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SPORT AND EXERCISE PSYCHOLOGY

Moral values and moral identity moderate the indirect relationship between sport supplement use and doping use via sport supplement beliefs

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ABSTRACT

The Incremental Model of Doping Behaviour suggests doping grows out of the habitual use of performance-enhancing methods (e.g., sport supplements) and belief that they are necessary for performance. Importantly, in this model, doping is viewed as functional rather than moral choice. In two studies, we examined whether sport supplement use was indirectly related to doping use via sport supplement beliefs, and whether personal morality moderated this relationship. Competitive athletes (Study 1, N = 366; Study 2, N = 200) completed measures of supplement use, beliefs, and doping use. They also completed measures of moral values (Study 1) and moral identity (Study 2). In both studies, supplement use was indirectly related to doping use via beliefs. Moreover, this indirect relationship was moderated by moral values (Study 1) and moral identity (Study 2). That is, the relationship between supplement use and doping use via beliefs was negated when moral values and moral identity were high but not when they were low or moderate. Taken together, our findings suggest that sport supplement users, who believe they are necessary, are more likely to dope if they have low moral values and believe that being a moral person is unimportant to their self-image.

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KEYWORDS
Dietary supplements; drug use and abuse in sport; ethics; nutritional ergogenic aids; performance enhancement

Introduction

Sport supplement (e.g., caffeine, creatine, sodium bicarbonate) use is highly prevalent amongst athletes of all ages and abilities (Knapik et al., 2016; Maughan et al., 2018). Evidence suggests that sport supplement users are more likely to use prohibited substances (i.e., doping) than non-users (Ntoumanis et al., 2014). Several theoretical models have attempted to explain why sport supplement users are more likely to dope than non-users. The Incremental Model of Doping Behaviour (IMDB; Petróczi, 2013) proposes that doping grows out of the habitual use of performance enhancement methods, including sport supplements, medication, and specialist equipment. Importantly, the model suggests that the decision to dope is based primarily on functional rather than moral reasons. However, to our knowledge, there is no evidence whether this hypothesis is correct. Below, we outline the main tenets of this model, and the role of functional and moral considerations in the decision to dope.

The incremental model of doping behaviour

As part of the IMDB, Petróczi (2013) proposed that doping is a learned behaviour that develops over time from the accustomed and accepted use of performance-enhancing methods. Doping is viewed as a motivated, goal-directed behaviour whereby prolonged involvement of using performance enhancing methods can lead an athlete to dope. Performance enhancing methods may be encouraged both explicitly (e.g., an athlete is encouraged by their coach to use advanced footwear) or implicitly (e.g., an athlete witnesses competitors using altitude training) throughout an athlete's career (c.f., Hoberman, 2001; Hughes & Coakley, 1991). As a result, athletes develop beliefs that performance enhancing methods are necessary, and these beliefs, in turn, contribute towards a more favourable attitude towards doping and a greater likelihood of using prohibited substances (Petróczi et al., 2017). In short, the IMDB proposes that accepted and continued use of performance enhancing methods can lead to doping.

It has been proposed that athletes who hold the belief that performance enhancing methods are necessary for performance are more likely to dope (Petróczi et al., 2017). In support of this, Hurst et al. (2019) showed that sport supplement use was indirectly related to both doping attitudes and doping likelihood via beliefs that sport supplements are necessary for performance. In other words, athletes who used sport supplements, and believed that they were necessary for performance, were more likely to dope. These findings were replicated in two further studies, which showed that use of sport supplements and belief they are necessary for performance were linked to doping attitudes (Hurst et al., 2021a) and likelihood (Hurst et al., in press). While this research provides some support for the IMDB, it is limited in that outcome measures were proxies of doping behaviour (i.e., doping attitudes and likelihood to dope in a hypothetical scenario), which may not generalize to actual doping behaviour (Ntoumanis et al., 2014). Given the attitude-behaviour gap, a need exists to examine whether previous findings are replicated in studies that use more direct measures of doping behaviour.

