Doping behaviour in mixed martial arts athletes: the roles of social norms and self-regulatory efficacy

Michael Petrou, Lambros Lazuras, Mathew Hillier and Dara Mojtahedi

ABSTRACT
The present study examined, for the first time, the multivariate association between social norms, negative self-conscious emotions, and self-regulatory efficacy and doping intentions in an international sample of MMA athletes, with an emphasis on moderation and mediation effects. We also examined whether MMA athletes with different doping experiences also differed in doping-related self-conscious emotions, self-regulatory efficacy, social norms and doping intentions. A cross-sectional survey-based design was used, and structured anonymous online questionnaires were completed by 249 MMA athletes from 16 countries. Three groups of users were identified based on self-reported doping use: never users, never user contemplators, and ever users. One-way ANOVA showed that athletes with differed doping experiences gave significantly different scores in social norms, self-conscious emotions, self-regulatory efficacy, and doping intentions. Hierarchical regression analysis showed that doping intentions were significantly associated with perceiving greater social approval of doping among referent others (injunctive norms), anticipating less negative self-conscious emotions from doping, and with lower levels of self-regulatory efficacy, after controlling for the effect of past doping use. Moderated regression analysis showed that self-conscious emotions did not interact with social norms in predicting doping intentions. Regression-based mediation analysis further showed that self-regulatory efficacy significantly mediated the association of injunctive norms and self-conscious emotions with doping intentions. Our findings highlight the role of social norms and self-conscious emotions in the decision-making process underlying doping in MMA athletes. The practical implications of our findings are discussed within the context of clean sport education and related campaigns to prevent doping in MMA.

ARTICLE HISTORY
Received 27 November 2020
Accepted 25 May 2021

KEYWORDS
Doping; self-conscious emotions; intentions; self-efficacy; MMA

Mixed Martial Arts (MMA) is a full contact sport that integrates many fighting styles including wrestling, Brazilian jiu-jitsu, boxing and muay thai as its main components, and has gained increased popularity over the last two decades (Andreasson & Johansson, 2019). Although initial attempts were made to ban MMA competitions in some countries,
gradual changes in the rules and increased safety provisions for athletes have allowed the sport to develop into one of the world’s fastest growing sport, with millions of spectators across the globe and significant revenues in Ultimate Fighting Championship (UFC) fights – the world’s biggest MMA professional sport organisation based in the USA (Hess, 2007; Sánchez García & Malcolm, 2010). Although the International Mixed Martial Arts Federation (IMMAF) has developed its own anti-doping programme, its acceptance as a signatory to the World Anti-Doping Code is still pending. Also, although many professional MMA organisations operate around the world, only the UFC has implemented a comprehensive anti-doping programme based on the World Anti-Doping Agency’s (WADA) programme, after entering into agreement with the United States Anti-Doping Agency (USADA) in 2015 (USADA, 2015; WADA, 2015). Other MMA organisations have limited or no anti-doping programmes in place, and this presents a challenge for the clean sport outlook of MMA as many reports have identified an increasing number of positive doping cases among MMA athletes (Daum, 2011).

Currently there is scarce research on MMA athletes’ doping use and associated beliefs and attitudes. As it has been established with other sports (Morente-Sánchez & Zabala, 2013), such studies could allow national anti-doping organisations as well as MMA organisations to develop effective, evidence-based anti-doping educational programmes for MMA athletes and practical strategies to efficiently combat doping in MMA. The principle of sport-specific, evidence-based approach for designing education against doping (for both the content development, and delivery) is also endorsed in WADA’s (2021) Guidelines for the International Standard for Education. This approach is of particular importance for MMA athletes internationally, considering that the majority of such athletes do not fall into the scope of any anti-doping programmes and, thus, they receive no accredited anti-doping education at all. The main focus of our study is the association of social norms to doping intentions in MMA athletes, with an emphasis on psychological constructs that may explain this association. Potentially, this can provide the foundation for future, evidence-informed educational interventions against doping use in MMA.

**Social norms & doping behaviour**

Unlike formal laws and regulations that determine acceptable ways of behavioural conduct (e.g., doping use is punishable act that bears legal sanctions), social norms are subject to people’s subjective interpretations of their social milieus. Social interaction, media exposure, and vicarious learning can shape people’s understanding of what is normal or expected in a given context or situation (Chung & Rimal, 2016; Lapinski & Rimal, 2005). By this token, social norms represent an individual’s subjective interpretation of other people’s behavioural choices (e.g., how many athletes I think are using doping substances), and their attitude towards the said behaviour (e.g., how socially acceptable is doping use in my social milieu or in the society in general). The distinction between the perceived prevalence of a given behaviour in a referent social group (descriptive norms), and the perceived social approval of that behaviour by referent others (injunctive norms) has been described in the Focus Theory of Normative Conduct (Cialdini et al., 1990), and the Theory of Normative Social Behaviour (Rimal & Real, 2005), although the same concepts have been also integrated in attitude-behaviour and other social cognitive theories, such as the Theories of Reasoned Action and Planned Behaviour (Ajzen & Fishbein, 2000),
and the Attitudes-Social Influence-Efficacy (ASE) model (Vries & Mudde, 1998). Although each theory has utilised different methodological approaches to empirically examine the effects of each type of norm on intentions and behaviour, a large body of evidence indicates that descriptive and injunctive norms can have a differential effect on decision-making. Specifically, injunctive norms bear a moral dimension of expected social sanction from engaging in transgressive or norm-incongruent behaviour, and this moral impetus is not necessarily present in descriptive social norms (Chung & Rimal, 2016). Importantly, different psychological constructs can explain how each type of social norms influences intentions and actual behaviours (Chung & Rimal, 2016; Cialdini & Goldstein, 2004; Schultz et al., 2007).

