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# The Key Psychological Beliefs Underlying Student Participation in Recreational Sport

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## **The key psychological beliefs underlying student participation in recreational sport**

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**Abstract**

The first year of university study provides an ideal opportunity to target student participation in many health behaviors, such as recreational sport. The study used the Theory of Planned Behavior to identify the key behavioral, normative and control beliefs underlying student participation in recreational sport. A cross-sectional design was used with a four-week follow-up. A purposive sample of 206 participants responded to a theoretically informed questionnaire measuring baseline cognitions. Follow-up behavior was measured using self-report questionnaires. All beliefs correlated with intention and seven beliefs correlated with behavior. Four key beliefs predicted intention (“Enjoyable”; “Time consuming”; “Friends”; and “Family members”) and two key beliefs predicted behavior (“Enjoyable” and “Time consuming”). Interventions successfully targeting these specific beliefs may lead to a greater number of students participating in recreational sport.

**Keywords:** sports participation; Theory of Planned Behavior; intervention targets; motivation

32 **Introduction**

33 The university setting is an ideal opportunity to promote sport given the number of students  
 34 enrolled in higher education. Research has demonstrated there to be many benefits afforded  
 35 to those students participating in sport and recreational activities throughout their time in  
 36 university (Forrester, 2015; Webb & Forrester, 2015). These benefits include greater rates of  
 37 student learning (Haines, 2001), grade attainment (Huesman, Brown, Lee, Kellogg, &  
 38 Radcliffe, 2009) and retention (Kampf & Teske, 2013). These activities have also been  
 39 shown to promote campus community (Elkins, Forrester, & Noël-Elkins, 2011), enhance  
 40 student life (Byl, 2002), increase social cohesion (Miller, 2011), and help students cope with  
 41 academic stresses (Iso-Ahola, 1989; Kanters, 2000).

42 Of particular relevance are first-year students transitioning to university who are  
 43 adjusting to new environments and taking on greater responsibility for the first time (Arnett,  
 44 2000; Goldstein, Xie, Hawkins, & Hughes, 2015). The transition from familiar and controlled  
 45 environments to those that are more unstable means students face considerable challenges to  
 46 participate in health-related behaviors and adopt healthy lifestyles (Crozier, Gierc, Locke, &  
 47 Brawley, 2015). In the absence of parental guidance, first-year students could be tempted to  
 48 undertake many unhealthy behaviors such as excessive alcohol consumption, high fat food  
 49 intake, and smoking. For example, it has been shown that rates of binge drinking increase  
 50 when students begin university (Cameron et al., 2015) and weight gain is greatest during the  
 51 university transitioning year (Vella-Zarb & Elgar, 2010; Wengreen & Moncur, 2009).

52 Additionally, the university setting is one that promotes sedentary behavior with students  
 53 spending a considerable time in a seated position using the computer and internet (Buckworth  
 54 & Nigg, 2004; Fotheringham, Wonnacott, & Owen, 2000). Paradoxically, as first-year  
 55 students are still developing their behavioral patterns during the transitioning year, this period  
 56 of instability offers a teachable moment to develop interventions to influence the types of

57 health behaviors undertaken (Allom, Mullan, Cowie, & Hamilton, 2016; Stewart-Brown et  
58 al., 2000). Universities are therefore well placed to target health improvements through sport  
59 (Hensley, 2000; Kwan, Bray, & Martin Ginis, 2009; Leslie, Sparling, & Owen, 2001).

60         The provision of sport within universities can occur in many ways. In the United  
61 Kingdom, the most common type of sports provision are formal inter-university  
62 competitions. Sharing similarities with the regulated National Collegiate Athletic Association  
63 sports offered in the United States, these competitions provide students the opportunity to  
64 represent their university whilst competing against other institutions. However, only a limited  
65 number of students can participate in this provision of sport (Kanters, Bocarro, Edwards,  
66 Casper, & Floyd, 2013) and students may be unwilling to commit a considerable time to  
67 participation, particularly as match days can require a full afternoon and these sports have  
68 scheduled training requirements (Lower, Turner, & Petersen, 2013). Additionally, there may  
69 be cost attached to participation and the social activities associated with these teams may not  
70 appeal to all students (Vasold, Deere, & Pivarnik, 2019). To address some of these issues,  
71 universities also offer additional intramural and informal sports. These recreational sports are  
72 typically undertaken on the university campus and organized by sports instructors employed  
73 by the university.

