%
Rhythmic gymnastics	3	<1%
Crossbow shooting	2	<1%
Motorsport	2	<1%
Bocce ball	2	<1%
Biathlon	2	<1%
Fencing	2	<1%

(Cont'd...)

Table 1. (Continued)

Sport	<i>n</i>	%
Bowling	1	<1%
Chess	1	<1%
Triathlon	1	<1%
Badminton	1	<1%
Ballet	1	<1%

Because invitations were disseminated through sports clubs and coaches, the total number of athletes invited was not recorded, and a response rate could not be calculated. Club identifiers were not collected, preventing adjustment for potential clustering within clubs.

Participants received written information about the study purpose, procedures, and conditions of participation. They were informed that participation was voluntary and anonymous, that they could discontinue the questionnaire at any time without consequences, and that the data would be used exclusively for research purposes and accessed only by the research team. Questionnaire completion required approximately 20 minutes.

The study protocol was approved by the Committee for Scientific Work and Ethics of the Faculty of Kinesiology, University of Zagreb (Approval No. 1/2021). All participants provided informed consent before participation.

2.3. Measures

The study assessed TPB constructs together with broader psychosocial factors previously associated with doping-related attitudes, intentions, and behavior. Measures included attitudes toward doping, performance-enhancement attitudes, subjective norms, perceived behavioral control, descriptive norms, behavioral intention, achievement goal orientation, self-esteem, sport motivation, and self-reported prohibited substance use. Demographic and sport-related characteristics were also assessed.

2.3.1. Demographic and sport-related characteristics

Participants reported gender, age, nationality, marital status, educational attainment, years of participation in organized sport, sport discipline, and competitive achievement. Sport type and competition level were classified as described in Section 2.1.

2.3.2. Attitudes toward doping

Attitudes toward doping were assessed using a four-item scale developed by Lazuras *et al.*³ Items referred to the use

of prohibited substances to improve sporting performance during the season and were rated on seven-point bipolar semantic differential scales: “bad–good,” “useless–useful,” “harmful–beneficial,” and “unethical–ethical.” Scores were averaged, with higher scores indicating more favorable attitudes toward doping. Internal consistency was high (Cronbach’s $\alpha = 0.91$). A preliminary psychometric evaluation supported a unidimensional structure for the Croatian version of the scale.

2.3.3. Performance Enhancement Attitude Scale

Performance-enhancement attitudes were assessed with the Performance Enhancement Attitude Scale (PEAS).⁸ The original scale contains 17 items rated from 1 (“strongly disagree”) to 6 (“strongly agree”), with higher scores indicating more favorable attitudes toward performance enhancement. The scale was translated into Croatian using a forward–backward translation procedure. Its psychometric properties were first examined in a sample of 264 kinesiology students. The 17-item model showed inadequate fit, whereas a six-item model showed better fit, $\chi^2(9) = 15.14$, $p = 0.056$, comparative fit index (CFI) = 0.982, Tucker–Lewis index (TLI) = 0.967, root mean square error of approximation (RMSEA) = 0.058, 90% confidence interval (CI), 0.012–0.098, and standardized root mean square residual (SRMR) = 0.035, with satisfactory internal consistency ($\alpha = 0.83$). Both models were then evaluated in the main sample of 988 athletes using robust maximum likelihood estimation because multivariate normality was not supported. The 17-item model showed inadequate fit, $\chi^2(119) = 778.88$, $p < 0.001$, CFI = 0.86, TLI = 0.84, RMSEA = 0.075, 90% CI, 0.071–0.079, and SRMR = 0.047, whereas the six-item model showed good fit, $\chi^2(9) = 35.02$, $p < 0.001$, CFI = 0.98, TLI = 0.96, RMSEA = 0.058, 90% CI, 0.043–0.075, and SRMR = 0.021. The six-item scale showed high internal consistency ($\alpha = 0.88$) and was used in subsequent analyses.

