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

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Abstract

25 The use of image and performance enhancement drugs (IPEDs) in recreational sport
26 represents an emerging public health and societal problem. The present study
27 investigated whether self-affirmation changed exercisers' intentions to use IPEDs, via
28 the effects of mental construal and message acceptance. Sixty-eight exercisers who
29 self-reported IPEDs use participated in the study and were randomly assigned to
30 either a self-affirmation or a control group. All participants read a health-related
31 message about the consequences of IPEDs and subsequently completed a survey
32 measuring message acceptance, mental construal, doping intentions and IPEDs-
33 related social cognitive variables. There were no significant differences between the
34 self-affirmed and the control groups. Hierarchical linear regression analysis further
35 showed that message acceptance, subjective norms, and situational temptation were
36 significantly associated with intentions to use IPEDs. Our findings raise the
37 possibility that for recreational exercisers IPED's use is seen mostly as a health-
38 related matter than a socio-moral transgression.

39

40 **Keywords:** IPEDs; exercise; recreational sport; self-affirmation; mental construal;
41 message acceptance.

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44

45 **Self-affirmation and Image/Performance Enhancing Drug Use in Recreational**
46 **Exercise**

47 The use of image and performance enhancement drugs (IPEDs) in recreational
48 sport and exercise settings represents an emerging societal and public health
49 challenge. According to the 2020 UK Anti-Doping report on IPEDs (UKAD, 2020),
50 over a million people in the UK currently use IPEDs, such as anabolic steroids, with
51 young people being more likely to use IPEDs. The use of IPEDs is associated with a
52 wide range of physical and mental health problems (Birzniece, 2015; Nieschlag &
53 Vorona, 2015), with younger users being at greater risk for such problems. Research
54 on IPEDs revealed that users have little awareness of the health risks involved in
55 IPEDs use and that some users may self-experiment with IPEDs to explore their side-
56 effects (Lazuras et al., 2017a; Morente-Sánchez, & Zabala, 2013). At least 20% of
57 gym users and amateur athletes self-reported doping use (Lazuras et al., 2017a).
58 IPEDs use can be initiated as early as 12 years of age (Nicholls et al., 2017). Although
59 past research provides evidence about the psychological constructs that are associated
60 with IPEDs use in both recreational and competitive/elite sport (see Nicholls et al.,
61 2017; Ntoumanis et al., 2014), there is insufficient research to support an evidence-
62 based approach to facilitating behaviour change in this context.

63 Self-affirmation theory (Steele, 1988) presents a relevant framework for
64 enabling behaviour change, especially in the context of health-related behaviours,
65 including substance use (Epton & Harris, 2008; Harris & Epton, 2010). The theory
66 posits that people are vigilant to information that threatens their sense of self-integrity
67 (i.e., perception of the self as morally and adaptively adequate; Cohen & Sherman,
68 2014), which may promote defensive processing of risk messages (e.g., smokers may
69 be defensive against messages depicting the health consequences of smoking). Such

70 defensiveness will reduce the effectiveness of risk communication campaigns and
71 related preventive efforts (Epton et al., 2015; Harris et al., 2007). However, if people
72 are allowed to self-affirm (e.g., by reflecting on their most important values or key
73 strengths), including in a domain unrelated to that targeted by the risk communication,
74 then they may display greater acceptance of the risk message, greater motivation to
75 change their behaviour, and subsequently change their behaviour (Epton et al., 2015;
76 Sweeney & Moyer, 2015). For instance, evidence has shown that self-affirmation is
77 effective in reducing the negative effects of stereotype threat on academic
78 performance (Cohen & Sherman, 2014), improving prospective academic attainment
79 and progression in ethnic minority groups (Goyer et al., 2017), and in enabling health-
80 related behaviour change across different behavioural domains (Epton et al., 2015).
81 Studies have also shown that self-affirmation improves information processing and
82 problem solving capacity under cognitively taxing conditions (Creswell et al., 2007,
83 2013; Harris et al., 2017), and is associated with increased neural activity in the
84 brain's reward areas, such as the ventral striatum (Dutcher et al., 2016, 2020), and in
85 the ventromedial prefrontal cortex (vmPFC), which is associated with processing self-
86 referential information and positively evaluated self-representations (Falk et al.,
87 2015).

