

Self-Affirmation and Image/Performance Enhancing Drug Use in Recreational Exercise.

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1 **Self-affirmation and Image/Performance Enhancing Drug Use in Recreational**
2 **Exercise**

3
4 **Abstract**

5 The use of image and performance enhancement drugs (IPEDs) in recreational sport
6 represents an emerging public health and societal problem. The present study
7 investigated whether self-affirmation changed exercisers' intentions to use IPEDs, via
8 the effects of mental construal and message acceptance. Sixty-eight exercisers who
9 self-reported IPEDs use participated in the study and were randomly assigned to
10 either a self-affirmation or a control group. All participants read a health-related
11 message about the consequences of IPEDs and subsequently completed a survey
12 measuring message acceptance, mental construal, doping intentions and IPEDs-
13 related social cognitive variables. There were no significant differences between the
14 self-affirmed and the control groups. Hierarchical linear regression analysis further
15 showed that message acceptance, subjective norms, and situational temptation were
16 significantly associated with intentions to use IPEDs. Our findings raise the
17 possibility that for recreational exercisers IPED's use is seen mostly as a health-
18 related matter than a socio-moral transgression.

19
20 **Keywords:** IPEDs; exercise; recreational sport; self-affirmation; mental construal;
21 message acceptance.

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25 **Self-affirmation and Image/Performance Enhancing Drug Use in Recreational** 26 **Exercise**

27 The use of image and performance enhancement drugs (IPEDs) in recreational
28 sport and exercise settings represents an emerging societal and public health
29 challenge. According to the 2020 UK Anti-Doping report on IPEDs (UKAD, 2020),
30 over a million people in the UK currently use IPEDs, such as anabolic steroids, with
31 young people being more likely to use IPEDs. The use of IPEDs is associated with a
32 wide range of physical and mental health problems (Birzniece, 2015; Nieschlag &
33 Vorona, 2015), with younger users being at greater risk for such problems. Research
34 on IPEDs revealed that users have little awareness of the health risks involved in
35 IPEDs use and that some users may self-experiment with IPEDs to explore their side-
36 effects (Lazuras et al., 2017a; Morente-Sánchez, & Zabala, 2013). At least 20% of
37 gym users and amateur athletes self-reported doping use (Lazuras et al., 2017a).
38 IPEDs use can be initiated as early as 12 years of age (Nicholls et al., 2017). Although
39 past research provides evidence about the psychological constructs that are associated
40 with IPEDs use in both recreational and competitive/elite sport (see Nicholls et al.,
41 2017; Ntoumanis et al., 2014), there is insufficient research to support an evidence-
42 based approach to facilitating behaviour change in this context.

43 Self-affirmation theory (Steele, 1988) presents a relevant framework for
44 enabling behaviour change, especially in the context of health-related behaviours,
45 including substance use (Epton & Harris, 2008; Harris & Epton, 2010). The theory
46 posits that people are vigilant to information that threatens their sense of self-integrity
47 (i.e., perception of the self as morally and adaptively adequate; Cohen & Sherman,
48 2014), which may promote defensive processing of risk messages (e.g., smokers may
49 be defensive against messages depicting the health consequences of smoking). Such

50 defensiveness will reduce the effectiveness of risk communication campaigns and
51 related preventive efforts (Epton et al., 2015; Harris et al., 2007). However, if people
52 are allowed to self-affirm (e.g., by reflecting on their most important values or key
53 strengths), including in a domain unrelated to that targeted by the risk communication,
54 then they may display greater acceptance of the risk message, greater motivation to
55 change their behaviour, and subsequently change their behaviour (Epton et al., 2015;
56 Sweeney & Moyer, 2015). For instance, evidence has shown that self-affirmation is
57 effective in reducing the negative effects of stereotype threat on academic
58 performance (Cohen & Sherman, 2014), improving prospective academic attainment
59 and progression in ethnic minority groups (Goyer et al., 2017), and in enabling health-
60 related behaviour change across different behavioural domains (Epton et al., 2015).
61 Studies have also shown that self-affirmation improves information processing and
62 problem solving capacity under cognitively taxing conditions (Creswell et al., 2007,
63 2013; Harris et al., 2017), and is associated with increased neural activity in the
64 brain's reward areas, such as the ventral striatum (Dutcher et al., 2016, 2020), and in
65 the ventromedial prefrontal cortex (vmPFC), which is associated with processing self-
66 referential information and positively evaluated self-representations (Falk et al.,
67 2015).