2.3.4. Subjective norms

Subjective norms were measured with the three-item scale developed by Lazuras *et al.*³ and Barkoukis *et al.*³² The items captured perceived social approval of doping by significant others, including whether people important to the participant would want them to use prohibited substances to improve performance during the season. Responses were provided on seven-point Likert-type scales, and mean scores were calculated, with higher scores indicating greater perceived social approval or pressure to dope. Internal consistency was high (Cronbach’s $\alpha = 0.88$).

2.3.5. Perceived behavioral control

Perceived behavioral control was measured using the three-

item scale developed by Lazuras *et al.*,³ which assessed participants' perceived control over using prohibited substances to improve performance during the season. Responses were provided on seven-point Likert-type scales, and mean scores were calculated, with higher scores indicating greater perceived behavioral control. Internal consistency was relatively low (Cronbach's $\alpha = 0.64$); findings involving this measure were therefore interpreted cautiously.

2.3.6. Descriptive norms

Descriptive norms were measured using the single item developed by Lazuras *et al.*³ The item asked participants to estimate the percentage of athletes in their country who use doping. Responses ranged from 0% to 100%, with higher percentages indicating greater perceived doping prevalence among athletes in the national sport context.

2.3.7. Behavioral intention

Behavioral intention was measured using the three-item scale developed by Lazuras *et al.*³ Items assessed intentions to use prohibited substances to improve performance during the season. Responses were provided on seven-point Likert-type scales, and mean scores were calculated, with higher scores indicating stronger intentions to dope. Internal consistency was very high (Cronbach's $\alpha = 0.99$), indicating substantial homogeneity among the three items and possible item redundancy.

2.3.8. Achievement goal orientation

Achievement goal orientation was measured using the Croatian version of the Competitive Task and Ego Orientation in Sport Questionnaire.¹⁰ The 13-item questionnaire measures task and ego orientation. Task orientation reflects a focus on learning and skill improvement, whereas ego orientation reflects a focus on outperforming others and competitive success. Separate scores were calculated for task and ego orientation from responses on five-point Likert-type scales, with higher scores indicating stronger task or ego orientation. Internal consistency was high for both task orientation ($\alpha = 0.94$) and ego orientation ($\alpha = 0.90$). The Croatian version had previously undergone psychometric evaluation.

2.3.9. Self-esteem

Self-esteem was measured using the Croatian 10-item version of the Rosenberg Self-Esteem Scale.^{13,34} The scale includes five positively and five negatively worded items rated on a four-point Likert-type scale from 1 ("strongly disagree") to 4 ("strongly agree"). Negatively worded items were reverse-scored, and scores were summed, with higher scores indicating greater self-esteem. Internal consistency

was satisfactory ($\alpha = 0.84$).

2.3.10. Sport motivation

Sport motivation was measured using the Sport Motivation Scale (SMS-28).⁹ The scale assesses seven dimensions: three forms of intrinsic motivation, three forms of extrinsic motivation, and amotivation. Responses were provided on a seven-point Likert-type scale from 1 ("does not correspond at all") to 7 ("corresponds exactly"). The Croatian version was translated using a forward-backward procedure and initially evaluated in 264 kinesiology students. Because the original factor structure was not supported, a three-factor structure comprising intrinsic motivation, extrinsic motivation, and amotivation was developed. The three dimensions comprised six, five, and three items, respectively.

The three-factor structure was then evaluated in the main sample of 988 athletes and showed acceptable fit, $\chi^2(73) = 276.97$, CFI = 0.961, TLI = 0.952, RMSEA = 0.053, 90% CI, 0.047–0.059, and SRMR = 0.040. Internal consistency was high for intrinsic motivation ($\alpha = 0.94$) and satisfactory for extrinsic motivation ($\alpha = 0.79$) and amotivation ($\alpha = 0.80$). Scores for the three dimensions were used in subsequent analyses.

2.3.11. Self-reported use of prohibited substances

Self-reported prohibited-substance use was assessed using an item based on Barkoukis *et al.*³¹ Participants reported whether they had ever used prohibited substances to improve athletic performance. Response options were "never," "once, but never again," "occasionally," and "regularly." The four categories were retained for descriptive analyses and dichotomized as "never use" versus "ever use" for inferential analyses, with "ever use" including one-time, occasional, and regular use.

