

**Doping behaviour in mixed martial arts athletes: The roles of health risk beliefs and moral attitudes**

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### **Abstract**

**Objectives:** The present study examined, for the first time, the effects of self-reported doping use and doping susceptibility on health risk perceptions of doping use, and on moral attitudes in an international sample of amateur and professional MMA athletes.

**Design/Method:** A cross-sectional survey-based design was used, and structured anonymous online questionnaires were completed by 249 MMA athletes from 16 countries.

**Results:** Self-reported doping use was significantly associated with doping susceptibility. Almost a third of athletes were willing to use a prohibited substance that would help them win, but did not pose a mortal threat. Paired samples t-tests showed that short-term doping use was perceived as less harmful than long-term doping. Finally, 2×3 MANOVAs indicated that self-reported doping use and doping susceptibility had both main and interactive effects on moral attitudes, but only doping use differentiated health risk perceptions about doping.

**Conclusions:** Mortality appears to be more valued than morality in the decision to use a prohibited substance to win an important title. Efforts to promote clean sport in MMA should target health risks beliefs, especially about the short-term health consequences of doping. Moral attitudes should also be targeted, especially with regards to the endorsement of cheating and a "win at all costs" culture. The policy implications of our findings are discussed.

**Keywords:** Doping; moral attitudes; perceived health risk; MMA athletes.

### **Doping behaviour in mixed martial arts athletes: The roles of health risk and moral beliefs**

In recent years Mixed Martial Arts (MMA) has grown exponentially in both viewership and participation<sup>1-2</sup>. However, this growth has also been accompanied by a rise in the use of banned performance-enhancing drugs (PEDs), with the United States Anti-Doping Agency (USADA) reporting 116 doping violations in the past five years within the UFC alone<sup>3-4</sup>. The pervasiveness of doping within MMA can be attributed to the sport's neuromuscular demands for competitive success (i.e., muscular strength and endurance)<sup>5-7</sup>. As with other sports, many athletes facing high levels of competition are predisposed to consuming PEDs in an attempt to gain an unfair advantage over their competition<sup>8</sup>. According to the 2021 World Anti-Doping Code, anti-doping programs have a twofold purpose, to protect the health of athletes, and to maintain the integrity of sport by promoting and protecting moral and other values that determine the Spirit of Sport<sup>9</sup>. Indeed, health risk and violations of the Spirit of Sport values are two out of the three criteria used to determine if a substance must be included in the Prohibited List<sup>9</sup>. Understanding athletes' perceptions of the health risks involved in doping use, as well as their moral beliefs is of pivotal importance in terms of understanding the decision-making process underlying doping use<sup>10</sup>, and for informing interventions and campaigns to promote clean sport<sup>11</sup>.

Previous research has shown that elite athletes who were affiliated with doping users downplayed the health risks of doping use<sup>12</sup>. Other research showed that elite cyclists focused on the short-term performance enhancing properties of doping use and disregarded long-term health consequences<sup>13</sup>. However, there is scarce research on athletes' health risk perceptions of doping use, and how those perceptions are associated with doping use and/or future doping susceptibility. Other studies have shown that athletes engaged in doping (or willing to dope) tend also to display "moral flexibility" by adjusting their moral beliefs to accommodate their

choices and reduce any guilt or other adverse emotions related to their actual or intended misconduct<sup>14-16</sup>. In this context, the concept of moral attitudes is particularly relevant because it reflects athletes' moral functioning in sport and addresses both pro-social (e.g., keeping winning in proportion) and anti-social (e.g., acceptance of cheating) attitudes<sup>17</sup>. Research has shown that moral attitudes are associated with cheating behaviour and rule-violation in different sport settings<sup>18-19</sup>. If moral attitudes are associated with cheating and rule violation in sport, then it is theoretically plausible that they are also associated with doping use. However, research on the social psychological drivers of doping use has not yet addressed the role of prosocial and antisocial moral attitudes<sup>17</sup>. The present study assessed, for the first time, the associations between doping use experiences, doping susceptibility, health risk beliefs, and moral attitudes in sport in MMA athletes. Based on previous research<sup>12,-18-19</sup>, it was anticipated that MMA athletes who reported doping use and were more susceptible for future doping would also report lower scores in health risk perception and prosocial attitudes (i.e., keeping winning in proportion; Hypothesis 1), and higher scores in antisocial moral attitudes (i.e., acceptance of cheating; acceptance of gamesmanship; Hypothesis 2).