68 In the context of IPEDs use, however, only two studies have examined the
69 effects of self-affirmation on behaviour change processes and related psychological
70 constructs, after exposing participants to messages about the health consequences of
71 IPEDs. Specifically, Barkoukis, Lazuras, and Harris (2015a) demonstrated that self-
72 affirmed athletes who self-reported IPEDs use in the past displayed lower scores in
73 situational temptation and in doping intentions, as compared to their non-affirmed
74 counterparts. In another study with exercisers who used nutritional supplements, but

75 did not self-report IPEDs use, self-affirmation changed moral and descriptive norms
76 around IPEDs use, and anticipated regret from using IPEDs, but did not affect
77 intentions to use IPEDs (Barkoukis et al., 2020). Both studies examined the direct
78 effect of self-affirmation on social cognitive variables associated with IPEDs use, but
79 they did not investigate whether the effect of self-affirmation was mediated by other
80 variables, such as message acceptance. Research has shown that one route through
81 which self-affirmation influences intentions and behaviours is by increasing
82 acceptance of the risk message (Armitage et al., 2008; Harris & Epton, 2009; Harris
83 & Napper, 2005; Sherman, & Cohen, 2002; Sherman et al., 2000).

84 In the case of doping, increasing acceptance of health risk messages is highly
85 relevant. According to the 2021 World Anti-doping Code, the health of the athlete
86 represents one of the cornerstones of doping prevention and control efforts. Also,
87 athletes convicted with doping use face sport participation bans and, sometimes
88 followed by severe social and career consequences (Kirby et al., 2011). This has
89 resulted in a stigmatization of doping use that can make athletes and coaches
90 defensive about receiving anti-doping messages (Allen et al., 2017; Backhouse et al.,
91 2016; Barkoukis et al., 2019). Therefore, it is important to investigate whether self-
92 affirmation increases the acceptance of doping-related message, and whether, in turn,
93 message acceptance facilitates the decision to compete clean.

94 In addition, mental construal may also help to explain the effects of self-
95 affirmation on processes related to behaviour change, including changes in attitudes,
96 self-efficacy, beliefs, and intentions. According to Construal Level Theory (CLT;
97 Liberman & Trope, 1998) mental construal reflects a psychological process through
98 which people mentally represent and interpret their environment, either in concrete or
99 abstract terms. Higher-level construals are abstract, and reflect the core, abstract, and

100 commonly shared features of an event, object, or situation, whereas lower-level
101 construals reflect more short distant, concrete, specific, and unique features of events,
102 situations, or objects (Trope & Liberman, 2003, 2010). In short, higher-level construal
103 thinking implies a "big picture" and more distant perspective, whereas lower level,
104 subordinate construal implies a more narrowly focused, short-distance perspective.
105 Given that self-affirmation enhances cognitive processing and executive functions,
106 such as response inhibition and working memory capacity under pressure (e.g.,
107 Creswell et al., 2013), it is possible that self-affirmation activates higher-level,
108 superordinate (vs. lower-level, subordinate) construals. Indeed, Wakslak and Trope
109 (2009) showed that self-affirmed participants displayed a higher level construal of the
110 self (Study 1) and engaged in more abstract thinking and interpretation of different
111 actions unrelated to the self (Studies 2 and 3). Similarly, Schmeichel and Vohs (2009;
112 Studies 3 and 4) demonstrated that self-affirmation led to higher mental construal,
113 which was in turn associated with greater self-regulation.

114 The study of mental construal is relevant to IPEDs use research for the
115 following reasons. IPEDs users tend to display more favourable beliefs towards
116 doping use in the form of more supportive/conducive social norms (Barkoukis et al.,
117 2015b; Dunn et al., 2012; Lentillon-Kaestner & Carstairs, 2010) and more favourable
118 attitudes and outcome expectancies (Barkoukis et al., 2013; Hildebrandt et al., 2012).
119 A possible reason is that perceiving IPEDs use as more normative, popular, and
120 beneficial reflects a self-serving mechanism that can protect and preserve self-
121 integrity and moral adequacy while engaging in a risky behaviour (i.e., IPEDs use). It
122 may also facilitate IPEDs use by reducing any negative psychological aftereffects
123 (e.g., pre- and post-decisional regret). Indeed, low levels of anticipated regret have

124 been associated with IPEDs use in both elite athletes and recreational users, in both
125 adolescent and adult populations (e.g., Barkoukis et al., 2020; Lazuras et al., 2017b).