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Alongside the suggestion that use of performance enhancing methods can lead to doping, a main tenet of the IMDB is that the decision to dope is primarily based on functional rather than moral reasons. In other words, doping is viewed as a motivated, goal-oriented behavioural choice for maximising one's athletic ability rather than gaining an unfair advantage (Backhouse et al., 2016; Petróczi, 2013). It is therefore implied that athletes do not view doping as cheating or a moral issue but purely as another way to facilitate performance. On this basis, athletes who use sport supplements are unlikely to consider doping as cheating and against the rules, but instead consider whether it will improve and support performance. However, to date, no study has tested the relative contribution of functional and moral factors in an athlete's decision to dope.

Personal morality and doping

Morality concerns decisions about the "right" ways to behave, and reflects a person's values, which transcend situations to serve as judgment criteria to guide decisions (Schwartz, 1992, 2007). Moral values can indicate what is a virtuous, good, or ethical way to behave, and can regulate a person's behaviour (Haidt & Kesebir, 2010). Values play a prominent role in anti-doping legislation, which underpin the World Anti-Doping Agency's (WADA) strategy, which is "founded on the intrinsic value of sport" (WADC, 2021, p. 13). WADA refer to this intrinsic value as the "spirit of sport", which is a cornerstone of their anti-doping policy. Indeed, WADA identifies 11 values that underpin the spirit of sport, four of which can be classified as moral values: these are ethics, fair play and honesty; character and education; respect for rules and laws; and respect for self and other competitors (see, WADC, 2021, p. 13).

A construct that is closely aligned to moral values, is moral identity, which concerns the importance or salience of morality to a person's identity (Hardy & Carlo, 2011). When moral values are central to a person's identity, decision making is likely to be aligned with these values (Krettenauer & Hertz, 2015). Aquino and Reed (2002), in their socio-cognitive model of moral identity, defined moral identity as a self-conception organised around a set of moral traits, and identified nine traits as essential characteristics of a moral person (e.g., honesty, fairness, hard work). If someone feels that these traits are central to their self-concept, they are proposed to have a strong moral identity and, in turn, be more likely to act in line with these traits.

Cross-sectional evidence has shown that both moral values and moral identity are related to doping. Recently Mortimer et al. (2021) revealed that moral values were related to the likelihood to compete clean (i.e., to *not* dope), whereas several studies have identified that moral identity is negatively related to doping (e.g., Kavussanu et al., 2020; Ring & Hurst, 2019; Stanger & Backhouse, 2020). In short, past research suggests that if an athlete believes moral values are important and that being a moral person is central to their identity, they may be less likely to dope. However, given the IMDB, moral values and moral identity would be expected to have little influence on an athlete's decision to dope when that athlete believes performance enhancing substances and methods are necessary for their athletic endeavours. Thus, a need exists in examining the putative interaction between an athlete's belief about the necessity to use performance enhancing substances and personal morality in shaping that athlete's decision to dope.

The present research

The present research was designed to extend previous work (Hurst et al., 2019, 2021a, in press) and evaluate the IMDB (Petróczi, 2013), and examine relationships between sport supplement use, doping use, and personal morality. We conducted two cross-sectional studies and aimed to: 1) test direct and indirect (via sport supplement beliefs) effects of sport supplement use on doping use, and 2) determine whether moral values (Study 1) and moral identity (Study 2) moderate the indirect relationship of sport supplement use on doping use (via sport supplement beliefs; see, Figure 1).

Study 1

Materials and methods

Participants

Three-hundred and sixty-six competitive athletes (61% male; as mean ± SD; age = 23.8 ± 10.3 years old, years competing = 5.7 ± 5.4) volunteered to participate in the study. Participants competed in team (54%) and individual (46%) sports at club (40%), university (6%), county (15%), regional (10%), national (22%) and international (6%) level. Eligibility criteria stipulated participants competed for a sport team