### **Methods**

After gaining ethical approval by Cyprus National Bioethics Committee, links to an anonymous online survey were disseminated through social media and internet groups between March 2018 and September 2019. Two-hundred and forty-nine MMA athletes (Median age = 26-30 years; 59.8% males), of mixed levels (professional = 56.2%, amateur = 40.2%; undisclosed = 3.6%), from 16 countries: United Kingdom (51.8%, n = 129), USA (27.7%, n = 69), Iceland (4%, n = 10), Australia (3.2%, n = 8), Canada (2.8%, n = 7), Ireland (2.4%, n = 6), Thailand (1.6%, n = 4) and other (3.6%, n = 9)<sup>i</sup> were recruited. The survey comprised of a battery of questions derived from WADA's Research Package for Anti-Doping Organisations<sup>20</sup> to measure background characteristics; self-reported doping;

doping susceptibility; health risk perceptions about short and long-term doping use; and moral attitudes.

*Background characteristics* included level of competition (amateur vs. professional), years of competing in MMA, and amount of income gained from MMA fighting.

*Self-reported doping use* was measured with a single item asking athletes to describe their doping experiences on a seven-point anchor scale (1 = I have never considered using a banned PED, to 7 = I regularly try or use banned PEDs). Participants were further classified into *never users* (never used or considered using doping substances); *never user contemplators* (never actually used, but considered in the past or currently to use PEDs), and *ever users* (having used/currently using doping substances).

*Doping susceptibility* was measured with three variations of the Goldman dilemma, adapted from Connor et al<sup>18</sup>. The three items varied the levels of mortal and moral threat. Specifically, the first item reflected mortal and moral threat by asking participants if they would use an undetectable, illegal PED that would guarantee them the winning of a very important title (i.e., *UFC world championship belt*) but would kill them in five years. The second item asked the same question but this time moral threat was absent (i.e., the PED was legal), but mortal threat remained (i.e., would kill them in five years). Finally, the last item reflected only moral threat (i.e. mortal threat absent). Responses to all three items were binary (yes/no).

*Health risk* perceptions were measured with a single question asking participants to indicate how much harm to their health would be caused by using different prohibited PEDs. Twelve PEDs were listed (e.g., anabolic steroids, beta blockers, designer steroids, SARMS, growth hormone releasing peptides), and responses were recorded on a 5-point continuous scale ranging from no harm (= 1) to serious harm (=5). Two versions of this measure were used, one assessing perceived health harm/risk for short-term doping use (i.e., up to 2 months), and the second version reflected long-term, more regular doping use. Internal consistency

reliability for both measures was high (Cronbach's  $\alpha$  short-term doping = .94, Cronbach's  $\alpha$  long-term doping = .95).

Moral attitudes were assessed with the Attitudes to Moral Decision-Making in Sport Questionnaire (AMDYSQ<sup>17</sup>), which reflects attitudes towards cheating and other actions that help athletes gain an unfair competitive advantage. Three sub-scales are included and reflect acceptance of cheating (e.g., "*it is OK to cheat if nobody knows*"; 7 items), keeping winning in proportion (e.g., "*it is OK to lose sometimes because in life you don't win everything*"; 6 items), and acceptance of gamesmanship (e.g., "*I sometimes try to wind up the opposition*"; 7 items). Acceptance of cheating and gamesmanship reflect anti-social moral attitudes, whereas keeping winning in proportion reflects pro-social attitudes. Responses were recorded on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), and internal consistency reliability scores were at acceptable levels (Cronbach's  $\alpha$  acceptance of cheating = .86, Cronbach's  $\alpha$  keeping winning in proportion = .65, Cronbach's  $\alpha$  acceptance of gamesmanship = .77).

## Results

SPSS v.24 (SPSS Inc., Chicago, IL) was used for data analysis.

### *Prevalence of Self-Reported Doping Use & Doping Susceptibility*

Analysis of frequencies showed that 64.2% ( $n = 115$ ) of MMA athletes were classified as never users, 29.1% ( $n = 52$ ) as never user contemplators, and 6.7% ( $n = 12$ ) as ever users. Seventy cases were recorded as missing values because they did not report their doping use. With regards to the prevalence of doping susceptibility, 3.1% ( $n = 5$ ) said they would use an illegal, undetectable but lethal PED, 6.2% ( $n = 10$ ) said they would use a legal but lethal PED, and 31.5% ( $n = 51$ ) said they would use an illegal, undetectable and non-lethal PED that would guarantee winning the UFC championship. Eighty seven cases were recorded as missing values because they did not respond to the doping susceptibility questions.