126 In this respect, it could be argued that IPEDs users engage in motivated
127 reasoning (i.e., are motivated to perceive, mentally represent, and report IPEDs use
128 positively), as a way of reducing cognitive and emotional discomfort that may
129 precede and/or potentially result from their behaviour (Epley & Gilovich, 2016;
130 Kunda, 1990). Different construal levels can have differential outcomes in the
131 processing of self-referential information and may lead to either self-serving
132 tendencies, or to preparation for adaptive change. Supporting this argument, Belding
133 et al. (2015) demonstrated that the activation of lower-level, concrete construals
134 through priming led to more self-protection motivation and dismissal of negative
135 information about the self, whereas activating higher-level, abstract construals led to a
136 greater acceptance of negative self-referential information. It is possible, therefore,
137 that the self-affirmation effects on IPEDs-related decision-making variables (e.g.,
138 anticipated regret, social and moral norms, intentions) that were observed elsewhere
139 (i.e., Barkoukis et al., 2015a; Barkoukis et al., 2020) resulted from the activation of
140 higher-order mental construals that facilitate adaptive processing of health-risk
141 information and motivate adaptive change (i.e., consideration of stopping using or
142 avoiding IPEDs use). No study has empirically examined this assumption as yet.

143 *The Present Study*

144 The present study set out to investigate whether self-affirmation changes
145 social cognitive beliefs and intentions to use IPEDs, and whether mental construal and
146 message acceptance mediate this effect. The social cognitive variables that were focal
147 in the present study derived from previous research and theory in the context of
148 doping use in sport and included attitudes, social norms, self-efficacy, situational

149 temptation, and anticipated regret towards IPEDs use. The integrated model of doping
150 use (Barkoukis et al., 2013; Lazuras et al., 2015) posits that those beliefs can shape
151 intentions to use IPEDs, and accordingly lead to actual doping behaviour. Several
152 studies have provided empirical support for this model by showing that doping
153 intentions and self-reported doping use are associated with stronger doping attitudes,
154 more supportive social norms towards doping, and reduced efficacy to resist doping,
155 and greater temptation to succumb to social pressures to dope (Lazuras et al., 2010;
156 Lazuras et al., 2017). Research evidence also supports a significant association
157 between self-reported doping intentions and use of doping substances (Lucidi et al.,
158 2008; Ntoumanis et al., 2014).

159 Furthermore, previous research on IPEDs use and self-affirmation (Barkoukis
160 et al., 2015a; Barkoukis et al., 2020) has investigated the effect of self-affirmation on
161 self-reporting doping use intentions in competitive athletes and nutritional supplement
162 use intentions in recreational athletes. However, to date there is no evidence
163 concerning the effect of self-affirmation on self-reported IPEDs use and intentions in
164 recreational exercisers. Also, past research on self-affirmation and IPEDs behaviour
165 did not incorporate message acceptance and mental construal as potential explanatory
166 variables for self-affirmation effects on intentions and other decision-making
167 variables. Therefore, in the present study it was hypothesized that self-affirmed
168 participants would report significantly less favourable beliefs (i.e., attitudes, social
169 norms, anticipated regret, situational temptation, and self-efficacy) and intentions to
170 use IPEDs, relative to non-affirmed ones. Furthermore, based on past research on self-
171 affirmation and message acceptance (e.g., Harris & Epton, 2009; Harris & Napper,
172 2005) and mental construal (Sodenberg et al., 2015; Trope & Liberman, 2010; Trope
173 et al., 2007) it was hypothesised that the effects of self-affirmation on intentions to

174 use IPEDs would be mediated by message acceptance, mental construal, and other
175 doping-related social cognitions.

176 **Method**

177 *Participants*

178 Snowball sampling (chain referral) was used to identify recreational exercisers in
179 Greece who admitted past or current IPEDs use. Five fitness instructors were initially
180 asked to assist data collection. All fitness instructors agreed to approach exercisers
181 who they knew from private discussions they were doping and give them the survey.
182 Eligibility criteria included systematic participation in training for the past five years
183 and use of doping substances. Overall, 68 exercisers (53 males) who self-reported
184 IPEDs use participated in the study. An a priori power analysis to define the
185 appropriate sample size of the study was conducted with GPower3.10. Taking into
186 consideration previous research on self affirmation on sport and doping (Barkoukis et
187 al., 2015a, 2020) the effect size was set at $f = 0.40$ using one-way ANOVA with fixed
188 effects, the probability level at $\alpha = 0.05$, and the power at 0.85. A sample size of 60
189 participants (30 in each group) emerged as a sufficient sample providing adequate
190 power.