The study of social norms in the context of doping behaviour is important for the following reasons. Firstly, social norms around doping have been largely studied as secondary sources of influence on intentions and behaviour, within the context of broader attitude-behaviour theories, such as the theory of planned behaviour (TPB; Ajzen, 1991) or variants of this model (for a meta-analysis see Ntoumanis et al., 2014). As such, social norms and associated normative processes have rarely been the primary focus of psychological research on doping use. Relatedly, the few studies that have examined social norms and doping have provided mixed findings. Lazuras et al. (2010) found that injunctive, but not descriptive, social norms were associated with doping intentions in elite athletes when temptation to dope was controlled for. Another study with American adolescent athletes showed that both descriptive and injunctive social norms were associated with intentions to use anabolic steroids (Woolf et al., 2014). However, another study reported that although the bivariate associations between injunctive and descriptive social norms and doping intentions were significant, social norms were not associated with intentions in a multivariate model (Barkoukis, Lazuras, Tsorbatzoudis, & Rodafinos, 2013). In order to be able to appreciate the value of social norms in decision-making processes underlying doping use, and to subsequently inform sport-specific preventive interventions, it is important to further examine which types of norms are associated with doping intentions in specific sports, such as MMA. Thirdly, social norms can exert direct or indirect influence on behaviours (Chung & Rimal, 2016). A better understanding of normative influences on doping use, therefore, requires that empirical research addresses the psychological factors that may explain (e.g., moderate or mediate) the association between social norms, intentions, and actual behaviour. To this end, the present study specifically focused on the roles of self-conscious emotions and self-regulatory efficacy.

**Self-conscious emotions & social norms**

Self-conscious emotions, such as shame, guilt, and embarrassment, are deeply rooted in social interactions and experienced when people’s behaviour defies perceived social norms (e.g., moral transgressions), and can motivate reparatory action to restore social harmony – to illustrate, shame and guilt may motivate people to regulate their future behaviour so that they avoid transgressing social and moral norms and risk social exclusion (Giner-Sorolla & Espinosa, 2011; Sznyer, 2019; Tangney et al., 2007). Research on doping has shown that feelings of regret, guilt, and shame are inversely associated with doping intentions and self-reported doping use (Boardley et al., 2017; Kavussanu & Ring, 2017; Lazuras et al., 2015). A single study with adolescent athletes further
highlighted the role of social norms in the experience of self-conscious emotions in doping. Specifically, doping intentions were more strongly associated with social norms when anticipated regret from getting caught doping was low (Lazuras et al., 2017). However, to the best of the authors’ knowledge, no study has so far examined the role of a broader array of negative self-conscious emotions, such as shame, guilt, and embarrassment, on the association between social norms and doping intentions. Therefore, it is unclear whether the moderation effect observed by Lazuras et al. (2017) can be extended to other negative self-conscious emotions, or if it is specific only to anticipated regret. There is also no study on the association of self-conscious emotions, social norms, and doping intentions in MMA athletes.

**Self-regulatory efficacy & social norms**

Self-regulatory efficacy represents one’s confidence to self-regulate his/her action and fulfil desirable goal states (e.g., avoid using prohibited performance enhancing drugs [PEDs]) in the face of countering social norms, emotional states, and situational barriers (Bandura, 2001). To the extent that normative pressures imply moral transgressions, such as doping, then self-regulatory efficacy can help individual athletes preserve clean sport and fair play by choosing to stay clean and avoid doping use (Lucidi et al., 2008; Mallia et al., 2016). Research has shown that higher self-regulatory efficacy is negatively associated with both doping intentions and self-reported behaviour in different sports, thereby representing a protective factor against doping use (Mallia et al., 2016; Ntoumanis et al., 2014). Importantly, self-regulatory efficacy may serve to protect athletes from external pressures to engage in doping use and related pro-doping social norms. This is demonstrated in the use of specific norm-directed items (e.g., “I would be able to resist the temptation to use doping substances even in the case in which all my teammates are using doping substances”) in validated measures of doping-related self-regulatory efficacy (see Mallia et al., 2016). Research has also shown that situational temptation (reflecting the lack of self-regulatory efficacy) was associated with doping intentions, and mediated the effects of social norms on intentions among elite athletes (Lazuras et al., 2010). It is theoretically plausible that self-regulatory efficacy can also explain (mediate) the association between social norms and doping intentions in MMA athletes – a hypothesis that has not been empirically examined as yet.

**The present study**

The present study set out to assess, for the first time in the extant literature, the differential association of descriptive and injunctive social norms with self-reported doping use and future doping intentions in an international sample of MMA athletes. Because this is one of the first quantitative studies on doping in MMA, we also wanted to assess doping prevalence among MMA athletes, and how self-reported doping use differentiated scores in the key variables of interest in the present study. Previous research has shown that athletes who self-reported doping tend to report higher scores in intentionality and social norms, and lower scores in anticipated regret and self-regulatory efficacy (e.g., Barkoukis et al., 2013; Lazuras et al., 2010). By a way of extension, we wanted to replicate those findings in the context of MMA and examine if self-reported doping use
significantly differentiated scores in social norms, self-conscious emotions, self-regulatory efficacy, and doping intentions. A linear trend was hypothesised, with higher doping use corresponding to more pro-doping social norms and intentions, and lower scores in self-conscious emotions and self-regulatory efficacy (Hypothesis 1).