This measure captures self-reported use of prohibited substances for performance enhancement and should not be interpreted as covering the full range of World Anti-Doping Code violations or as confirming an anti-doping rule violation. Therapeutic use exemptions and intentional versus inadvertent use were not assessed separately.

2.4. Data analysis

Data were analyzed using R version 4.0.3³⁵ (R Foundation for Statistical Computing, Austria) with the psych³⁶ (version 2.0.9) and lavaan³⁷ (version 0.7-7) packages. Analyses included psychometric evaluation of the study measures, descriptive and bivariate analyses, and tests of the a priori hypotheses. Analyses not specified a priori were treated as exploratory.

The psychometric properties of the Croatian versions of

the TPB measures, SMS-28, and PEAS were examined using confirmatory factor analysis. The translated measures were initially evaluated in a separate sample of 264 kinesiology students, and the modified PEAS and SMS-28 structures were subsequently evaluated in the main sample of 988 athletes. Model fit was assessed using χ^2 , CFI, TLI, RMSEA, and SRMR. Internal consistency of multi-item measures was assessed using Cronbach's α .

Descriptive statistics included means, standard deviations, medians, interquartile ranges, frequencies, percentages, and observed ranges. Distributional assumptions were examined using the Shapiro-Wilk test, skewness, and kurtosis. The four response categories for self-reported use of prohibited substances ("never," "once," "occasionally," and "regularly") were retained for descriptive analyses and dichotomized as "never use" versus "ever use" for inferential analyses because of the small number of participants in the individual use categories.

Bivariate correlations examined associations of self-esteem, achievement goal orientation, and sport motivation with attitudes toward doping, performance-enhancement attitudes, and behavioral intention. Pearson correlations were used for attitudes toward doping and performance-enhancement attitudes, whereas Spearman rank-order correlations were used for behavioral intention because of its non-normal distribution.

Differences in psychosocial characteristics between the ever-use ($n = 75$) and never-use ($n = 913$) groups were examined using Welch t tests, which were selected to account for unequal group sizes and potential variance heterogeneity.³⁸ Effect sizes were used to assess the magnitude of group differences. Chi-square tests examined associations between prohibited-substance-use status and gender, sport type, and competition level.

Analyses corresponding to the a priori hypotheses were treated as hypothesis-driven, whereas additional associations and group comparisons were considered exploratory. Given the number of statistical tests, exploratory findings were interpreted cautiously, with emphasis on effect magnitude, consistency, and theoretical coherence rather than statistical significance alone.

Hierarchical multiple regression was used to examine associations of doping-related attitudes, performance-enhancement attitudes, subjective norms, descriptive norms, and perceived behavioral control with behavioral intention. Doping-related and performance-enhancement attitudes were entered in the first block, subjective and descriptive norms in the second, and perceived behavioral control in the third. Because behavioral intention showed

substantial deviation from normality, bias-corrected and accelerated bootstrap confidence intervals based on 10,000 resamples were used.³⁹ Regression coefficients were interpreted as associations rather than as evidence of causal or temporal relationships.

No further exclusions for missing psychosocial data were made after application of the eligibility criteria described in Section 2.1. Statistical significance was set at $\alpha = 0.05$, with exact p values reported where appropriate and values below 0.001 reported as $p < 0.001$.

3. Results

3.1. Self-reported prohibited substance use

Of 988 participants, 913 (92.4%) reported never using prohibited substances, whereas 75 (7.6%) reported use at least once during their sporting careers. Among participants reporting use, 25 (2.5% of the total sample) reported one-time use, 34 (3.4%) occasional use, and 16 (1.6%) regular use.