With regards to handling the missing values observed in the aforementioned variables, we further utilised non-response imputation (NRI) and respectively imputed non-response values for self-reported doping use and doping susceptibility. Because of the unequal sample sizes, non-parametric tests were used. Pearson's chi-square ( $\chi^2$ ) was used to determine if responders differed from non-responders in background characteristics, namely level of competition, years of training in MMA, and income derived from MMA. No significant differences emerged, except for a marginally significant association between doping susceptibility (i.e., to use an illegal, undetectable and non-lethal PED that would guarantee winning the UFC championship) and level of competition ( $\chi^2 = 4.39, p = .036$ ). Kruskal-Wallis test was further used to examine if responders differed significantly from non-responders in the key variables of interest in the present study, that is, health risk perceptions and moral attitudes. The analysis showed that compared to responders, non-responders in self-reported doping use and doping susceptibility did not differ significantly ( $p > .05$ ) in health risk perceptions. Accordingly, responders and non-responders in doping susceptibility did not differ significantly in moral attitudes (i.e., acceptance of cheating, keeping winning in proportion, and acceptance of gamesmanship). Differences in moral attitudes could not be computed for self-reported doping use because there were zero non-responder cases.

#### *Associations between Self-Reported Doping Use & Doping Susceptibility*

Analysis of frequencies with Pearson's chi-square ( $\chi^2$ ) and 99% Monte Carlo Confidence Intervals (CIs) with 10000 samples showed that doping susceptibility was significantly associated with self-reported doping use, but an inverse trend was observed. Specifically, compared to ever users, significantly more contemplator never users reported that they would use an undetectable illegal ( $\chi^2 = 6.79, p = .034$ ) or legal PED ( $\chi^2 = 9.22, p = .010$ ) that would guarantee winning the UFC championship, but would kill them in five years. On the contrary, compared to never users, significantly more contemplator never users and

ever users were willing to take an illegal, undetectable, and non-lethal PED that would guarantee them winning the UFC championship ( $\chi^2 = 42.35, p < .001$ ). The frequencies of doping susceptibility per user group are shown in Table 1. Further analysis showed that doping susceptibility was unrelated ( $p > .05$ ) to background factors (i.e., level of competition, years of competing in MMA, and amount derived from MMA competitions).

#### *Perceived Health Risks from Doping Use*

Bootstrapped paired samples t-test with 1000 resamples and 95% CIs for the mean differences were further used to assess if health risk perceptions differed for short-term and long-term doping use in the total sample, and in each doping use group (i.e., never users; never user contemplators; and ever users). The analyses showed that short-term doping use was perceived as significantly less harmful than long-term doping use in the total sample ( $t(162) = 11.74, p < .001$ ), and in the sub-samples of never users ( $t(98) = 8.02, p < .001$ ); never user contemplators ( $t(51) = 8.39, p < .001$ ); and ever users ( $t(10) = 2.65, p = .024$ ). The mean scores for the total sample and for each doping use group are presented in Table 2.

#### *Effects of Past Use and Doping Susceptibility on Moral Attitudes and Perceived Health Risks*

Two 2×3 MANOVAs were used to assess the main and interaction effects of doping susceptibility (2 levels: wanting or not wanting to use a prohibited, undetected but non-lethal PED) and self-reported doping use (3 levels: never users, never user contemplators, and ever users) respectively, on moral attitude dimensions (i.e., acceptance of cheating, keeping winning in proportion, and acceptance of gamesmanship), and on doping-related health risk perceptions (i.e., short and long-term). Because there were zero cases of ever users reporting lethal doping susceptibility (with legal or illegal PEDs), we only used the third doping susceptibility item, where athletes were asked if they would use a prohibited, undetectable and non-lethal PED to win an important title.