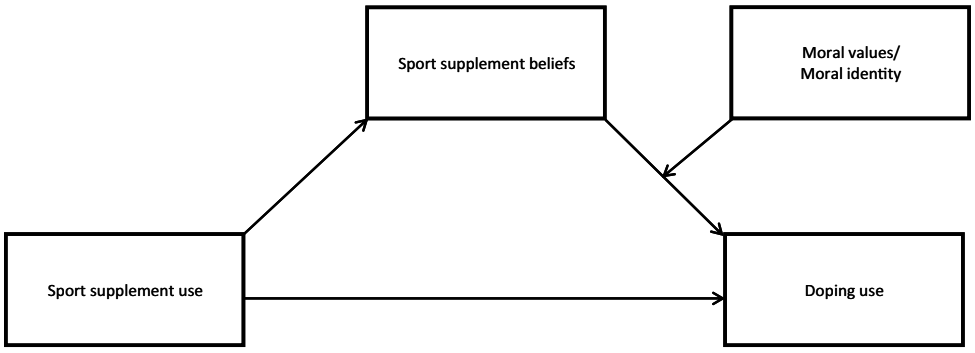

Figure 1. Proposed moderated mediation model where we propose that the indirect effect of sport supplement use on doping via sport supplement beliefs is moderated by moral values (Study 1) and moral identity (Study 2).

and were aged 16 years or above. We chose those 16 or older as the British Psychological Society code of ethics and conduct states that young people aged over 16 years are able to give their full consent to participate in research independently of their parents/guardians (British Pyscholoigcal Society, 2018).

Measures

Sport supplement use. Participants were first presented with the definition of sport supplements by Maughan et al. (2018): "Sport supplements are a food, food component, nutrient or non-food compound that is purposefully ingested in addition to the habitually consumed diet with the aim of achieving a specific health and/or performance benefit". They were then asked to indicate whether they use sport supplements (i.e., yes, no), which were coded as 0 (non-user) and 1 (user).

Sport supplement beliefs[1]. Beliefs about sport supplements were measured using the Sports Supplements Beliefs Scale (Hurst et al., 2017). Participants were presented with six-statements (e.g., "sport supplements improve my chances of winning" and "sport supplements are necessary for me to be competitive") and indicated their degree of agreement on a 6-point Likert type scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The mean of the six-items represents participants' beliefs in sport supplements, with higher scores indicative of stronger beliefs that sport supplements are necessary for sport performance. The scale has shown very good internal consistency in athletes (α range = 0.84 to 0.91; Hurst et al., 2019, 2020, 2021a) and good validity (Hurst et al., 2017).

Moral values. We measured moral values using four items from the Spirit of Sport Values scale (Mortimer et al., 2021). Participants were presented with four of the WADA's Spirit of Sport moral values (i.e., ethics, fair play and honesty; character and education; respect for rules and laws; respect for self and other participants) and asked to rate the importance of each value on a 7-point scale, with anchors of −1 (*opposite of what I believe*), 0 (*not important*) and 5 (*very important*). The mean of the four ratings was computed as a measure of participants' moral values. The original 11-item scale has shown good convergent validity and internal reliability for use in athletes (α = 0.82; Mortimer et al., 2021).

Doping use. Doping use was measured using a one-item scale from WADA's Research Package for Anti-Doping Organisations (Donovan et al., 2015). Participants were first presented with the statement: "The following question relates to substances in sport that are banned for use (i.e., doping). Examples include anabolic steroids, testosterone, and amphetamines." They were then asked to indicate which of the following statements best represents them: 1) I have never considered using a banned performance enhancing substance; 2) At one stage I thought briefly about using a banned performance enhancing substance; 3) At one stage I thought quite a bit about using a banned performance enhancing substance; 4) I still think occasionally about using a banned performance enhancing substance because other athletes are using them; 5) I briefly used a banned performance enhancing substance in the past but no longer do so; 6) I occasionally use a banned performance enhancing substance for specific purposes; and 7) I regularly try or use banned performance enhancing substances. For this study, doping use in this study refers to reported doping use.

Procedure

After gaining ethical approval from the first author's local institution (ETH1920-0163), participants were recruited online via social media (e.g., Facebook, Twitter, Instagram). They were sent a link to an anonymous online survey on a Jisc platform (Jisc, 2021), which stores data on an encrypted server, within Amazon Web Services. Participants read the information sheet and were informed that participation was voluntary, and that their data would remain completely anonymous. They then provided informed consent before completing measures described above.