3.2. Group differences by gender, sport type, and competition level

3.2.1. Gender

Self-reported use of prohibited substances did not differ significantly between male and female athletes, $\chi^2(1) = 2.33$, $p = 0.127$, $\phi = 0.05$, with use reported by 8.6% of male and 5.9% of female athletes. Male athletes reported more favorable attitudes toward doping ($M = 1.65$, $SD = 1.40$) than female athletes ($M = 1.41$, $SD = 1.10$), $t(986) = 2.83$, $p = 0.005$, Hedges' $g = 0.18$, 95% CI, 0.05–0.31, and more favorable performance-enhancement attitudes ($M = 12.74$, $SD = 7.89$ vs. $M = 11.06$, $SD = 6.68$), $t(986) = 3.39$, $p < 0.001$, Hedges' $g = 0.22$, 95% CI, 0.09–0.35). Behavioral intention was also higher among male athletes ($M = 1.49$, $SD = 1.46$) than female athletes ($M = 1.30$, $SD = 1.12$), Welch $t(898.38) = 2.28$, $p = 0.023$, Hedges' $g = 0.14$, 95% CI, 0.01–0.27. All three differences were small in magnitude.

3.2.2. Sport type

Self-reported use of prohibited substances differed significantly between individual- and team-sport athletes, $\chi^2(1) = 69.60$, $p < 0.001$, $\phi = 0.27$. Use was reported by 19.2% of individual-sport athletes and 3.3% of team-sport athletes.

3.2.3. Competition level

Self-reported use of prohibited substances also differed significantly between competition-level groups, $\chi^2(1) = 5.20$, $p = 0.023$, $\phi = 0.07$. Use was reported by 9.4% of lower

competition-level athletes and 5.5% of higher competition-level athletes.

3.3. Associations of broader psychosocial characteristics with attitudes toward doping, performance-enhancement attitudes, and behavioral intention

Table 2 summarizes the descriptive statistics and internal consistency estimates for the study variables, whereas Table 3 presents the associations between self-esteem, achievement goal orientation, and sport motivation and doping-related attitudes, performance-enhancement attitudes, and behavioral intention.

Self-esteem, task orientation, and intrinsic motivation were negatively associated with attitudes toward doping and performance-enhancement attitudes, whereas ego orientation, extrinsic motivation, and amotivation were positively associated with both outcomes (all $p < 0.001$; Table 3). The strongest associations with attitudes toward doping were observed for ego orientation ($r = 0.30$) and amotivation ($r = 0.29$), whereas performance-enhancement attitudes were most strongly associated with self-esteem ($r = -0.34$) and amotivation ($r = 0.34$).

A similar pattern was observed for behavioral intention. Self-esteem ($\rho = -0.19$, $p < 0.001$), task orientation ($\rho = -0.16$, $p < 0.001$), and intrinsic motivation ($\rho = -0.14$, $p < 0.001$) were negatively associated with intention to dope. Ego orientation ($\rho = 0.24$, $p < 0.001$), extrinsic motivation ($\rho = 0.22$, $p < 0.001$), and amotivation ($\rho = 0.26$, $p < 0.001$) were positively associated with intention. Amotivation and ego orientation showed the strongest positive associations.

Taken together, higher self-esteem, stronger task orientation, and intrinsic motivation were associated with less favorable doping-related attitudes and weaker intentions, whereas stronger ego orientation, extrinsic motivation, and amotivation were associated with more favorable attitudes and stronger intentions.

3.4. Differences in broader psychosocial factors according to self-reported doping behavior

Table 4 compares self-esteem, achievement goal orientation, and sport motivation between the ever-use and never-use groups.

The never-use group showed higher self-esteem ($M = 32.72$, $SD = 4.94$), stronger task orientation ($M = 4.21$, $SD = 0.87$), and higher intrinsic motivation ($M = 5.68$, $SD = 1.39$) than the ever-use group (self-esteem: $M = 26.99$, $SD = 5.91$; task orientation: $M = 3.57$, $SD = 0.75$; intrinsic motivation: $M = 5.02$, $SD = 1.06$; all $p < 0.001$). Conversely, the ever-use group showed higher ego

orientation ($M = 3.99$, $SD = 1.05$), extrinsic motivation ($M = 6.04$, $SD = 1.15$), and amotivation ($M = 4.37$, $SD = 1.48$) than the never-use group (ego orientation: $M = 3.04$, $SD = 1.07$; extrinsic motivation: $M = 4.91$, $SD = 1.38$; amotivation: $M = 2.73$, $SD = 1.60$; all $p < 0.001$; Table 4).