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

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

104 In the case of doping, increasing acceptance of health risk messages is highly
105 relevant. According to the 2021 World Anti-doping Code, the health of the athlete
106 represents one of the cornerstones of doping prevention and control efforts. Also,
107 athletes convicted with doping use face sport participation bans and, sometimes
108 followed by severe social and career consequences (Kirby et al., 2011). This has
109 resulted in a stigmatization of doping use that can make athletes and coaches
110 defensive about receiving anti-doping messages (Allen et al., 2017; Backhouse et al.,
111 2016; Barkoukis et al., 2019). Therefore, it is important to investigate whether self-
112 affirmation increases the acceptance of doping-related message, and whether, in turn,
113 message acceptance facilitates the decision to compete clean.

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

120 commonly shared features of an event, object, or situation, whereas lower-level
121 construals reflect more short distant, concrete, specific, and unique features of events,
122 situations, or objects (Trope & Liberman, 2003, 2010). In short, higher-level construal
123 thinking implies a "big picture" and more distant perspective, whereas lower level,
124 subordinate construal implies a more narrowly focused, short-distance perspective.
125 Given that self-affirmation enhances cognitive processing and executive functions,
126 such as response inhibition and working memory capacity under pressure (e.g.,
127 Creswell et al., 2013), it is possible that self-affirmation activates higher-level,
128 superordinate (vs. lower-level, subordinate) construals. Indeed, Wakslak and Trope
129 (2009) showed that self-affirmed participants displayed a higher level construal of the
130 self (Study 1) and engaged in more abstract thinking and interpretation of different
131 actions unrelated to the self (Studies 2 and 3). Similarly, Schmeichel and Vohs (2009;
132 Studies 3 and 4) demonstrated that self-affirmation led to higher mental construal,
133 which was in turn associated with greater self-regulation.

134 The study of mental construal is relevant to IPEDs use research for the
135 following reasons. IPEDs users tend to display more favourable beliefs towards
136 doping use in the form of more supportive/conducive social norms (Barkoukis et al.,
137 2015b; Dunn et al., 2012; Lentillon-Kaestner & Carstairs, 2010) and more favourable
138 attitudes and outcome expectancies (Barkoukis et al., 2013; Hildebrandt et al., 2012).
139 A possible reason is that perceiving IPEDs use as more normative, popular, and
140 beneficial reflects a self-serving mechanism that can protect and preserve self-
141 integrity and moral adequacy while engaging in a risky behaviour (i.e., IPEDs use). It
142 may also facilitate IPEDs use by reducing any negative psychological aftereffects
143 (e.g., pre- and post-decisional regret). Indeed, low levels of anticipated regret have

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

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

163 *The Present Study*

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

169 temptation, and anticipated regret towards IPEDs use. The integrated model of doping
170 use (Barkoukis et al., 2013; Lazuras et al., 2015) posits that those beliefs can shape
171 intentions to use IPEDs, and accordingly lead to actual doping behaviour. Several
172 studies have provided empirical support for this model by showing that doping
173 intentions and self-reported doping use are associated with stronger doping attitudes,
174 more supportive social norms towards doping, and reduced efficacy to resist doping,
175 and greater temptation to succumb to social pressures to dope (Lazuras et al., 2010;
176 Lazuras et al., 2017). Research evidence also supports a significant association
177 between self-reported doping intentions and use of doping substances (Lucidi et al.,
178 2008; Ntoumanis et al., 2014).

179 Furthermore, previous research on IPEDs use and self-affirmation (Barkoukis
180 et al., 2015a; Barkoukis et al., 2020) has investigated the effect of self-affirmation on
181 self-reporting doping use intentions in competitive athletes and nutritional supplement
182 use intentions in recreational athletes. However, to date there is no evidence
183 concerning the effect of self-affirmation on self-reported IPEDs use and intentions in
184 recreational exercisers. Also, past research on self-affirmation and IPEDs behaviour
185 did not incorporate message acceptance and mental construal as potential explanatory
186 variables for self-affirmation effects on intentions and other decision-making
187 variables. Therefore, in the present study it was hypothesized that self-affirmed
188 participants would report significantly less favourable beliefs (i.e., attitudes, social
189 norms, anticipated regret, situational temptation, and self-efficacy) and intentions to
190 use IPEDs, relative to non-affirmed ones. Furthermore, based on past research on self-
191 affirmation and message acceptance (e.g., Harris & Epton, 2009; Harris & Napper,
192 2005) and mental construal (Sodenberg et al., 2015; Trope & Liberman, 2010; Trope
193 et al., 2007) it was hypothesised that the effects of self-affirmation on intentions to