Data analysis

Data were analysed using SPSS version 26.0 (IBM, Armonk, NY, USA). Little's Missing Completely at Random test (MCAR; Little, 1988) identified 11 (2.9%) participants with missing data, that were missing completely at random (χ^2 = 233.85, *df* = 242, p = 0.635). Given that missing data can reduce the accuracy of the analyses and compromise inferences (Schlomer et al., 2010), missing data were replaced using a multiple imputation, which is acceptable to use when less than 5% of data is missing (Cheema, 2014). The multiple imputation model generated five data sets with maximum parameters set at 100 (Royston, 2004), and the mean of the five data sets were used to replace missing data.

We used PROCESS v4.0 (Hayes, 2013) SPSS macro (model 14), which simultaneously tests direct and indirect (via sport supplement beliefs) effects of sport supplement use on doping use and whether moral values moderate the indirect pathway. Given sex differences in the likelihood to dope (Ntoumanis et al., 2014), we included this as a covariate in the analysis (coding: male = 0, female = 1). PROCESS estimates different conditional values of the moderator variable (i.e., moral values) for the indirect effect, and moderated mediation is assumed when the indirect effect differs between the mean, one standard deviation above (+1 SD) or one standard deviation below (−1 SD) the mean of moral values (Hayes, 2013). Essentially, if moral values moderate the indirect relationship of sport supplement use on doping use via sport supplement beliefs, the strength and/or direction of the mediation effect of sport supplements beliefs will change depending on the moral value score. Conditional indirect effects are statistically significant when zero is not included between lower and upper 95% bootstrap confidence intervals. Bootstrapping was set at 10,000 samples and bias-corrected 95% confidence intervals (CIs) were estimated for all effects.

[1]Data relating to Sport Supplements Beliefs in Study 1 have been published elsewhere as part of another project (Hurst et al. (in press). Ego orientation is related to doping likelihood via sport supplement use and sport supplement beliefs. *European Journal of Sport Science*, 1-19.)

Results

Descriptive statistics, Cronbach alpha coefficients, and zero-order correlations

Descriptive statistics, Cronbach alpha coefficients and zero-order correlations for all measures are reported in Table 1. Over a third of participants used sport supplements (37.4%) and nearly all never considered doping (92.1%). A small proportion thought briefly (4.4%), quite a bit (1.6%) and occasionally (0.8%) about doping. Very few participants briefly (0.3%), occasionally (0.3%) and regularly (0.5%) doped. Internal consistency was very good for measures of sport supplement beliefs and moral values. Zero-order correlations showed that sport supplement use was positively associated with sport supplement beliefs and doping use. Doping use was positively associated with sport supplement beliefs and negatively related to moral values.

Main analyses

The direct effects of sport supplement use (b = 0.06, 95% CI = −0.09 to 0.22, p = 0.43) and sex (b = −0.08, 95% CI = −0.23 to 0.06, p = 0.25) on doping use were not significant. Sport supplement beliefs (b = 0.57, 95% CI = 0.34 to 0.81), moral values (b = 0.19, 95% CI = 0.04 to 0.33) and the interaction between sport supplement beliefs and moral values (b = −0.11, 95% CI = −0.16 to −0.05; Figure 2) were significant predictors of doping use. To probe this interaction, conditional indirect effects of sport supplement use on doping use (via sport supplement beliefs) were tested at three levels of moral values: one SD below the mean (i.e., low), the mean (i.e., moderate), and one SD above the mean (i.e., high). These tests showed that the indirect relationship of sport supplement use on doping use (via sport supplement beliefs) only existed when scores for moral values were low (effect = 0.27, 95% CI = 0.05 to 0.51) and moderate (effect = 0.15, 95% CI = 0.05 to 0.28), but not when they were high (effect = 0.05, 95% CI = −0.04 to 0.16). Pairwise contrasts between conditional indirect effects revealed significant differences between high and low moral values, but not between high and moderate values, nor between moderate and low values (Table 2, Supplementary Figure 1).