Based on previous research with elite athletes (e.g., Lazuras et al., 2010), it was also hypothesised that MMA athletes’ pro-doping intentions would be positively and significantly associated with higher scores in descriptive social norms, and with pro-doping injunctive norms (Hypothesis 2). Furthermore, in order to further extend previous research on the role of self-conscious emotions on doping intentions, and their relationship with doping-related social norms (e.g., Lazuras et al., 2017) it was hypothesised that higher scores in self-conscious emotions (i.e., shame, guilt, and embarrassment) from getting caught doping would be negatively associated with doping intentions and self-reported behaviour (Hypothesis 3), and that self-conscious emotions would moderate the association between social norms and doping intentions (Hypothesis 4). Lastly, based on previous research (e.g., Lazuras et al., 2010; Mallia et al., 2016) we hypothesised that self-regulatory efficacy will be negatively associated with doping intentions and self-reported doping use (Hypothesis 5), and that it will mediate the associations of self-conscious emotions and social norms with doping intentions (Hypothesis 6).

Methods

Participants

Two-hundred and forty-nine MMA athletes (Median age = 26–30 years; 59.8% males) were recruited using an opportunity sampling approach. MMA athletes from the following countries were recruited: United Kingdom (51.8%, n = 129), the USA (27.7%, n = 69), Iceland (4%, n = 10), Australia (3.2%, n = 8), Canada (2.8%, n = 7), Ireland (2.4%, n = 6), and Thailand (1.6%, n = 4). One MMA athlete completed the questionnaire from each of the following countries: Cyprus, Czech Republic, Denmark, Fiji Islands, Greece, the Netherlands, New Zealand, Oman, and Singapore. The majority (56.2%, n = 140) of the athletes self-identified as professional MMA athletes, 40.2% (n = 100) self-identified as amateur athletes, and nine (3.6%) cases did not declare their competitive level.

Measures

A battery of questions derived from WADA’s Research Package for Anti-Doping Organisations (Donovan et al., 2015) was used to collect data on doping intentions, past doping use, self-conscious emotions, and social cognitive beliefs (i.e., social norms, self-regulatory efficacy). The measures were completed in English. With respect to the psychometric properties of the measures (i.e., validity and reliability), Donovan et al. (2015) argued that all the measures have previously established reliability and at least face validity. Information about the measures reliability is presented below and in Table 1, in terms of internal consistency reliability (i.e., Cronbach’s α). With regards to the validity of the measures used relevant information is presented in the Results section.

Self-reported doping use was assessed with a single item asking participant to indicate which statement best represented their doping experiences. Based on their self-reports,
participants were further classified into never users (never used or considered using doping substances); never user contemplators (never used but considered using doping substances), and ever users (having used/currently using doping substances).

**Doping intentions** and **self-regulatory self-efficacy** were measured by presenting participants with a hypothetical scenario where they were offered a non-detectable doping substance that could enhance their performance at no financial cost. Intentions were assessed with a single item, and self-regulatory self-efficacy was assessed with two items. In particular, using five-point Likert-scales responses, participants were then asked to state how much consideration they would give to the offer (**doping intention**; 1 = none at all, 5 = a lot of consideration), how confident they were that they would refuse the offer (**self-regulatory efficacy**; 1 = very confident could refuse, 5 = wouldn’t want to refuse), and how confident they were in being able to resist pressure from teammates (**self-regulatory efficacy from teammates**; 1 = very confident could refuse, 5 = wouldn’t want to refuse). Mean scores were calculated and higher scores indicated stronger doping intentions, and lower confidence/efficacy to resist doping pressure. The internal consistency reliability coefficient for the self-regulatory self-efficacy measure was acceptable (Cronbach’s α = .77). We did not compute the respective coefficient for doping intentions because a single item was used.

**Self-conscious emotions** were measured with the mean of three items respectively reflecting anticipated shame, embarrassment, and guilt from being caught doping. Responses were recorded on a five-point Likert scale (1 = not at all, 5 = a great extent). A mean score was calculated and higher scores indicated greater negative self-conscious emotions from getting caught doping. The internal consistency reliability coefficient for the self-conscious emotions measure was high (Cronbach’s α = .92).

Finally, participants were asked a series of questions pertaining to **injunctive and descriptive social norms** towards doping in MMA. **Injunctive norms** were measured by asking participants to state whether or not doping was approved by their coaches, parents, teammates/training partners, team doctors, close friends, and trainers; using five-point Likert-scale for each group (1 = definitely approve, 5 = definitely disapprove). The internal consistency reliability coefficient for injunctive norms was high (Cronbach’s α = .81). **Descriptive norms** were measured by asking participants to estimate the following prevalence rates, from 0% to 100% using 10% intervals: MMA athletes using doping

---

**Table 1. Bivariate associations among the study variables.**

|       | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
|-------|----|----|----|----|----|----|----|----|----|
| 1. Intentions | −  | .06| .00| −.01| .55** | .23** | −.53*** | −.39*** | .64*** |
| 2. Age†  | −  | .18* | .20** | .14 | .12 | −.00 | .01 | .09 |
| 3. Gender† | −  | .01 | −.08 | −.11 | .10 | .10 | −.04 |
| 4. Competitive level† | −  | −.10 | .08 | .05 | .04 | −.14 |
| 5. Past doping use (groups)† | −  | .24** | −.53*** | −.46*** | .59*** |
| 6. Descriptive norms | −  | −.37*** | −.14 | .29*** |
| 7. Injunctive norms | −  | .29*** | −.45*** |
| 8. Self-conscious emotions | −  | −.47*** |
| 9. Self-regulatory efficacy | −  | −  |

|       | M  | SD |
|-------|----|----|
| 1. Intentions | 1.77 | 1.04 |
| 2. Age†  | 3.27 | 1.08 |
| 3. Gender† | 1.05 | 0.23 |
| 4. Competitive level† | 1.58 | 0.49 |
| 5. Past doping use (groups)† | 1.42 | 0.61 |
| 6. Descriptive norms | 44.96 | 18.18 |
| 7. Injunctive norms | 4.29 | 0.64 |
| 8. Self-conscious emotions | 4.38 | 1.04 |
| 9. Self-regulatory efficacy | 1.46 | 0.79 |

Cronbach’s α

Notes: *p < .05, **p < .005, ***p < .001; †Point biserial correlations are reported for the nominal variables age, gender, and competitive level, and past doping use.
substances; Elite/Professional MMA athletes in your respective country using doping sub-
stances; Elite/Professional MMA athletes using doping substances within the next two
years; Coaches encouraging athletes to use doping substances; Coaches encouraging
elite/professional MMA athletes to use doping substances. The internal consistency
reliability coefficient for the descriptive norms measure was high (Cronbach’s $\alpha = .92$).