3.5. Hierarchical regression of behavioral intention

Hierarchical multiple regression examined associations between attitudes toward doping, performance-enhancement attitudes, subjective norms, descriptive norms, perceived behavioral control, and behavioral intention to dope. Because behavioral intention was positively skewed and leptokurtic, bias-corrected and accelerated 95% bootstrap confidence intervals based on 10,000 resamples were used to account for non-normality.⁴⁰

Attitudes toward doping had the strongest association with behavioral intention across all three models, with performance-enhancement attitudes showing the next strongest association (Table 5).

In Model 1, attitudes toward doping and performance-enhancement attitudes were entered simultaneously, accounting for 72% of the variance in behavioral intention ($R^2 = 0.72$). Attitudes toward doping had the stronger association ($\beta = 0.58$, $p < 0.001$, 95% CI, 0.52–0.63), while performance-enhancement attitudes were also positively associated with behavioral intention ($\beta = 0.32$, $p < 0.001$, 95% CI, 0.27–0.37).

Adding subjective and descriptive norms in Model 2 resulted in a statistically significant but modest increase in explained variance ($\Delta R^2 = 0.01$, $F(2, 983) = 22.45$, $p < 0.001$). Attitudes toward doping ($\beta = 0.51$, $p < 0.001$, 95% CI, 0.46–0.57) and performance-enhancement attitudes ($\beta = 0.27$, $p < 0.001$, 95% CI, 0.22–0.33) remained positively associated with behavioral intention. Subjective norms were also positively associated with behavioral intention ($\beta = 0.15$, $p < 0.001$, 95% CI, 0.11–0.20), whereas descriptive norms had a modest negative association ($\beta = -0.04$, $p = 0.009$, 95% CI, -0.08 to -0.01).

In Model 3, perceived behavioral control was not significantly associated with behavioral intention ($\beta = 0.00$, $p = 0.861$, 95% CI, -0.04 to 0.03) and contributed no additional explained variance ($\Delta R^2 = 0.00$; $F(1, 982) = 0.003$, $p = 0.861$). The associations observed in Model 2 remained essentially unchanged.

The final model accounted for 73% of the variance in behavioral intention ($R^2 = 0.73$). Attitudes toward doping had the largest standardized coefficient, with performance-enhancement attitudes and subjective norms also positively associated with behavioral intention. Descriptive norms had a modest negative association, whereas perceived

Table 2. Descriptive statistics and internal consistency estimates for the main study variables ($N = 988$)

Variable	M	SD	Observed range	α
Attitudes toward doping	1.57	1.30	1.00–7.00	0.91
Performance-enhancement attitudes (PEAS)	12.13	7.52	6–36	0.88
Subjective norms	1.50	0.98	1.00–7.00	0.88
Perceived behavioral control	4.75	1.84	1.00–7.00	0.64
Descriptive norms	24.50	20.49	0–100	–
Behavioral intention	1.42	1.35	1.00–7.00	0.99
Self-esteem	32.29	5.24	16–40	0.84
Task orientation	4.16	0.87	1.00–5.00	0.94
Ego orientation	3.11	1.10	1.00–5.00	0.90
Intrinsic motivation	5.63	1.38	1.00–7.00	0.94
Extrinsic motivation	5.00	1.39	1.00–7.00	0.79
Amotivation	2.87	1.65	1.00–7.00	0.80

Notes: PEAS: Performance Enhancement Attitude Scale; M: Mean; SD: Standard deviation; α : Cronbach's alpha. "–" indicates that an internal consistency estimate was not applicable.

Table 3. Associations of broader psychosocial characteristics with attitudes toward doping, performance-enhancement attitudes, and behavioral intention

Psychosocial characteristic	Attitudes toward doping (r)	PEAS (r)	Behavioral intention (ρ)
Self-esteem	–0.28***	–0.34***	–0.19***
Task orientation	–0.23***	–0.33***	–0.16***
Ego orientation	0.30***	0.23***	0.24***
Intrinsic motivation	–0.15***	–0.16***	–0.14***
Extrinsic motivation	0.21***	0.20***	0.22***
Amotivation	0.29***	0.34***	0.26***

Notes: PEAS: Performance Enhancement Attitude Scale. r : Pearson correlation coefficient; ρ : Spearman rank-order correlation coefficient. Pearson correlations are reported for attitudes toward doping and performance-enhancement attitudes; Spearman rank-order correlations are reported for behavioral intention. *** $p < 0.001$.

behavioral control was not significantly associated with the outcome.