In sum, we found that: 1) sport supplement use is indirectly related to doping use via sport supplement beliefs, and 2) the indirect effect was negated when moral values were high but not when moral values were low or moderate.

Table 1. Descriptive statistics, alpha coefficients, and zero-order correlations for Study 1 variables (N = 366).

Variable	Mean (SD)	α	1	2	3
1. Sport supplement use	0.38 (0.49)	N/A			
2. Sport supplement beliefs	2.75 (1.20)	0.90	0.46**		
3. Moral values	4.19 (1.02)	0.87	0.06	0.02	
4. Doping use	1.16 (0.68)	N/A	0.15**	0.25**	−0.11*

SD = standard deviation, α = Cronbach alpha. Possible range scores for sport supplement use: 0 (non-users) to 1 (users); sport supplement beliefs: 1 to 6; moral values: −1 to 5; and doping use: 1 to 7. * = p < 0.05, **p < 0.001.

Study 2

Materials and methods

Participants

We recruited 200 competitive athletes (49% female; as mean ± SD; age = 26.0 ± 12.3 years old, years competing at highest level = 5.7 ± 6.2) to the study. Participants were from team (61%) and individual (39%) sports competing at club (26%), university (8%), county (10%, regional (13%), national (34%) and international (10%) level. Eligibility criteria were the same as Study 1.

Measures

Measures for sport supplement use, sport supplement beliefs, and doping use were the same as in Study 1.

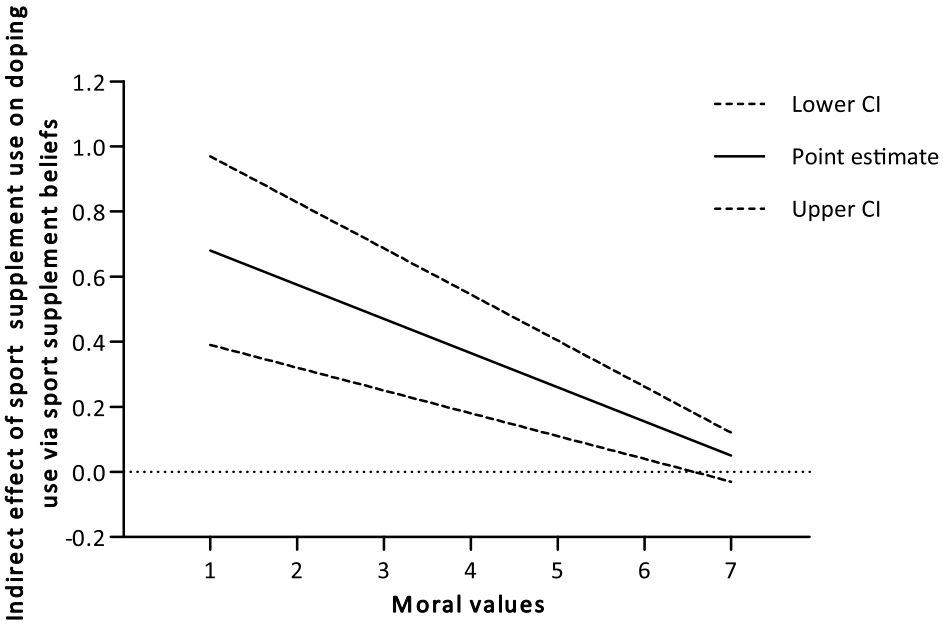

Figure 2. Visual representation relating moral values to the indirect effects of sport supplement use on doping use via sport supplement beliefs.

Table 2. Pairwise contrasts between conditional indirect effects of sport supplement use on doping use via sport supplement beliefs at three levels of moral values (Study 1; N = 366).