The first analysis indicated a significant main effect of doping use groups on acceptance of cheating ( $F = 6.36, p = .002, \eta_p^2 = .075$ ), and significant main effects of non-lethal doping susceptibility on acceptance of cheating ( $F = 22.17, p < .001, \eta_p^2 = .124$ ), and on keeping winning in proportion ( $F = 13.74, p < .001, \eta_p^2 = .081$ ). A significant interaction effect was also observed for acceptance of cheating ( $F = 4.03, p = .020, \eta_p^2 = .049$ ; see Figure 1). A marginally non-significant interaction effect was observed for keeping winning in proportion ( $F = 2.93, p = .056, \eta_p^2 = .036$ ; see Figure 2).

The second analysis indicated a significant main effect of doping use groups on the perceived health risks of long-term doping use ( $F = 4.56, p = .012, \eta_p^2 = .062$ ). Post-hoc analysis (Bonferroni) showed that ever users reported significantly lower scores ( $p = .021$ ) in health risk perception compared to never user contemplators. No other significant main effects or interaction effects were observed.

### Discussion

The present study examined, for the first time, the associations between self-reported doping use, doping susceptibility, health risk beliefs, and prosocial and antisocial moral attitudes in sport among MMA athletes. Although our measures of doping susceptibility were previously used to address the Goldman's dilemma<sup>21-22</sup>, the emphasis of the present study was on the trade-off between moral and mortal threats. Mortal threat reflected the decision to use a lethal (legal or prohibited) substance, whereas moral threat reflected the decision to use a non-lethal but prohibited and undetectable substance to win an important MMA title. Our findings showed that while a small minority of MMA athletes would take either the prohibited (3.1%) or legal but lethal PED (6.2%), almost a third of athletes (31.5%) would take the undetectable prohibited PED that did not pose mortal threat. This suggests the mortal, rather than moral, threat is a more important consideration in deciding to use a prohibited PED.

Furthermore, doping susceptibility was significantly associated with self-reported doping use, and an interesting trend emerged for the lethal vs. non-lethal PED scenarios. Specifically, none of the athletes in the "ever users" group would take a legal or prohibited PED that posed a mortal threat, as compared to athletes classified as contemplator never users. When the susceptibility scenario involved a prohibited PED that was non-lethal, then significantly more ever users and contemplators, than never users were willing to dope. This finding suggests that MMA athletes who have doped in the past would rather "play safe" and only consider doping if it does not pose a mortal threat, but ensures winning. Taken together, these findings indicate that athletes who have not engaged in doping do not represent a homogeneous group. Rather, among the never users, a small minority of athletes is willing to take chances and use doping even if this poses a mortal threat - a choice that the more *experienced* doping users refrain from.

Regarding health risk perceptions, athletes perceived the short-term use of doping substances (i.e., up to 2 months) as less harmful than long-term doping. We further examined whether this effect could be attributed to motivated reasoning (i.e., if it is only present in athletes who already doped or thought about doing it), but our analysis showed that this is not the case. Additionally, partly supporting the first hypothesis of the study, MMA athletes who had used doping substances perceived long-term doping use as less harmful, compared to never user contemplators. MMA athletes who believe there is less health risk involved in short-term doping use may be more susceptible to doping during training camps, which typically last between 8 and 10 weeks, in preparation for specific events or short-term benefits such as recovery from injury. Thus, we recommend that intervention to promote clean sport and protect the health of athletes in MMA should target health risk perceptions about doping use, and reinforce the harmful effects of doping, especially with regards to short-term use.

Our findings largely supported our second hypothesis about the association of doping use and susceptibility with moral attitudes. Specifically, doping use and susceptibility had main and interaction effects on acceptance of cheating, and doping susceptibility had a main effect on keeping winning in proportion. However, doping use and susceptibility did not significantly differentiate scores in the acceptance of gamesmanship. Firstly, these findings indicate that moral attitudes assessed with the AMDYSQ<sup>17</sup> are relevant to the study of doping behaviour. Although previous research has examined the role of moral (pro-social and anti-social) attitudes in cheating and rule violation in sport<sup>18-19</sup>, our study is the first to utilise the specific measure in the context of doping behaviour. Our findings indicate that anti-social attitudes, such as acceptance of cheating differed significantly between doping use and susceptibility groups, following a linear trend (see Figure 1). Additionally, doping susceptibility (i.e., wanting to take a non-lethal, but undetectable banned PED) was associated with lower scores in pro-social attitudes, such as keeping winning in proportion. This suggests that a "win at all costs" mentality may partly underlie the decision to engage in doping use, especially when doping is perceived as non-threatening to one's life. Taken together, our findings highlight the need to utilise models of moral values and attitudes<sup>18</sup> in the context of doping use. They also emphasise the need for values-based education in MMA athletes, especially as this pertains to beliefs about the acceptance of cheating and the sacrifices one is willing to undertake in order to win an important title.