4. Discussion

The present study examined doping-related attitudes, subjective norms, perceived behavioral control, and

behavioral intention, alongside performance-enhancement attitudes, self-esteem, achievement goal orientation, and motivation among Croatian athletes. The observed associations were generally consistent with those reported in previous meta-analyses^{24,25} and studies conducted in other national and sporting settings.^{21,27–29} These findings

Table 4. Differences in broader psychosocial factors according to self-reported doping behavior

Variable	Self-reported doping	<i>n</i>	M	SD	<i>t</i>	df	<i>p</i>	Hedges' <i>g</i>	95% CI
Self-esteem	Ever use	75	26.99	5.91	-8.17	82.70	<0.001	-1.14	-1.38 to -0.90
	Never use	913	32.72	4.94					
Task orientation	Ever use	75	3.57	0.75	-7.03	91.03	<0.001	-0.74	-0.98 to -0.50
	Never use	913	4.21	0.87					
Ego orientation	Ever use	75	3.99	1.05	7.54	87.14	<0.001	0.89	0.65 to 1.13
	Never use	913	3.04	1.07					
Intrinsic motivation	Ever use	75	5.02	1.06	-5.00	95.99	<0.001	-0.48	-0.72 to -0.25
	Never use	913	5.68	1.39					
Extrinsic motivation	Ever use	75	6.04	1.15	8.02	92.41	<0.001	0.83	0.59 to 1.07
	Never use	913	4.91	1.38					
Amotivation	Ever use	75	4.37	1.48	9.11	88.78	<0.001	1.03	0.79 to 1.27
	Never use	913	2.73	1.60					

Notes: M: Mean; SD: Standard deviation; *t*: Welch *t* statistic; df: Degrees of freedom; 95% CI: 95% confidence interval. Hedges' *g* represents the standardized mean difference calculated as the ever-use group minus the never-use group. Positive *g* values indicate higher scores in the ever-use group, whereas negative values indicate higher scores in the never-use group.

Table 5. Hierarchical multiple linear regression analysis of behavioral intention to dope

Predictor/model statistic	Model 1				Model 2				Model 3			
	β	<i>p</i>	95% CI		β	<i>p</i>	95% CI		β	<i>p</i>	95% CI	
			Lower	Upper			Lower	Upper			Lower	Upper
Attitudes	0.58	<0.001	0.52	0.63	0.51	<0.001	0.46	0.57	0.51	<0.001	0.46	0.57
Performance-enhancement attitudes (PEAS)	0.32	<0.001	0.27	0.37	0.27	<0.001	0.22	0.33	0.27	<0.001	0.22	0.33
Subjective norms	–	–	–	–	0.15	<0.001	0.11	0.20	0.15	<0.001	0.11	0.20
Descriptive norms	–	–	–	–	-0.04	0.009	-0.08	-0.01	-0.04	0.009	-0.08	-0.01
Perceived behavioral control	–	–	–	–					0.00	0.861	-0.04	0.03
<i>R</i> ²			0.72				0.73				0.73	
Adjusted <i>R</i> ²			0.72				0.73				0.73	
Model significance	$F(2, 985) = 1,273.42, p < 0.001$				$F(4, 983) = 675.67, p < 0.001$				$F(5, 982) = 540.01, p < 0.001$			
Model comparison	–				$F(2, 983) = 22.45, p < 0.001$				$F(1, 982) = 0.003, p = 0.861$			
ΔR^2	–				0.01				0.00			

Notes: PEAS: Performance Enhancement Attitude Scale; β : Standardized regression coefficient; CI: Confidence interval; *R*²: Coefficient of determination; ΔR^2 : Change in explained variance between successive models; Confidence intervals are bias-corrected and accelerated 95% bootstrap confidence intervals based on 10,000 resamples. Model-comparison *F* tests compare each model with the immediately preceding model. “–” indicates not applicable.

indicate that patterns identified in previous research are also evident in the Croatian sample. However, the single-country design does not allow direct comparisons between national contexts or conclusions about cultural differences in these associations.