Comparison	Contrast	Boot SE	Lower	Upper
Mean *vs*. Mean −1 SD	−0.12	0.07	−0.27	0.01
Mean +1SD *vs*. Mean	−0.10	0.06	−0.21	0.01
Mean −1SD *vs*. Mean +1SD	−0.22	0.13	−0.48	−0.02

Boot SE = Bootstrap standard error

Moral identity. We used the internalization dimension of the moral identity scale (Aquino & Reed, 2002) to measure moral identity. Participants were presented with nine moral traits (e.g., hardworking, fair, honest) and responded to five items (e.g., "It would make me feel good to be a person who has these characteristics" and "I strongly desire to have these characteristics") on a Likert-type scale anchored by 1 (*strongly disagree*) to 7 (*strongly agree*). The scale has shown good internal consistency in athletes (α range = 0.72 to 0.83; Kassim & Boardley, 2018; Ring et al., 2019, 2018). The mean of the five items was computed and used as the measure of moral identity.

Procedure

Ethical approval was granted by the lead author's local ethics committee (ETH1920-0163). Participants completed the measures in the same manner as in Study 1.

Data analysis

Data were analysed using SPSS 26.0 and were first screened for missing data. Little's MCAR test revealed that data were missing completely at random ($\chi^2 = 68.57$, $df = 59$, $p = 0.184$). Missing data were replaced in the same manner as in Study 1. Descriptive statistics, Cronbach alphas and zero-order correlations were calculated for all measures. The same analyses were used as in Study 1. Briefly, we used Model 14 of PROCESS to test direct and indirect (via sport supplement beliefs) effects of sport supplement use on doping use and included moral identity as a moderator variable and sex as a covariate.

Results

Descriptive statistics, Cronbach alphas and zero-order correlations

Table 3 shows descriptive statistics, Cronbach alpha coefficients and zero-order correlations for all measures. Nearly half of the participants used sport supplements (46.5%), with the majority never using doping substances (84.5%). Participants thought about using doping briefly (5.5%), quite a bit (1.0%) and occasionally (0.5%), with few doping briefly (2.5%), occasionally (1.5%) and regularly (4.5%). Participants reported moderate sport supplement beliefs and high moral identity. Sport supplement use was positively correlated with sport supplement beliefs and doping use, and sport supplement beliefs were negatively related with moral identity and positively related to doping use. Moral identity was negatively associated with doping use.

Table 3. Descriptive statistics, alpha coefficients, and zero-order correlations for Study 2 variables ($N = 200$).

Variables	Mean (SD)	α	1	2	3
1. Sport supplement use	0.47 (0.50)	N/A			
2. Sport supplement beliefs	2.94 (1.40)	0.93	0.48**		
3. Moral identity	5.89 (1.12)	0.73	−0.13	−0.21**	
4. Doping use	1.54 (1.50)	N/A	0.28**	0.53**	−0.39**

SD = standard deviation, α = Cronbach alpha. Possible range scores for sport supplement use: 0 (non-users) to 1 (users), sport supplement beliefs: 1 to 6; moral identity and doping use: 1 to 7. **p < 0.001.

Main analyses

The direct effect of sport supplement use ($b = 0.13$, 95% CI = −0.21 to 0.47) and sex ($b = 0.11$, 95% CI = −0.19 to 0.41) on doping use were not significant. Sport supplement beliefs ($b = 2.62$, 95% CI = 2.12 to 3.11), moral identity ($b = 0.74$, 95% CI = 0.45 to 1.03), and the interaction between sport supplement beliefs and moral identity ($b = -0.37$, 95% CI = −0.45 to −0.29) were significant predictors of doping use. The index of moderated mediation indicated a significant interaction (index = −0.49, 95% CI = −0.68 to −0.31, Figure 3). Conditional indirect effects revealed that sport supplement use on doping use via sport supplement beliefs was significant when scores for moral identity were low (effect = 1.13, 95% CI = 0.72 to 1.58) and moderate (effect = 0.58, 95% CI = 0.35 to 0.85), but not when scores were high (effect = 0.03, 95% CI = −0.12 to 0.23). Pairwise contrasts between conditional indirect effects indicated significant differences between high, moderate, and low levels of moral identity (Table 4, Supplementary Figure 2). In sum, our data confirm an indirect relationship between sport supplement use and doping use via sport supplement beliefs and reveal that the indirect relationship only holds for athletes with moderate and low moral identity.