**Design/procedure**

A cross-sectional survey-based design was used. MMA athletes were approached via
social media and asked to complete an online survey about their beliefs, attitudes, and
behaviour regarding doping use in mixed martial arts. Data collection took place online
between March 2018 and September 2019, and the completion of the questionnaire
lasted approximately 30 min. Due to using both direct and indirect recruitment
approaches, it is not possible to calculate the response rate. All ethical considerations
(Harriss et al., 2019) were carefully taken into account and approval from the Cyprus
National Bioethics Committee (EEBK 2018.01.98) was granted before the initiation of
the study. Informed consent was obtained by participants prior to responding to the
Web-based anonymous questionnaire that was used for data collection.

**Statistical analysis**

SPSS v.24 (SPSS Inc., Chicago, IL) was used to analyse the data. Pearson’s chi-square ($\chi^2$)
was used to assess differences in age, gender, and competitive level between user
groups. One-way analysis of variance (ANOVA) was used to assess differences in doping
intentions and social cognitive beliefs between doping use groups. Bootstrapped hier-
archical linear regression analysis was used to assess the multivariate association
between social cognitive beliefs and doping intentions, after controlling for the effects
of age, gender, and past doping use. Moderated regression analysis examined if self-con-
scious interacted with social norms in predicting intentions. Mediation analysis was used
to examine the indirect association between social norms, self-conscious emotions and
doping intentions, via the effects of self-regulatory efficacy. The R-based JAMOVI software
1.8.1 (The Jamovi Project, 2021) was used to examine the factor structure of the measures
used in the study with Confirmatory Factor Analysis (Rios & Wells, 2014).

**Results**

**Psychometric characteristics of the measures used in the study**

The means and standard deviation scores, internal consistency reliability coefficients, and
bivariate correlations among the study’s variables are presented in Table 1. Internal con-
sistency reliability was high for all the multi-item measures (Cronbach’s $\sim .77$ to .92). The
construct validity of the measures was supported because they were significantly corre-
lated with each other in the expected direction. Specifically, intentions were significantly
associated with descriptive and injunctive norms, self-conscious emotions, and self-regu-
latory efficacy ($r_s \sim .23$ to .64). Finally, Confirmatory Factor Analysis with Maximum Like-
lihood Estimation of parameters was used, and verified the factor structure of our
measures. The model fit indices used were based on Hu and Bentler (1999) and were at acceptable levels ($\chi^2 = 209$, df = 105, $p < .001$; CFI = 0.93, SRMR = 0.06, RMSEA = 0.07), and the $\chi^2$/df ratio was ≤ 2, further indicating good fit (Alavi et al., 2020).

Self-reported doping use & demographic variables

“Never users” represented the largest group (64.2%, $n = 115$) of athletes in our sample, followed by “Never user contemplators” (29.1%, $n = 52$) and finally, “ever users” (6.7%, $n = 12$). A further seventy athletes chose not to report their doping use, but Little’s MCAR test indicted a null effect, suggesting that the values were missing completely at random. Analysis of frequencies with Pearson’s chi-square ($\chi^2$) indicated no significant differences ($p > .05$) emerged in self-reported doping use between age and gender groups. Also, although more amateur MMA athletes (11.3%, $n = 8$) were classified as ever users than professionals (3.7%, $n = 4$) this effect was non-significant ($p > .05$).

Between group differences in doping intentions and related variables

One-way ANOVA indicated that statistically significant differences emerged between doping use groups in all the variables.\(^1\) Effect sizes (Cohen’s $f$) ranged from moderate to large, and are summarised in Table 2. Post-hoc analysis (Bonferroni) indicated that the observed differences were significant across groups following a linear trend. Ever users reported significantly different scores, indicating stronger pro-doping intentions and beliefs, in all the variables, as compared to never user contemplators and never users. Never user contemplators differed significantly from never users in all variables, except in descriptive social norms. The mean and standard deviation scores between user groups are presented in Table 2.

Multivariate associations between social norms, self-conscious emotions, and doping intentions

A hierarchical regression model was developed to assess the direct effects of background variables, self-reported doping use, social norms, self-conscious emotions, and self-regulatory efficacy on doping intentions. The analysis was completed in three steps with demographic variables and past doping use being included in Step 1, social norms and self-conscious emotions added in Step 2, and self-regulatory efficacy added in Step

### Table 2. Differences in doping intentions and related variables between doping user groups.

|                      | Never users | Never user contemplators | Ever users | $F$     | Cohen’s $f$ |
|----------------------|-------------|--------------------------|------------|---------|-------------|
|                      | $M$ | SD | $M$ | SD | $M$ | SD |       |         |           |
| Doping intentions    | 1.37 | 0.75 | 2.36 | 1.02 | 3.16 | 1.19 | 38.75*** | 0.65    |
| Self-conscious emotions | 4.69 | 0.70 | 4.05 | 1.22 | 2.91 | 1.29 | 24.22*** | 0.52    |
| Self-regulatory efficacy | 1.20 | 0.36 | 1.69 | 0.65 | 3.12 | 1.58 | 57.21*** | 0.79    |
| Descriptive norms    | 42.31 | 17.48 | 47.41 | 19.12 | 59.00 | 13.03 | 5.43**   | 0.22    |
| Injunctive norms     | 4.52 | 0.50 | 3.99 | 0.63 | 3.43 | 0.67 | 30.17*** | 0.58    |

Notes: *$p \leq .05$, **$p \leq .005$, ***$p \leq .001$. 