Overall, 7.6% of participants reported ever using prohibited substances for performance enhancement. This proportion is similar to figures reported in previous studies of competitive athletes. Laure *et al.*⁴¹ reported 4.0% lifetime doping use among young French athletes, Lazuras *et al.*³ reported 9.9% among elite Greek athletes, Barkoukis *et al.*³¹ reported 8.0%, Zabala *et al.*⁴² reported 8.2% among amateur cyclists, and Davoren *et al.*³⁰ found estimates ranging from 6.5% to 9.2% among elite United States athletes. However, these numbers are not directly comparable because studies differ in their samples, definitions of doping, reference periods, and assessment methods. Accordingly, the 7.6% observed here should be interpreted as a sample-specific proportion rather than as an estimate of doping prevalence among Croatian athletes. Higher estimates reported in specific athlete groups, including youth athletes²⁶ and bodybuilders,⁴³ further illustrate variation across populations and study methods.

Differences between athlete groups were also evident. Male athletes had more favorable doping-related and performance-enhancement attitudes and stronger behavioral intentions compared with female athletes, although these differences were modest. Previous studies have similarly found greater doping susceptibility among men.^{24,44-46} However, lifetime use did not differ significantly by gender, suggesting that differences in attitudes and intentions were not reflected in self-reported behavior. Individual-sport athletes were also more likely to report ever use and had more favorable doping-related attitudes than team-sport athletes, in line with findings from selected individual-sport samples.^{3,4,27,47}

An unexpected finding concerned competitive level. Contrary to several previous studies suggesting greater doping risk among elite athletes,^{48,49} lower-level athletes were more likely to report ever use. Pedersen⁴⁵ reported a similar finding. This difference may reflect variation in exposure to anti-doping systems or incentives to improve competitive standing. However, these explanations remain tentative because the relevant mechanisms were not measured in the present study.

The TPB results align with previous studies identifying attitudes as an important correlate of doping intention.^{19,24,33,49-52} Attitudes toward doping were most strongly associated with behavioral intention, whereas subjective norms were more weakly associated. These

findings reinforce the importance of favorable evaluations of doping and perceived approval from significant others in relation to doping intentions.

Perceived behavioral control was not significantly associated with behavioral intention after accounting for the other variables, consistent with findings reported in previous studies.^{50,52} The relatively low internal consistency of the perceived behavioral control measure in the present study ($\alpha = 0.64$) may have attenuated this association, and the null finding should therefore be interpreted cautiously.

Descriptive norms were weakly negatively associated with behavioral intention ($\beta = -0.04$), contrary to previous findings linking higher perceived doping prevalence with greater doping susceptibility.⁴ In contrast, subjective norms were positively associated with intention, indicating that perceived approval from significant others may be more relevant than generalized estimates of doping prevalence. Given the minimal coefficient for descriptive norms, this finding should not be interpreted as evidence that perceiving doping as more common reduces doping intention.

Beyond the TPB variables, self-esteem, achievement goal orientation, and sport motivation were also associated with doping-related attitudes and intentions. Higher self-esteem, task orientation, and intrinsic motivation were associated with less favorable doping-related attitudes and weaker intentions, whereas ego orientation, extrinsic motivation, and amotivation were associated with more favorable attitudes and stronger intentions. These findings are consistent with previous research linking motivational and achievement-related characteristics with doping-related outcomes.^{11,12}

The study contributes evidence from a large sample of Croatian athletes on established TPB variables and broader psychosocial factors associated with doping-related attitudes and intentions. Similarities with previous findings indicate that several of these associations are also evident in the Croatian setting. However, the cross-sectional design does not allow conclusions about their temporal ordering or causal relationships.