191 *Measures*

192 *Mental construal:* The psychological distance measure developed by Allard and
193 Griffin (2017) was used to measure the extent to which individuals' mindsets are
194 characterized by psychologically distant or close perspectives. The measure consists
195 of 12 item-pairs. Each pair contains one psychologically close and one
196 psychologically distant item (example pairs are 'Near – Far', 'Friend – Enemy', 'Self
197 – Others' and 'Specific – General'). In each pair, participants select 'the word that

198 best fits my frame of mind right now'. The psychologically close items were scored 0
199 and the psychologically distant items scored 1. A composite score was produced with
200 higher scores indicating a more psychologically distant mindset at the time of
201 completing this measure.

202

203 *Message acceptance:* Acceptance of the health message was measured with eight
204 items based on those used in past research by Harris and Napper (2005). These items
205 measured participants' understanding of the existence of negative side effects of
206 doping use (e.g., 'There is an association between doping use and negative health side
207 effects') and their severity (e.g., How threatening did you find the message about the
208 negative health side effects of doping?). Responses were given on a 7-point bi-polar
209 scale ranging from 1 (*negative pole*) to 7 (*positive pole*). A composite score was
210 produced with higher scores indicating greater message acceptance.

211 The social cognitive measures (i.e., attitudes, norms, self-efficacy, situational
212 temptation, anticipated regret and intentions) were derived from previous studies with
213 Greek athletes (Barkoukis et al., 2015a, 2015b, 2020; Lazuras et al., 2015).

214 *Attitudes:* The stem proposition 'The use of prohibited substances is...' followed by
215 four semantic differential evaluative adjectives (*bad/good; useless/useful;*
216 *right/wrong; detrimental/beneficial*) was used to measure attitudes towards doping
217 use. Responses were given on a seven-point bi-polar scale ranging from 1 (*negative*)
218 to 7 (*positive*).

219 *Subjective norms:* A composite score of three items (e.g., 'most people who are
220 important to me would want me to use prohibited substances to enhance my
221 performance during this season') was used to assess participants' subjective norms.

222 Responses were given on a seven-point scale (1 = *strongly disagree*, 7 = *strongly*

223 *agree*) with higher scores showing more positive normative beliefs towards doping
224 use.

225 *Descriptive norms.* Two open-ended questions estimated participants' descriptive
226 norms. These questions assessed beliefs about the perceived prevalence of doping use
227 in elite and fellow athletes (e.g., 'Out of 100%, how many athletes at the same
228 competitive level to you in Greece do you think engage in doping to enhance their
229 performance?').

230 *Self-efficacy.* Self-efficacy was measured with three items (e.g., 'I feel in complete
231 control over whether I will use prohibited substances to enhance my performance
232 during this season'), with responses given on a seven-point scale (1 = *strongly*
233 *disagree*, 7 = *strongly agree*) and higher scores indicating higher efficacy.

234 *Situational temptation.* Situational temptation was measured with five items following
235 the stem proposition ('How much would you be tempted to use prohibited doping
236 substances to enhance your performance this season' (e.g., when your coach suggests
237 so). Responses were given on a five-point Likert scale (1 = *not at all tempted*, 5 =
238 *very much tempted*) with higher scores indicating more temptation.

239 *Doping use intentions.* A composite score of three items (e.g., 'I intend to use
240 prohibited substances to enhance my performance during this season') was used to
241 measure participants' intentions to use doping substances. Participants responded on a
242 seven-point scale (1 = *definitely not*, 7 = *definitely yes*) with higher scores reflecting
243 higher doping use intentions.

244 *Anticipated regret.* Anticipated regret was assessed with four items following the stem
245 proposition ("If I use prohibited substances to enhance my performance during this
246 season, I will..."). An example item is 'be disappointed with myself'. Responses were

247 recorded on a 7-point Likert scale (1 = *definitely not*, 7 = *definitely yes*) with higher
248 scores reflecting higher regret.

249 **Affirmation manipulation.** The aim of the manipulation was to induce self-
250 affirmation in participants in the intervention group. Participants randomized to the
251 experimental group read the self-affirmation manipulation procedure developed by
252 Reed and Aspinwall (1998). The manipulation consists of 10 questions designed to
253 encourage participants to recall and give examples on past acts of other-directed
254 kindness, such as “Have you ever forgiven another person when they have hurt you?
255 and “Have you ever been considerate of another person’s feelings?” Participants
256 responded using a Yes–No format. Those who responded positively were asked to
257 elaborate further on their experiences by providing more details. Writing about such
258 acts of kindness has been shown to be more effective in increasing message
259 acceptance when compared to control tasks, such as writing about irrelevant issues or
260 not writing at all (e.g., Crocker et al., 2008). Participants randomized to the control
261 condition were given a similar self-reported task and asked to state their opinions on a
262 range of unrelated issues, such as “I think that chocolate is the best flavor ice cream”.
263 Participants responded using a Yes – No format and those responding Yes were asked
264 to elaborate more by providing further details.