INTERNATIONAL JOURNAL OF SPORT AND EXERCISE PSYCHOLOGY 1093
3. Using this sequence allowed us to identify the unique variance added by each set of variables in the equation and whether the adding self-regulatory efficacy at Step 3 attenuated the effects of social norms and self-conscious emotions on doping intentions. The overall model was statistically significant and predicted 50.5% (Adjusted $R^2$) in the variance in doping intentions – a large multivariate effect size ($f^2 = 1.02$). The lowest tolerance level observed was .493, suggesting low multicollinearity among the predictor variables. Standardised beta coefficients ($\beta$) were used to indicate the relative strength of predictor variables, unstandardised beta coefficients ($B$) indicated how much doping intentions would change following a unit change in the predictor variable, and 95% Confidence Intervals (CIs) were used to indicate the range of true values for $B$.

At the first step of the analysis, only past doping use ($\beta = 614, p < .001$) was significantly associated with future doping intentions. At the second step of the analysis, adding social norms and self-conscious emotions significantly increased variance in intentions by 8.4% ($F$ change $= 7.51, p < .001$). Past doping use retained its significant effect, but its relative strength was reduced, and stronger doping intentions were associated with injunctive (i.e., perceived approval of doping by referent others), but not descriptive, social norms, and with self-conscious emotions. Adding self-regulatory efficacy at Step 3 significantly increased variance in intentions by 8.9%, and turned the effect of self-conscious emotions non-significant. The effects of injunctive social norms and past doping use were retained. The findings from the regression analysis are summarised in Table 3.

**Interaction between social norms and self-conscious emotions**

Two moderated regression models were examined to respectively assess if self-conscious emotions interacted with injunctive or descriptive social norms in predicting doping intentions.

### Table 3. Multivariate associations between social norms, self-conscious emotions, and doping intentions.

|                     | $B$    | 95% CI for $B$ | $\beta$ | Adjusted $R^2$ | $R^2$ |
|---------------------|--------|----------------|---------|----------------|-------|
| **Step 1**          |        |                |         |                |       |
| Competitive level   | .157   | -.131, .444    | .073    | .341           | .358  |
| Gender              | .271   | -.319, .861    | .060    |                |       |
| Age                 | -.054  | -.184, .077    | -.056   |                |       |
| Past doping use     | 1.013  | .795, 1.232    | .614*** |                |       |
| **Step 2**          |        |                |         |                |       |
| Competitive level   | .112   | -.159, .383    | .052    | .415           | .442  |
| Gender              | .370   | -.188, .928    | .082    |                |       |
| Age                 | -.021  | -.145, .103    | -.022   |                |       |
| Past doping use     | .608   | .345, .872     | .369*** |                |       |
| Injunctive norms    | -.469  | -.706, -.231   | -.294***|                |       |
| Descriptive norms   | .001   | -.007, .008    | .010    |                |       |
| Self-conscious emotions | -.165 | -.298, -.031   | -.170*  |                |       |
| **Step 3**          |        |                |         |                |       |
| Competitive level   | .195   | -.055, .446    | .090    | .505           | .530  |
| Gender              | .310   | -.203, .823    | .069    |                |       |
| Age                 | -.035  | -.149, .079    | -.036   |                |       |
| Past doping use     | .344   | .083, .605     | .208*   |                |       |
| Injunctive norms    | -.387  | -.607, -.166   | -.243***|                |       |
| Descriptive norms   | -.002  | -.009, .005    | -.040   |                |       |
| Self-conscious emotions | -.073 | -.200, .055    | -.075   |                |       |
| Self-regulatory efficacy | .520  | .328, .711     | .409*** |                |       |

Notes: *$p \leq .05$, **$p \leq .005$, ***$p \leq .001$. 

M. PETROU ET AL.
intentions. The predictor variables were mean-centred to reduce multicollinearity effects, and an interaction term (self-conscious emotions × social norms) was computed for each model. The results showed that self-conscious emotions did not significantly interact ($p > .05$) with either descriptive or injunctive social norms in predicting doping intentions.

**Indirect association of social norms and self-conscious emotions on doping intentions, via self-regulatory self-efficacy**

The INDIRECT Macro for SPSS (Preacher & Hayes, 2008) was used to perform the mediation analysis. Bootstrapping with 1000 resamples and bias-corrected and accelerated confidence intervals (BCAs) were used. The size of the observed mediation effects was indicated by the Sobel test ($z$). Two mediation models were examined. The first model (Model 1) examined if refusal self-regulatory efficacy mediated the association between injunctive norms and doping intentions. The second model (Model 2) examined if refusal self-regulatory efficacy mediated the association between self-conscious emotions and doping intentions. The results showed that self-regulatory efficacy mediated the associations between injunctive norms and intentions ($z = -5.23, p < .001$; Figure 1); and between self-conscious emotions and intentions ($z = -5.48, p < .001$; Figure 2).

**Discussion**

The present study examined, for the first time, the multivariate association between social norms, negative self-conscious emotions (i.e., anticipated guilt, shame, and embarrassment), and self-regulatory efficacy and doping intentions in an international sample of

![Diagram](image-url)

**Figure 1.** Total and indirect associations between injunctive social norms and doping intentions. Notes: The total ($c$) and the indirect effect ($c'$) of injunctive social norms on doping intentions are shown; Unstandardised path coefficients are presented, with standard errors in brackets; *$p \leq .05$, **$p \leq .005$, ***$p \leq .001$. 