Discussion

In this multi-study research project, we conducted two cross-sectional studies to test whether sport supplement use was indirectly related to doping use via sport supplement beliefs, and whether personal morality moderated this relationship. Across both studies we found that sport supplement beliefs mediated the relationship between sport supplement use and doping use, and that this mediation did not exist when moral values (Study 1) and moral identity (Study 2) were high. This study is a first at providing evidence that personal morality may influence the relationship between sport supplement use, beliefs, and doping, and highlights the important role personal morality plays in an athlete's decision to use prohibited substances.

Sport supplements beliefs and doping

In two studies, we showed that sport supplement use was indirectly related to doping use via sport supplement beliefs. By assessing self-reported doping use, our results further extend previous research reporting sport supplement use is indirectly related to both doping attitudes (Hurst et al., 2019, 2021a) and doping likelihood (Hurst et al., 2019, in press) via sport supplement beliefs. Given that in both Study 1 and 2 there was no direct effect of sport supplement use on self-reported doping use, our results highlight

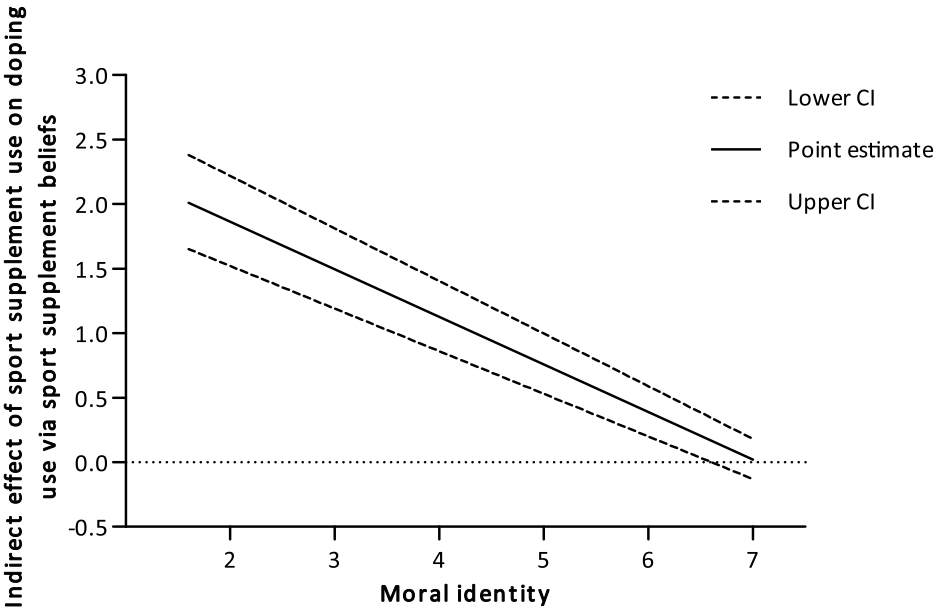

Figure 3. Visual representation relating moral identity to the indirect effects of sport supplement use on doping use via sport supplement beliefs.

Table 4. Pairwise contrasts between conditional indirect effects of sport supplement use on doping use via sport supplement beliefs at three different levels of moral identity (Study 2; N = 200).

Moral identity score	Contrast	Boot SE	Lower	Upper
Mean *vs*. Mean −1 SD	−0.56	0.11	−0.78	−0.34
Mean +1SD *vs*. Mean	−0.55	0.11	−0.77	−0.34
Mean −1SD *vs*. Mean +1SD	−1.13	0.21	−1.56	−0.68

Boot SE = Bootstrap standard error

the importance of beliefs that sport supplements are necessary for performance as a mechanism that could explain the link between sport supplement and doping use. This suggests that athletes who use sport supplements may develop beliefs that using these substances are necessary for performance, and in turn, be more likely to dope.