265 **Health message.** Following the self-affirmation manipulation participants in both
266 conditions read a health message about IPEDs use. This message was adopted from
267 Barkoukis et al. (2015a). It included a general statement about the side effects of
268 doping use and the relationship between doping use and premature mortality.
269 Subsequently the specific side effects on psychological variables, different bodily
270 systems (e.g., cardiovascular, reproductive, endocrine systems, etc), and the overall
271 longer term health side effects were presented. The description of side effects was

272 based on side-effects identified in the medical literature and was accompanied by
273 relevant research citations to strengthen the message by indicating the scientific basis.
274 The message was approx. 600 words.

275 ***Procedure***

276 The fitness instructors were asked to administer a survey on exercisers using
277 doping substances. The surveys were in envelopes and the fitness instructors were
278 blind to the manipulation; they were assigned numbers and were randomly assigned to
279 control and intervention groups. The fitness instructors were asked to give the
280 envelopes to the exercisers and continuously recruit exercisers until they were
281 informed by the researchers that they collectively reached the critical number of 60
282 participants with complete data. Data collection lasted approximately one year.
283 Exercisers provided consent for participation. The first page of the survey included
284 the informed consent provided by the Research Ethics Committee of the University of
285 Sheffield giving participants information regarding the study's aim, asking them
286 whether they had read and understood the information, informing them that their
287 participation was voluntary and they could withdraw from the study at any time they
288 wished, and that their responses were confidential and would be treated solely for
289 research purposes. In order to proceed with the questionnaire the participants had to
290 sign the consent form. Only gender was recorded as a demographic variable to further
291 ensure the anonymity. The variables were presented to the participants in the
292 following order: self affirmation/control manipulation, mental construal, health
293 message, message acceptance, social cognitive variables.

294 ***Data analysis***

295 SPSS version 25 (IBM Corporation, Armonk, NY) was used to analyse the data.

296 Descriptive statistics (means and standard deviations) were calculated for all variables
297 in the experimental and control groups. The correlations among the variables in the
298 full sample were calculated using Pearson's r . To test for differences between the self-
299 affirmed and non self-affirmed groups a Students' T-test was performed. The effects
300 of self-affirmation on intentions to use IPEDs and the potential mediating role of
301 message acceptance, mental construal, and other doping-related social cognitions was
302 tested via a hierarchical regression analysis. The analysis included four steps; self-
303 affirmation manipulation at Step 1, mental construal at Step 2, message acceptance at
304 Step 3, and social cognitions at Step 4. Statistical significance was set at $p < .05$.
305 Missing values were very few, representing 0.01% of the entire dataset across all
306 measures. Therefore, no further action was taken with respect to replacing missing
307 values using imputation techniques or performing analyses regarding the randomness
308 of missing data.

309 **Results**

310 *Preliminary analyses*

311 Means and standard deviations of the study's variables are presented in Table 1. The
312 analysis of correlation revealed moderate correlations among the study variables
313 (Table 2). The estimation of variance inflation factor ($VIF < 3.04$, tolerance < 1.0)
314 supported that multicollinearity did not affect the analyses (Akinwande et al., 2015).
315 Cronbach alpha exceeded .70 for all subscales (see Table 2) with the exception of
316 mental construal where alpha was lower. Skewness and kurtosis statistics were at
317 acceptable levels for all variables (< 3).

318 *Effect of self-affirmation on IPEDs use intentions and related social cognitive*
319 *variables*

320 The means and standard deviations of the study variables are presented in
321 Table 1. Independent samples t-tests were used to test for differences between the two
322 groups in the studied variables. Levene's test of equality of variances supported the
323 homogeneity of variances in almost all variables, but message acceptance and
324 subjective norms; for these two variables we report the findings based on the unequal
325 variance assumption. The results indicated no significant differences between the
326 experimental and control groups in any of the tested variables (mental construal,
327 message acceptance, attitudes, subjective and descriptive norms, self-efficacy,
328 situational temptation, anticipated regret or intentions), albeit mental construal ($t(65)$
329 $= -1.91, p = .059$) was marginally non-significant. In both cases, participants in the
330 intervention group had higher scores as compared to those in the control condition
331 (Table 1).