INTERNATIONAL JOURNAL OF SPORT AND EXERCISE PSYCHOLOGY 1095
MMA athletes, with an emphasis on moderation and mediation effects. We also examined whether MMA athletes with different doping experiences reported stronger pro-doping intentions and social norms, and lower scores in self-conscious emotions and self-regulatory efficacy.

In support of the first hypothesis of the study, significant differences in social norms, self-conscious emotions, self-regulatory efficacy, and doping intentions were observed between athletes with different doping experiences. Specifically, a linear trend was evident with MMA athletes who self-reported lifetime doping use (ever users), scoring significantly higher doping intentions and pro-doping social norms, and lower scores in self-conscious emotions and self-regulatory efficacy, than MMA athletes who thought about doping but did not use it (never user contemplators) and never users. These findings are in line with previous research on the effects of doping use on social cognitive beliefs towards doping among elite competitive athletes (Barkoukis et al., 2013; Lazuras et al., 2010) and suggest that past or current doping choices have a significant effect on how athletes perceive doping in their social milieu (i.e., in terms of prevalence and social acceptance among referent groups), how motivated they are to continue use PEDs in the future, and how they regulate anticipated emotional experiences and resistance efforts.

With respect to the second and third hypotheses of our study, the results showed that injunctive (but not descriptive) social norms, self-conscious emotions, and self-regulatory efficacy were significantly associated with doping intentions, over and above the effects of past doping use, and in the expected direction. Our findings indicate that different types of social norms are differentially associated with doping intentions and behaviour. Specifically, perceived social approval by referent others (e.g., coach, teammates/training
partners, doctor, close friends, parents) plays a more important role in shaping pro-doping decision-making, as compared to descriptive social norms, which reflect the perceived prevalence of doping in different groups. This is in line with the research about the unique predictive effect of injunctive (but not descriptive) social norms on doping intentions (Lazuras et al., 2010; Ntoumanis et al., 2014), but contradicts previous research where null effects were observed for both types of social norms in a multivariate model, when other predictors were controlled for (Barkoukis et al., 2013).

A possible explanation of our findings may relate to the distinctive properties of each type of social norms. Specifically, descriptive norms are said to be “morally neutral” because they simply convey information about the prevalence of a given behaviour in a given context, without necessarily implying whether the behaviour in question is morally questionable (Chung & Rimal, 2016; Cialdini & Goldstein, 2004). On the other hand, injunctive social norms reflect referent group values and expectations, imply moral judgment and associated social sanctions, and people conform to injunctive social norms out of a need to preserve group harmony (Chung & Rimal, 2016). Compared to descriptive norms, injunctive norms tend to predict behaviour across situations (Chung & Rimal, 2016; Cialdini, 2007; Cialdini & Goldstein, 2004). Based on these arguments, it is theoretically plausible that MMA athletes’ intentions to use doping may be driven by the need to maintain harmony among their referent groups, especially among those who perceive doping use as socially accepted and endorsed by fellow athletes. Future research may further examine the moderating effect of group harmony on the association between injunctive norms and intentions.

The fourth hypothesis of our study was not supported because self-conscious emotions did not significantly moderate the association between social norms and doping intentions. This finding contradicts previous research where anticipated-regret interacted with social norms in predicting doping intentions in competitive adolescent athletes (Lazuras et al., 2017). A possible explanation is that such a moderation effect is specific to anticipated regret and does not relate to other aggregated measures of negative self-conscious emotions, such as embarrassment, shame, and guilt. Indeed, anticipated regret appears to have unique effects on decision-making processes (Sandberg & Conner, 2008; Zeelenberg, 1999). Nevertheless, our results showed that MMA athletes who anticipate less guilt, shame, and embarrassment if they were caught doping reported stronger doping intentions. Previous research has shown that negative self-conscious emotions, such as regret and guilt, are significantly associated with both doping intentions and behaviour (Boardley et al., 2017; Lazuras et al., 2017). Self-regulatory processes, such as moral disengagement, have also been found to attenuate the effect of guilt in the context of moral transgressions (Bandura et al., 1996). In doping research, athletes who find ways to morally justify and excuse their pro-doping beliefs and choices, also tend to experience (or expect) less guilt from doping (Boardley et al., 2017; Ring & Hurst, 2019; Tangney et al., 2007). Future research on MMA athletes may further extend the present findings by examining whether moral disengagement moderate the effects of anticipated negative self-conscious emotions (i.e., guilt, shame, and embarrassment) on doping intentions.

Lastly, the fifth hypothesis of the study was supported as self-regulatory efficacy mediated the effects of both injunctive social norms and self-conscious emotions on doping intentions. These findings further extend the mediation effect observed by
Lazuras et al. (2010) whereby situational temptation (i.e., feeling unable to resist doping temptations) mediated the associations between injunctive norms and doping intentions in elite athletes. In the present study the focus of the measure was in regulating one’s responses and being able to resist (instead of give into) temptations to dope. Furthermore, self-regulatory efficacy in the present study also mediated the association between self-conscious emotions and doping intentions. Similar findings have been reported in other non-sport domains where self-efficacy mediated the appeal of guilt or shame-oriented messages on behavioural intentions (Pounders et al., 2018). Previous research on coping orientations has also described how self-conscious emotions, such as shame and guilt are associated with self-regulatory efficacy (Covert et al., 2003; Folkman & Lazarus, 1984). However, this is the first study to highlight the mediating role of regulatory self-efficacy on the association between self-conscious emotions and doping intentions in MMA athletes.