Our study is not free of limitations. First of all, the cross-sectional design does not allow us to draw causal inferences about the direction of the observed effect. Previous research has shown that health risk beliefs can both precede and follow health-risk behaviour<sup>24</sup>, but this has not been examined as yet in the context of doping behaviour. Furthermore, previous research has shown that moral attitudes precede the display of cheating and rule violations in sport<sup>19-20</sup>. Future studies may further investigate this process in

relation to doping behaviour. Secondly, our study did not incorporate measures of moral values. This would have allowed us to present a more comprehensive analysis about the role of moral values and moral attitudes in doping behaviour. Recent research<sup>24</sup> have addressed the role of moral values in sport, and future studies may further extend this line of inquiry by incorporating Whitehead et al.'s<sup>17</sup> model about the value-expressive function of moral attitudes and their relationship to doping behaviour. Also, the missing data observed in self-reported doping use and susceptibility could potentially indicate response bias, however our missing value analysis with non-response imputation (NRI) suggested that responders did not significantly differ from non-responders in the key variables of our study (i.e., health risk perceptions and moral attitudes).

To conclude, our findings show that when doping poses a *de facto* mortal threat, less athletes are willing to engage, but when the mortal threat is lifted and only the moral threat is present, considerably more MMA athletes are willing to engage in doping. This highlights the importance of health over moral values in the decision to engage in doping. MMA athletes in the present study also misperceived the health risks of doping use, believing that doping for up to two months is less harmful than long-term doping use. Finally, both doping use and doping susceptibility significantly differentiated pro-social (i.e., keeping winning in proportion) and anti-social (i.e., acceptance of cheating) moral attitudes. The practical implications of our study are the following. Sport medicine professionals and anti-doping practitioners in MMA should tackle athletes' health risk beliefs, especially with regards to the short-term use of PEDs. This recommendation is in line with the revised, 2021 World Anti-Doping Code<sup>9</sup> which prioritises athletes' health. Secondly, values-based education should be implemented in MMA sport, especially with respect to dispelling "win at all costs" beliefs, and de-normalising cheating as means to win a fight or an important title. This

recommendation is relevant to the implementation of the World Anti-Doping Agency's International Standards of Education<sup>25</sup> where values-based education plays a central role.

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Table 1. Count Cases and Frequencies (%) of Doping Susceptibility by User Group

	Prohibited PED/mortal		Legal PED/mortal		Prohibited PED/non-mortal	
	Yes	No	Yes	No	Yes	No
Never users	1 (1.0%)	103 (99.0%)	3 (2.9%)	101 (97.1%)	15 (14.4%)	89 (85.6%)
Never user contemplators	4 (8.7%)	42 (91.3%)	7 (15.2%)	39 (84.8%)	26 (56.5%)	20 (43.5%)
Ever users	0 (0.0%)	12 (100.0%)	0 (0.0%)	12 (100.0%)	10 (83.3%)	2 (16.7%)
	$\chi^2$	6.79*		9.22*		42.35***

*Note.* \* $p < .05$ ; \*\* $p < .005$ ; \*\*\* $p < .001$ .

Table 2. Perceived Health Risk for Short-Term and Long-Term Doping Use

	Never users		Ever user contemplators		Ever users		Total sample	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Short-term doping use	2.72	0.99	2.69	0.81	2.16	0.61	2.67	0.92
Long-term doping use	3.42	0.99	3.67	0.93	2.83	0.84	3.46	0.97
<i>t</i>	8.02***		8.39***		2.65*		11.74***	

Note. \* $p < .05$ ; \*\* $p < .005$ ; \*\*\* $p < .001$ .

Figure 1. Interaction between self-reported doping use and doping susceptibility for acceptance of cheating.

----- Insert Figure 1 around here -----

Figure 2. Interaction between self-reported doping use and doping susceptibility for keeping winning in proportion.

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<sup>1</sup> The following countries were also represented by one participant each: Cyprus, Czech Republic, Denmark, Fiji Islands, Greece, the Netherlands, New Zealand, Oman, and Singapore