332 The correlation analysis indicated moderate-to-high effect sizes in the
333 observed associations among most of the study variables (Table 2), with the exception
334 of mental construal that was not correlated with the study variables. Multiple linear
335 regression analysis was used to assess the predictive effects of self-affirmation
336 manipulation, mental construal, message acceptance and social cognitions (attitudes
337 towards doping, subjective and descriptive norms, self-efficacy, situational
338 temptation, and anticipated regret) on doping intentions. The analysis was completed
339 in four steps in order to assess the unique effects of the self-affirmation manipulation
340 (coded as a dummy 'intervention' variable at Step 1, 0 = control group, 1 =
341 experimental group) in Step 1, mental construal (Step 2), message acceptance (Step
342 3), and social cognitions (Step 4). A significant overall model emerged ($F(9, 55) =$

343 10.71, $p < .001$) predicting 57.7% ($AdjR^2$) of the variance in doping intentions. At
344 Step 1, the effect of the manipulation was not statistically significant. At Step 2, the
345 addition of mental construal did not significantly improve the predicted variance
346 ($R^2change = .10, p = .422$). The addition of message acceptance at Step 3 improved
347 the overall predicted variance by 21.7% with message acceptance emerging as a
348 significant predictor of doping intentions. The addition of social cognitive variables at
349 Step 4 significantly improved the overall predicted variance ($R^2change = .39$). At this
350 step, the effect of message acceptance became non-significant. Significant predictors
351 of doping intentions at this step included subjective norms, and situational temptation.
352 The findings from the regression analysis are summarized in Table 3. Although we
353 hypothesized that the effect of self-affirmation manipulation on intentions to use
354 IPEDs would be indirect, via the effects of message acceptance, mental construal, and
355 IPED-related social cognitive variables, this hypothesis could not be examined
356 because self-affirmation did not have a significant effect on intentions.

357 **Discussion**

358
359 The present study examined the effects of self-affirmation on intentions to use
360 IPEDs and related social cognitive beliefs, such as attitudes, social norms, anticipated
361 regret, and self-efficacy. Intentions represent a proximal antecedent of volitional
362 behaviour, such as IPEDs use, and the social cognitive beliefs that were focal in the
363 present study have been associated with doping use in previous research (Ajzen,
364 2020; Barkoukis et al., 2013; Lazuras et al., 2017; Ntoumanis et al., 2014). To better
365 understand doping decision-making processes it is important to understand the
366 correlates of doping behaviour and intentions, and how these can be altered by
367 psychological interventions, such as self-affirmation. Previous research has shown
368 that self-affirmation interventions can lead to significant changes in message

369 acceptance, intentions, and actual behaviour change (Epton et al., 2015), and self-
370 affirmation induced differences in doping-related social cognitions have also been
371 reported (Barkoukis et al., 2015; Barkoukis et al., 2020).

372 However, contrary to the hypotheses, the self-affirmation manipulation in the
373 present study did not have a significant effect on intentions to use IPEDs and related
374 social cognitive beliefs in exercisers with IPEDs use history. Mental construal was
375 also unrelated to intentions to use IPEDs. Furthermore, in examining the multivariate
376 associations between the self-affirmation manipulation, mental construal and message
377 acceptance, and the social cognitive beliefs related to IPEDs use, only subjective
378 norms, and situational temptation were significantly associated with intentions to use
379 IPEDs, over and above the effects of other correlates.

380 The present findings are similar to previous research showing no effect of self-
381 affirmation manipulation on intentions to use nutritional supplements among
382 exercisers (Barkoukis et al., 2020). However, they are inconsistent with evidence
383 suggesting a significant effect on intentions towards IPEDs in athletes who had
384 admitted doping use (Barkoukis et al., 2015a). Also, the present findings contrast with
385 previous evidence showing significant effect of self-affirmation in improving message
386 acceptance and enabling health-related behaviour change (Cohen & Sherman, 2014;
387 Cornil, & Chandon, 2013; Epton et al., 2015; Sweeney & Moyer, 2015).

388 A possible explanation for the present study findings may lie in the conditions
389 under which the self-affirmation manipulation was implemented. For self-affirmation
390 to be effective, Ferrer and Cohen (2019) have argued three conditions should be met,
391 namely presence of a psychological threat, opportunities to change behaviour and
392 timeliness of the self-affirmation with the threat and opportunities. Our study did not
393 meet all these conditions. In particular, it may be that the intervention was not always

394 or even typically timely with the threat. That is, we asked IPEDs-user exercisers to
395 complete a survey about their IPEDs use beliefs, but survey completion and exposure
396 to the self-affirmation manipulation and the IPEDs-related health message were not
397 timely with their use of IPEDs: some exercisers might have completed the
398 manipulation while on an IPEDs cycle, whereas others completed the study before or
399 after their IPEDS use cycle. Thus, the timeliness of the manipulation with respect to
400 the threat (i.e., doping use) may have been low. Accordingly, we did not provide
401 relevant opportunities for behaviour change, which is another condition for self-
402 affirmation success (Ferrer & Cohen, 2019), mainly because the focus of the study
403 was to determine short-term effects of self-affirmation on behavioural intentions and
404 associated social cognitive beliefs, rather than to test for changes in IPEDs use.