Our study is not free of limitations. Firstly, the cross-sectional design used limits our ability to draw causal inferences among the study variables. Secondly, the overrepresentation of athletes from Anglo-Saxon countries (mostly UK and the USA) limits the generalizability of our findings to MMA athletes in other countries. Thirdly, our study used self-reports of doping behaviour, and our results can be susceptible to reporting bias – notably, 28% of the participants did not complete the self-reported doping use measure. Nevertheless, the anonymity of the questionnaires used and the framing of our question’s willingness to dope (vs. intentions) are likely to reduce reporting bias (Gucciardi et al., 2010). Notwithstanding those limitations, the present study was the first one to address doping behaviour and related social cognitive processes in an international sample of MMA athletes – a population that is largely underrepresented in the doping literature, despite high-profile doping scandals. Moreover, this is the first study to assess the differential association of descriptive and injunctive social norms with intentions, self-conscious emotions and regulatory self-efficacy in the context of doping use.

The practical implications of our findings are the following. MMA athletes who express more favourable beliefs and intentions to dope are more likely to be at risk for doping use, if they have not engaged already with doping. Therefore, relevant social cognitive measures may serve as proxy measures of doping risk. Also, the ways social approval and related norms towards doping are communicated within referent groups (e.g., coaches, teammates/training partners, doctors) should be revisited, because injunctive social norms that are misperceived or misrepresented as more permissive towards doping may increase individual risk for doping use among MMA athletes. Sports psychology practitioners should be in place to identify misperceived or misrepresented social norms in MMA athletes, and accordingly actively try to change them by providing appropriate normative messages. Lastly, sport medicine professionals may also target self-regulatory efficacy (i.e., educating athletes on how to effectively resist doping pressures) as this variable appears to significantly mediate the effects of both injunctive social norms and self-conscious emotions on doping intentions.

Our study shows that MMA athletes who perceive more permissive social norms towards doping among referent groups, and expect less negative emotions from doping use can be at higher risk for doping. Also, perceived social approval (injunctive norms) was more influential than the perceived prevalence (descriptive norms) of doping in referent groups. Self-regulatory efficacy can play a protective role by mediating
the effects of social norms and self-conscious emotions on doping intentions. Future
effort to reduce doping risk in MMA athletes should target both injunctive norms and
the development of refusal/resistance efficacy skills.

Notes
1. The same pattern of results was observed when we used non-parametric (Mann-Whitney)
tests, but we have decided to report the parametric test findings in the analysis and in
Table 2. The Mann-Whitney results are available for readers upon request.

Disclosure statement
No potential conflict of interest was reported by the author(s).

Funding
This study was supported by the Cyprus Anti-Doping Authority (CyADA).

Data availability statement
The data that support the findings of his study are available from the corresponding author upon
reasonable request.

ORCID
Michael Petrou http://orcid.org/0000-0002-6379-1220
Lambros Lazuras http://orcid.org/0000-0002-5075-9029
Dara Mojtahedi http://orcid.org/0000-0002-3709-9871

References
Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision
Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T
Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and auto-
matic processes. European Review of Social Psychology, 11(1), 1–33. https://doi.org/10.1080/
14792779943000116
Alavi, M., Visentin, D. C., Thapa, D. K., Hunt, G. E., Watson, R., & Cleary, M. (2020). Chi-square for model
fit in confirmatory factor analysis. Journal of Advanced Nursing, 76(9), 2209–2211. https://doi.org/
10.1111/jan.14399
Andreasson, J., & Johansson, T. (2019). Negotiating violence: Mixed martial arts as a spectacle and
sport. Sport in Society, 22(7), 1183–1197. https://doi.org/10.1080/17430437.2018.1505868
Bandura, A. (2001). Social cognitive theory: An agentic perspective. Annual Review of Psychology, 52
(1), 1–26. https://doi.org/10.1146/annurev.psych.52.1.1
Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (1996). Mechanisms of moral disengage-
ment in the exercise of moral agency. Journal of Personality and Social Psychology, 71(2), 364–374.
https://doi.org/10.1037/0022-3514.71.2.364
Barkoukis, V., Lazuras, L., Tsorbatzoudis, H., & Rodafinos, A. (2013). Motivational and social cognitive
predictors of doping intentions in elite sports: An integrated approach. Scandinavian Journal of
Medicine & Science in Sports, 23(5), e330–e340.
Boardley, I. D., Smith, A. L., Mills, J. P., Grix, J., & Wynne, C. (2017). Empathic and self-regulatory processes governing doping behavior. *Frontiers in Psychology, 8*, 1495. https://doi.org/10.3389/fpsyg.2017.01495

Chung, A., & Rimal, R. N. (2016). Social norms: A review. *Review of Communication Research, 4*, 1–28. https://doi.org/10.12840/issn.2255-4165.2016.04.01.008

Cialdini, R. B. (2007). Descriptive social norms as underappreciated sources of social control. *Psychometrika, 72*(2), 263–268. https://doi.org/10.1007/s11336-006-1560-6

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology, 55*(1), 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology, 58*(6), 1015–1026. https://doi.org/10.1037/0022-3514.58.6.1015

Covert, M. V., Tangney, J. P., Maddux, J. E., & Heleno, N. M. (2003). Shame-proneness, guilt-proneness, and interpersonal problem solving: A social cognitive analysis. *Journal of Social and Clinical Psychology, 22*(1), 1–12. https://doi.org/10.1521/jscp.22.1.1.22765

Daum, M. R. (2011). Intelligent defence: A call for federal regulation of mixed martial arts. *Harvard Journal of Sports & Entertainment Law, 21* (2), 247–287.