Our results partly support the IMDB, which proposes that doping is a learned behaviour that develops over time from the accustomed use of performance enhancing methods (e.g., sport supplements) and the belief that they are necessary for athletic development. This may happen due to positive experiences (e.g., improved performance) athletes have after using sport supplements and other performance enhancing methods. For instance, an athlete may consume caffeine before a competition, feel more mentally alert, and perform better. Afterwards, the athlete would attribute improvements in performance to caffeine, which in turn, strengthens the belief in the performance enhancing capacity of caffeine (Beedie et al., 2015). Over time, the athlete may begin using different performance enhancing methods to facilitate performance (e.g., acupuncture, analgesics, and cryotherapy), and begin to develop the belief that doping will provide a similar, or greater, improvement in performance (Hurst et al., 2017; Petróczi, 2013). As shown in Studies 1 and 2, this belief that performance enhancing methods are necessary for performance may therefore increase the likelihood of that athlete doping.

The role of personal morality on doping

Data from both studies suggest that personal morality plays an important role in an athlete's decision to dope, irrespective of whether the athlete believes that they are necessary for performance. We showed that both moral values (Study 1) and moral identity (Study 2) moderate the indirect relationship of sport supplement use on doping use via sport supplement beliefs. Collectively, both studies indicate that users of sport supplements, who believe sport supplements are necessary for performance, are less likely to self-report doping if they believe moral values are important and feel being a moral person is central to their self-concept.

Our findings have important theoretical and practical applications. Athletes who use sport supplements and believe they are necessary, may be more likely to dope only if they perceive moral values to be unimportant (Study 1) or that being a moral person is not part of their identity (Study 2). Thus, while the IMDB suggests that athletes, who use performance enhancing methods and believe that they are necessary for performance, may dope because of reasons for functionality, the current evidence suggests that athletes who hold this view are only likely to dope if the importance of moral values is low-to-moderate.

The results from this study provide evidence to underpin anti-doping education interventions that target moral values and show that use of sport supplements, and belief that they are necessary, may not lead an athlete to dope when athletes hold strong moral values. Before administering sport supplements to athletes, practitioners should assess their athletes' morality and consider whether they see the importance of moral values, such as a respect for the rules and their competitors, and if being a moral person is important to them. While moral values and moral identity are relatively stable in adults (Krettenauer & Hertz, 2015), national and international organisations should attempt to strengthen athletes' moral values and identity in their anti-doping interventions. This could be

achieved by emphasising the importance of acting in an ethical manner when taking part in sport. Recently, Kavussanu et al. (2021) reported that young athletes were less likely to dope three and six months after attending a "moral" intervention where participants engaged with content related to the importance of being hardworking, honest, and fair. This approach may be more fruitful than current interventions, which provide athletes with basic information about the anti-doping rules and regulations (Hurst et al., 2020).

Limitations and future research directions

The research has some limitations, which need to be considered when interpreting the results. The primary outcome measure, doping use, relied on self-report and athletes being honest in their response, which may be sensitive to social desirability and report bias. While we aimed to increase honesty in responses through an anonymised survey, given that athletes can be banned for up to four years for admitting to doping, they may have been reluctant to self-report their doping behaviour. We also used a cross-sectional design and cannot make assertions about causality. It would be fruitful for future research to use longitudinal designs to provide stronger evidence of the indirect relationship between sport supplement use, beliefs, and doping, and whether personal morality moderates this relationship.

Conclusion

We found that the relationship between sport supplement use was indirectly related to doping use via beliefs that sport supplements are necessary for performance. We also showed that this indirect relationship was moderated by both moral values and moral identity. That is, athletes who use sport supplements and believe that they are necessary for performance, may be less likely to dope if they have a strong sense of personal morality (reflected in their high moral values and moral identity) than those who do not perceive moral values as important or morality as central to their identity. These findings partially support the IMDB, whereby an athlete decides to dope after developing the belief that performance enhancing substances are necessary for performance but fail to support the proposal that doping is primarily a functional choice rather than moral choice. Instead, personal morality is likely to play a key role in regulating an athlete's decision to dope, even when that athlete uses sport supplements and believes that they are necessary for performance. This research helps explain why some sport supplement users progress to doping and others do not and highlights the importance for increasing and strengthening an athlete's morality in education interventions by anti-doping organisations.

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