405 In line with the above, another explanation for the null effects of self-
406 affirmation on the study's variables might lie in the sample of the study. In this study,
407 recreational athletes self-reporting IPEDs use participated whereas competitive
408 athletes confessing doping took part in the Barkoukis et al. (2015a) study. Past
409 evidence suggested the reasons for using IPEDs in exercise settings (e.g., appearance
410 enhancement, self-experimentation; Lazuras et al., 2017a) may differ from those in
411 competitive sport (e.g., performance enhancement, career transition; Overbye et al.,
412 2013). Also, in recreational sports doping is not as effectively regulated as it is in
413 competitive sports and may not be considered as an unethical behaviour (i.e., no
414 unfair advantage in competition is gained). Thus, recreational athletes may not feel
415 sufficiently ethically threatened by the IPEDs use to be influenced by the self-
416 affirmation manipulation.

417 Likewise, mental construal was not influenced by the self-affirmation
418 manipulation and was not associated with social cognition about IPEDs use. The

419 effects of doping use on health are evident in the long term and it is possible that the
420 athletes had developed an optimistically-biased belief about the effect of doping use
421 on their health. In this case, a concrete construal focusing on the near future that was
422 employed in the present study asking participants to declare their intentions to use
423 doping substances in the upcoming season may not be appropriate to describe the
424 decision-making process. A long-term perspective of health and developing a higher-
425 level construal might be more effective in predicting cognition and behaviour. This is
426 consistent with the findings of Eyal et al. (2004, 2009) and Sagristano et al. (2002)
427 showing that higher-level construals may more accurately predict intentions for
428 behaviours in the distant future. Nevertheless, more evidence is needed to identify the
429 role of mental construal in understanding doping behaviours and its potential to assist
430 in anti-doping education.

431 Furthermore, intentions to use IPEDs in the present study were predicted by
432 normative factors, such as the perceived social approval of IPEDs use by referent
433 others and the temptation to succumb to normative pressures to use IPEDs. This
434 highlights the role of social norms and normative pressures in IPEDs use in
435 recreational exercise settings. Past research has also shown that social norms may
436 determine the ways exercisers draw information about substance and usage safety
437 (e.g., reusing needles for injectable steroids; Kimergård, 2015; Santos & Coomber,
438 2017). Taking these factors into consideration, our findings suggest that efforts to
439 prevent IPEDs use in recreational sport settings may benefit from targeting social
440 norms in referent groups. Recent research has shown that a combination of normative
441 information and self-affirmation can lead to stronger behaviour change intentions and
442 actual behaviour change two weeks post-intervention (Rosas et al., 2017).

443 The limitations of our study should be considered. Firstly, selection bias is a
444 potential limitation as our participants may represent a group of steroid users who are
445 willing to admit their doping use to others. In this case participants may not have been
446 defensive talking about doping, and thus, even if the manipulation induced self -
447 affirmation, it did not exert any influence on the dependent variables. Although
448 selection bias is not uncommon in behaviour change intervention studies (Freijy &
449 Kothe, 2013; Tarquinio et al., 2015), this is something to be addressed in future
450 research examining the effects of self-affirmation effects on IPEDs use. In addition,
451 our sample consisted of a population difficult to reach, i.e., doping users. Therefore,
452 due to the sensitive nature of the survey we avoided asking demographic questions
453 (e.g., age, gender, type and amount of physical activity, type and amount of
454 substances used) that could potentially make them believe that their identity could be
455 disclosed. This was a necessary step in recruiting a very hard to reach sample and
456 making it as representative of users as possible. However, it prevented us from
457 obtaining information about participants' demographics, as well as the frequency and
458 "heaviness" of doping use. Although all participants had a lifetime experience with
459 doping use, their current doping behaviour was not measured, either in terms of
460 engagement in the behaviour or level of involvement (i.e., systematic vs occasional;
461 heavy vs light use). It is therefore possible that the current doping behaviour may
462 have distorted the data with respect to mental construal and message acceptance. In
463 addition, the periodization of the training and frequency of doping cycles were not
464 taken into account during the study. That is, it cannot be estimated whether an athlete
465 completed the manipulation while being in a doping cycle, before that cycle or after.
466 Also, although the sample size was adequate in terms of power and the participants
467 represented a population that is difficult to reach, the study sample was rather small