From a practical perspective, the findings highlight several psychosocial factors that may be relevant to anti-doping prevention, including self-esteem, motivational orientation, achievement goals, and perceived approval from significant others. The contrasting findings for subjective and descriptive norms further suggest that normative influences within athletes' immediate social environments may be particularly important when addressing doping intentions.

4.1. Limitations

Several limitations should be considered. First, the cross-sectional design precludes causal or temporal inference. Behavioral intention referred to the current season, whereas self-reported prohibited substance use referred to lifetime use, so the two measures were not temporally aligned.

Second, all measures were self-reported. Prohibited substance use may have been susceptible to social desirability and underreporting because of its sensitive nature, and the measure did not capture the types or circumstances of use. Common-method variance also cannot be excluded. The relatively extensive questionnaire may have increased the risk of careless responding;⁵³ however, formal indices of careless responding were not included in the original analytical protocol.

Third, recruitment was non-probabilistic, and the sample should not be considered representative of Croatian athletes. Because the total number of invited athletes and club identifiers were not recorded, response rates could not be calculated, and potential clustering within clubs could not be examined. The single-country design also limits generalizability.

Finally, the perceived behavioral control measure showed relatively low internal consistency ($\alpha = 0.64$), and descriptive norms were assessed with a single item. Dichotomizing self-reported use into never and ever use reduced information about frequency of use, while the broad classification of sports as team or individual may obscure differences between specific sports.

4.2. Future research

Future research should prioritize longitudinal designs to clarify the temporal relationships among psychosocial factors, doping-related cognitions, intentions, and subsequent behavior. Experimental and intervention studies could also examine whether factors associated with doping-related outcomes are modifiable and relevant to prevention.

Methodologically, future studies should complement self-report questionnaires with approaches that may reduce social desirability bias and provide more differentiated assessments of doping-related behavior. Indirect and scenario-based assessments,^{18,28} objective biological measures and analytical approaches, including hair analysis,^{54,55} and qualitative methods, including focus groups,^{19,56} and intervention approaches such as athlete-centered workshops may provide complementary perspectives. More detailed measures of doping behavior and normative perceptions, including personally relevant

reference groups, would also be valuable.

Future research should also examine motivational climate, moral reasoning, influences from peers, coaches, and parents, and personality characteristics such as perfectionism^{26,27} within theoretically specified models. The use of legal performance-enhancing substances may likewise warrant investigation as a potential marker of doping-related attitudes and behavior.^{44,57,58}

Finally, replication across different sports, competitive levels, and national settings would help establish the generalizability of the observed associations. Cross-national studies should assess measurement invariance before interpreting differences as cultural or national variation.

5. Conclusion

The present study assessed psychosocial factors associated with doping-related attitudes and intentions among Croatian athletes. The findings indicate that TPB-related variables and broader psychosocial factors, including self-esteem, achievement goal orientation, and sport motivation, were associated with doping-related attitudes and behavioral intentions. The results indicate that attitudes toward doping were most strongly associated with behavioral intention, while subjective norms made a smaller additional contribution.

Higher self-esteem, stronger task orientation, and higher intrinsic motivation were associated with less favorable doping-related attitudes and weaker intentions, whereas stronger ego orientation, higher extrinsic motivation, and higher amotivation were associated with more favorable attitudes and stronger intentions. Self-esteem, achievement goal orientation, and sport motivation also differed between the ever-use and never-use groups.

Overall, the study adds evidence that doping-related intentions are associated with both TPB variables and broader psychosocial factors among Croatian athletes. These associations may be relevant to the development of anti-doping prevention strategies, although longitudinal research is needed to clarify their temporal relationships with subsequent behavior.

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Conflict of interest

The authors declare they have no competing interests.

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Ethics approval and consent to participate

The study protocol was approved by the Committee for Scientific Work and Ethics of the Faculty of Kinesiology, University of Zagreb (Approval No. 1/2021). All participants provided electronic informed consent before accessing the questionnaire.

Consent for publication

All participants provided written informed consent prior to participation in the study. The consent form included permission for the publication of anonymized data collected through the questionnaire. No personally identifying information or images are included in this article.

Availability of data

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Further disclosure

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