Donovan, R. J., Jalleh, G., & Gucciardi, D. (2015). Social science research package for anti-doping organizations. Accessed October 18, 2020. https://www.wada-ama.org/sites/default/files/resources/files/wada_social_science_research_package_ado.pdf

Folkman, S., & Lazarus, R. S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

Gucciardi, D. F., Jalleh, G., & Donovan, R. J. (2010). Does social desirability influence the relationship between doping attitudes and doping susceptibility in athletes? *Psychology of Sport and Exercise, 11*(6), 479–486. https://doi.org/10.1016/j.psychsport.2010.06.002

Harriss, D. J., MacSween, A., & Atkinson, G. (2019). Ethical standards in sport and exercise science research: 2020 update. *International Journal of Sports Medicine, 40*(13), 813–817. https://doi.org/10.1055/a-1015-3123

Hess, P. (2007). The development of mixed martial arts: From fighting spectacles to state-sanctioned sporting events. *Willamette Sports J*, 4 (1), 1–23.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Kavussanu, M., & Ring, C. (2017). Moral identity predicts doping likelihood via moral disengagement and anticipated guilt. *Journal of Sport and Exercise Psychology, 39*(4), 293–301. https://doi.org/10.1123/jsep.2016-0333

Lapinski, M. K., & Rimal, R. N. (2005). An explication of social norms. *Communication Theory, 15*(2), 127–147. https://doi.org/10.1111/j.1468-2885.2005.tb00329.x

Lazuras, L., Barkoukis, V., Mallia, L., Lucidi, F., & Brand, R. (2017). More than a feeling: The role of anticipated regret in predicting doping intentions in adolescent athletes. *Psychology of Sport and Exercise, 30*, 196–204. https://doi.org/10.1016/j.psychsport.2017.03.003

Lazuras, L., Barkoukis, V., Rodafinos, A., & Tzorbatzoudis, H. (2010). Predictors of doping intentions in elite-level athletes: A social cognition approach. *Journal of Sport and Exercise Psychology, 32*(5), 694–710. https://doi.org/10.1123/jsep.32.5.694

Lazuras, L., Barkoukis, V., & Tzorbatzoudis, H. (2015). Toward an integrative model of doping use: An empirical study with adolescent athletes. *Journal of Sport and Exercise Psychology, 37*(1), 37–50. https://doi.org/10.1123/jsep.2013-0232

Lucidi, F., Zelli, A., Mallia, L., Grano, C., Russo, P. M., & Violani, C. (2008). The social-cognitive mechanisms regulating adolescents’ use of doping substances. *Journal of Sports Sciences, 26*(5), 447–456. https://doi.org/10.1080/02640410701579370

Mallia, L., Lazuras, L., Barkoukis, V., Brand, R., Baumgarten, F., Tzorbatzoudis, H., & Lucidi, F. (2016). Doping use in sport teams: The development and validation of measures of team-based efficacy beliefs and moral disengagement from a cross-national perspective. *Psychology of Sport and Exercise, 25*, 78–88. https://doi.org/10.1016/j.psychsport.2016.04.005
Morente-Sánchez, J., & Zabala, M. (2013). Doping in sport: A review of elite athletes’ attitudes, beliefs, and knowledge. *Sports Medicine, 43*(6), 395–411. https://doi.org/10.1007/s40279-013-0037-x

Ntoumanis, N., Ng, J. Y., Barkoukis, V., & Backhouse, S. (2014). Personal and psychosocial predictors of doping use in physical activity settings: A meta-analysis. *Sports Medicine, 44*(11), 1603–1624. https://doi.org/10.1007/s40279-014-0240-4

Pounders, K., Lee, S., & Royne, M. (2018). The effectiveness of guilt and shame ad appeals in social marketing: The role of regulatory focus. *Journal of Current Issues & Research in Advertising, 39*(1), 37–51. https://doi.org/10.1080/10641734.2017.1372322

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891. https://doi.org/10.3758/BRM.40.3.879

Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. *Communication Research, 32*(3), 389–414. https://doi.org/10.1177/0146197605275385

Rimal, R. N., & Real, K. (2005). How behaviors are influenced by perceived norms: A test of the theory of normative social behavior. *Communication Research, 32*(3), 389–414. https://doi.org/10.1177/0146197605275385

Sandberg, T., & Conner, M. (2008). Anticipated regret as an additional predictor in the theory of planned behaviour: A meta-analysis. *British Journal of Social Psychology, 47*(4), 589–606. https://doi.org/10.1348/014466607X258704

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*(5), 429–434. https://doi.org/10.1111/j.1467-9280.2007.01917.x

Sznycer, D. (2019). Forms and functions of the self-conscious emotions. *Trends in Cognitive Sciences, 23*(2), 143–157. https://doi.org/10.1016/j.tics.2018.11.007

Tangney, J. P., Stuewig, J., & Mashek, D. J. (2007). Moral emotions and moral behavior. *Annual Review of Psychology, 58*(1), 345–372. https://doi.org/10.1146/annurev.psych.56.091103.070145

USADA. (2015). Statement from USADA CEO Travis T. Tygart on UFC anti-doping program. https://ufc.usada.org/statement-from-usada-ceo-travis-t-tygart-on-ufc-anti-doping-program/

Vries, H. D., & Mudde, A. N. (1998). Predicting stage transitions for smoking cessation applying the attitude-social influence-efficacy model. *Psychology and Health, 13*(2), 369–385. https://doi.org/10.1080/08870449808406757

WADA. (2015). WADA commends UFC for enhanced anti-doping programme. https://www.wada-ama.org/en/media/news/2015-06/wada-commends-ufc-for-enhanced-anti-doping-programme

WADA. (2021). 2021 code implementation support program – guidelines for the international standard for education (ISE). https://www.wada-ama.org/sites/default/files/resources/files/guidelinesforeducation_final.pdf

Woolf, J., Rimal, R. N., & Sripath, P. (2014). Understanding the influence of proximal networks on high school athletes’ intentions to use androgenic anabolic steroids. *Journal of Sport Management, 28*(1), 8–20. https://doi.org/10.1123/jsm.2013-0046

Zeelenberg, M. (1999). Anticipated regret, expected feedback and behavioral decision making. *Journal of Behavioral Decision Making, 12*(2), 93–106. https://doi.org/10.1002/(SICI)1099-0771(199906)12:2<93::AID-BDM311>3.0.CO;2-S