468 and this might have influenced the results of the analysis. Therefore, future studies
469 would benefit from larger samples, and given that this may be difficult, a greater
470 control of potential sources of error variance such as the frequency and ‘heaviness’ of
471 doping use and attention to the timeliness of the self-affirmation with respect to the
472 doping cycles. Lastly, the mental construal measure demonstrated relative low
473 internal consistency and findings pertaining to mental construal should be interpreted
474 with caution.

475 Notwithstanding those limitations, the present study is among the first to
476 investigate the role of self-affirmation on intentions to use IPEDs among recreational
477 exercisers who admitted past or current IPEDs use, and advances previous research in
478 this area (Barkoukis et al., 2015a; Barkoukis et al., 2020). In particular, it tests a
479 sample of doping users, a population difficult to reach, for self-affirmation effects and
480 examines both direct and indirect effects, via mental construal, of self-affirmation on
481 behaviour change factors, such as message acceptance and intentions (Epton et al.,
482 2015). This study focused on recreational sport, which is a rather underrepresented
483 context in the study of IPED’s use. However, IPED’s use is evident across all levels
484 and types of sport (Nicholls et al., 2017). So far, research has largely focused on
485 competitive sport but clearly IPED’s use exist in recreational sport too (Lazuras et al.,
486 2017) and more research in this context is warranted. Our study indicated that IPED’s
487 use intentions were influenced by the acceptance of a health message but not in this
488 study by self-affirmation. This finding raises the possibility that for recreational
489 exercisers IPED’s use is not considered as a moral/ethical issue but as a health one. If
490 so, preventive interventions should place emphasis on the health hazards of IPED’s
491 use, rather than the values of sport participation. This possibility warrants further
492 research.

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693 **Table 1: Means and Standard Deviations of the Study's Variables**

	Experimental group		Control group	
	(n = 31)		(n = 37)	
	M	SD	M	SD
Distance	4.51	2.04	3.86	2.52
Message acceptance	5.00	1.63	5.47	1.17
Attitudes	4.64	1.70	5.04	1.48
Self-efficacy	5.65	1.35	5.69	1.28
Subjective norms	2.17	1.49	1.67	.86
Descriptive norm	51.76	20.80	47.20	20.41
Situational temptation	2.69	1.17	2.55	1.09
Anticipated regret	3.13	2.07	3.54	2.07
Intentions	3.21	2.41	2.59	2.18

694 **Note:** Higher scores in attitudes, situational temptation, norms and intentions reflect
695 more positive beliefs towards doping, whereas higher scores in anticipated regret
696 show more negative affect towards doping use.

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702 Table 2: *Correlation Coefficients Among and Internal Consistency of the Study's*
703 *Variables*

	1	2	3	4	5	6	7	8	9
1. Mental construal		-.18	.04	-.06	.10	.15	-.01	.03	.22
2. Message acceptance			-.58**	-.18	-.77**	-.07	-.47**	.56**	-.52**
3. Attitudes				-.15	-.58**	-.04	-.63**	.38*	-.51**
4. Self-efficacy					.21	.25*	.34**	-.32**	.17
5. Subjective norms						.16	.40**	-.52**	.57**
6. Descriptive norm							.20	-.23	.16
7. Situational temptation								-.48**	.70**
8. Anticipated regret									-.51**
9. Intentions									
Cronbach α	.62	.88	.79	.75	.86	.71	.85	.95	.98

704 *Note.* * = $p < .05$, ** = $p < .01$.

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708 Table 3: *Effect of self-affirmation on the decision-making process*

Step	Predictors	β	p	Adj R^2	F
1				.003	1.18
	Intervention	.13	.280		
2				.003	.91
	Intervention	.11	.366		
	Mental construal	.10	.422		
3				.20	6.61*
	Intervention	.03	.784		
	Mental construal	.09	.417		
	Message acceptance	-.47*	.000		
4				.57	10.71*
	Intervention	.03	.660		
	Mental construal	.10	.212		
	Message acceptance	.15	.273		
	Attitudes	.09	.470		
	Self-efficacy	-.13	.163		
	Subjective norms	.43*	.004		
	Descriptive norms	-.04	.628		
	Situational temptation	.59*	.000		
	Anticipated regret	-.20	.069		

709 Note: * < .001