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

196 **Method**

197 *Participants*

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

211 *Measures*

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

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

222

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

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

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

239 *Subjective norms:* A composite score of three items (e.g., 'most people who are
240 important to me would want me to use prohibited substances to enhance my
241 performance during this season') was used to assess participants' subjective norms.
242 Responses were given on a seven-point scale (1 = *strongly disagree*, 7 = *strongly*

243 *agree*) with higher scores showing more positive normative beliefs towards doping
244 use.

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

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

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

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

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

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

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

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

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

295 *Procedure*

296 The fitness instructors were asked to administer a survey on exercisers using
297 doping substances. The surveys were in envelopes and the fitness instructors were
298 blind to the manipulation; they were assigned numbers and were randomly assigned to
299 control and intervention groups. The fitness instructors were asked to give the
300 envelopes to the exercisers and continuously recruit exercisers until they were
301 informed by the researchers that they collectively reached the critical number of 60
302 participants with complete data. Data collection lasted approximately one year.
303 Exercisers provided consent for participation. The first page of the survey included
304 the informed consent provided by the Research Ethics Committee of the University of
305 Sheffield giving participants information regarding the study's aim, asking them
306 whether they had read and understood the information, informing them that their
307 participation was voluntary and they could withdraw from the study at any time they
308 wished, and that their responses were confidential and would be treated solely for
309 research purposes. In order to proceed with the questionnaire the participants had to
310 sign the consent form. Only gender was recorded as a demographic variable to further
311 ensure the anonymity. The variables were presented to the participants in the
312 following order: self affirmation/control manipulation, mental construal, health
313 message, message acceptance, social cognitive variables.

314 *Data analysis*

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

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

329 **Results**

330 *Preliminary analyses*

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

338 *Effect of self-affirmation on IPEDs use intentions and related social cognitive*
339 *variables*

340 The means and standard deviations of the study variables are presented in
341 Table 1. Independent samples t-tests were used to test for differences between the two
342 groups in the studied variables. Levene's test of equality of variances supported the
343 homogeneity of variances in almost all variables, but message acceptance and
344 subjective norms; for these two variables we report the findings based on the unequal
345 variance assumption. The results indicated no significant differences between the
346 experimental and control groups in any of the tested variables (mental construal,
347 message acceptance, attitudes, subjective and descriptive norms, self-efficacy,
348 situational temptation, anticipated regret or intentions), albeit mental construal ($t(65)$
349 $= -1.91, p = .059$) was marginally non-significant. In both cases, participants in the
350 intervention group had higher scores as compared to those in the control condition
351 (Table 1).

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

363 10.71, $p < .001$) predicting 57.7% ($AdjR^2$) of the variance in doping intentions. At
364 Step 1, the effect of the manipulation was not statistically significant. At Step 2, the
365 addition of mental construal did not significantly improve the predicted variance
366 ($R^2change = .10$, $p = .422$). The addition of message acceptance at Step 3 improved
367 the overall predicted variance by 21.7% with message acceptance emerging as a
368 significant predictor of doping intentions. The addition of social cognitive variables at
369 Step 4 significantly improved the overall predicted variance ($R^2change = .39$). At this
370 step, the effect of message acceptance became non-significant. Significant predictors
371 of doping intentions at this step included subjective norms, and situational temptation.
372 The findings from the regression analysis are summarized in Table 3. Although we
373 hypothesized that the effect of self-affirmation manipulation on intentions to use
374 IPEDs would be indirect, via the effects of message acceptance, mental construal, and
375 IPED-related social cognitive variables, this hypothesis could not be examined
376 because self-affirmation did not have a significant effect on intentions.

377 Discussion

378
379 The present study examined the effects of self-affirmation on intentions to use
380 IPEDs and related social cognitive beliefs, such as attitudes, social norms, anticipated
381 regret, and self-efficacy. Intentions represent a proximal antecedent of volitional
382 behaviour, such as IPEDs use, and the social cognitive beliefs that were focal in the
383 present study have been associated with doping use in previous research (Ajzen,
384 2020; Barkoukis et al., 2013; Lazuras et al., 2017; Ntoumanis et al., 2014). To better
385 understand doping decision-making processes it is important to understand the
386 correlates of doping behaviour and intentions, and how these can be altered by
387 psychological interventions, such as self-affirmation. Previous research has shown
388 that self-affirmation interventions can lead to significant changes in message

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

392 However, contrary to the hypotheses, the self-affirmation manipulation in the
393 present study did not have a significant effect on intentions to use IPEDs and related
394 social cognitive beliefs in exercisers with IPEDs use history. Mental construal was
395 also unrelated to intentions to use IPEDs. Furthermore, in examining the multivariate
396 associations between the self-affirmation manipulation, mental construal and message
397 acceptance, and the social cognitive beliefs related to IPEDs use, only subjective
398 norms, and situational temptation were significantly associated with intentions to use
399 IPEDs, over and above the effects of other correlates.

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

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

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

425 In line with the above, another explanation for the null effects of self-
426 affirmation on the study's variables might lie in the sample of the study. In this study,
427 recreational athletes self-reporting IPEDs use participated whereas competitive
428 athletes confessing doping took part in the Barkoukis et al. (2015a) study. Past
429 evidence suggested the reasons for using IPEDs in exercise settings (e.g., appearance
430 enhancement, self-experimentation; Lazuras et al., 2017a) may differ from those in
431 competitive sport (e.g., performance enhancement, career transition; Overbye et al.,
432 2013). Also, in recreational sports doping is not as effectively regulated as it is in
433 competitive sports and may not be considered as an unethical behaviour (i.e., no
434 unfair advantage in competition is gained). Thus, recreational athletes may not feel
435 sufficiently ethically threatened by the IPEDs use to be influenced by the self-
436 affirmation manipulation.

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

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

451 Furthermore, intentions to use IPEDs in the present study were predicted by
452 normative factors, such as the perceived social approval of IPEDs use by referent
453 others and the temptation to succumb to normative pressures to use IPEDs. This
454 highlights the role of social norms and normative pressures in IPEDs use in
455 recreational exercise settings. Past research has also shown that social norms may
456 determine the ways exercisers draw information about substance and usage safety
457 (e.g., reusing needles for injectable steroids; Kimergård, 2015; Santos & Coomber,
458 2017). Taking these factors into consideration, our findings suggest that efforts to
459 prevent IPEDs use in recreational sport settings may benefit from targeting social
460 norms in referent groups. Recent research has shown that a combination of normative
461 information and self-affirmation can lead to stronger behaviour change intentions and
462 actual behaviour change two weeks post-intervention (Rosas et al., 2017).

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

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

495 Notwithstanding those limitations, the present study is among the first to
496 investigate the role of self-affirmation on intentions to use IPEDs among recreational
497 exercisers who admitted past or current IPEDs use, and advances previous research in
498 this area (Barkoukis et al., 2015a; Barkoukis et al., 2020). In particular, it tests a
499 sample of doping users, a population difficult to reach, for self-affirmation effects and
500 examines both direct and indirect effects, via mental construal, of self-affirmation on
501 behaviour change factors, such as message acceptance and intentions (Epton et al.,
502 2015). This study focused on recreational sport, which is a rather underrepresented
503 context in the study of IPED’s use. However, IPED’s use is evident across all levels
504 and types of sport (Nicholls et al., 2017). So far, research has largely focused on
505 competitive sport but clearly IPED’s use exist in recreational sport too (Lazuras et al.,
506 2017) and more research in this context is warranted. Our study indicated that IPED’s
507 use intentions were influenced by the acceptance of a health message but not in this
508 study by self-affirmation. This finding raises the possibility that for recreational
509 exercisers IPED’s use is not considered as a moral/ethical issue but as a health one. If
510 so, preventive interventions should place emphasis on the health hazards of IPED’s
511 use, rather than the values of sport participation. This possibility warrants further
512 research.

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713 *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

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

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722 Table 2: *Correlation Coefficients Among and Internal Consistency of the Study's*
723 *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

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

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728 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		

729 Note: * < .001