74         In the United Kingdom, Sport England developed the Youth and Community Strategy  
75 (Sport England, 2012) to increase the number of students participating in recreational sport at  
76 least once per week for 30 minutes. To achieve this, two large projects were funded. The first  
77 project, the Active Universities (2011-2014), funded a total of 41 projects within 49  
78 universities (the same project was used in some cases). Baseline measures of 55 universities  
79 (some of whom did not receive funding) showed that 55% of students participated in any  
80 form of sport at least once per week for 30 minutes. Following the interventions, results  
81 showed a 2% increase in participation across the three years, with 160,018 new students

82 participating in sport. However, this increase was only demonstrated during the first year  
 83 (2011-2012), with no increase seen during the remaining two years (2012-2014) (Sport  
 84 England, 2014). The second project, the University Sport Activation Fund, provided funding  
 85 to 62 universities. Results showed 54% of students participated in university provided sport  
 86 during the first year (2014/15) and 55% during the second year (2015/16). Thus, only a 1%  
 87 increase was observed in the number of students participating in university provided sport.

88         It is clear that despite providing opportunities to participate in sporting activities,  
 89 merely offering sport does not translate to actual participation (Hashim, 2012). Given the  
 90 significant investment into the Sport England projects and the marginal increase in  
 91 recreational sports participation, there is a clear need for more targeted research to be  
 92 undertaken into promoting the behavior. The lack of change within the interventions could be  
 93 attributed to the lack of behavior change theories in their design. Indeed, interventions based  
 94 on theory have shown greater utility than those lacking a theoretical underpinning (Taylor,  
 95 Conner, & Lawton, 2012).

96 ***The Theory of Planned Behavior***

97 One of the most widely used psychological behavior change theories is the Theory of Planned  
 98 Behavior (TPB; Ajzen, 1985). As a parsimonious theory, the TPB includes four predictor  
 99 variables; intention, attitude, subjective norm, and perceived behavioral control. Intention is  
 100 the proximal determinant of behavior and represents the decision to exert effort to perform  
 101 the behavior (Ajzen & Fishbein, 1980). Intention is determined by attitude, subjective norm,  
 102 and perceived behavioral control. Attitude refers to the individual's perceptions toward the  
 103 behavior, whether that be positive or negative evaluations. Subjective norm concerns the  
 104 social pressure from significant others and perceived behavioral control refers to the  
 105 difficulty in undertaking the behavior. These three constructs are underpinned by behavioral,  
 106 normative, and control beliefs, respectively. Behavioral beliefs are the perceived

107 consequences of engaging in behavior, and people’s evaluation of these consequences (Ajzen  
 108 & Fishbein, 1980). For example, an individual may believe that participating in recreational  
 109 sport would provide health benefits and that being healthy is important. Normative beliefs are  
 110 the perceived expectations of important referents and a person’s motivation to comply with  
 111 the wishes of these important others (Ajzen, 1985). For example, family members may  
 112 support sports participation and the opinion of family members may matter to the individual.  
 113 Control beliefs are people’s evaluation about the presence of factors that may facilitate or  
 114 impede performance of the behavior (Ajzen & Madden, 1986). For example, participating in  
 115 sport could come at a considerable cost or require a significant amount of time.

116 According to the TPB, behavior is governed specifically by the salient behavioral,  
 117 normative, and control beliefs (Ajzen, 2002). Such beliefs vary given the behavior of interest.  
 118 For example, the beliefs underlying a person’s participation in sport are likely to differ from  
 119 the beliefs underlying their participation in physical activity. Similarly, the same person’s  
 120 decision to participate in recreational sport is likely to be governed by different beliefs to that  
 121 of participating in competitive sport. One of the major strengths of the TPB is its explicit  
 122 guidance on identifying important psychological processes for intervention development  
 123 (Fishbein & Ajzen, 2010). More specifically, the authors suggest a belief elicitation study  
 124 should be undertaken to identify the many salient beliefs underlying the behavior. Following  
 125 this, a main quantitative study is conducted to identify the specific beliefs governing the  
 126 behavior. As a consequence of this formative work, a behavioral intervention can be  
 127 developed to attend to the identified key beliefs.

128 [Figure 1 near here]

129 A large number of cross-sectional studies have been conducted assessing the  
 130 predictive validity of the model (Downs & Hausenblas, 2005). Reviews have found the



131 constructs to explain between 40%–45% of the variance in intentions (Armitage & Conner,  
 132 2001; Hagger, Chatzisarantis, & Biddle, 2002; McEachan, Conner, Taylor, & Lawton, 2011)  
 133 and 25%–36% of the variance in behavior (Armitage & Conner, 2001; Hagger et al., 2002).  
 134 Though useful, the information gained from predictive studies is insufficient for intervention  
 135 development because the relevant underlying beliefs are not revealed. For example, if attitude  
 136 is found to be an influential determinant of intention, information about the relevant  
 137 underlying beliefs is needed to enable an intervention to specifically manipulate the  
 138 foundations of attitude. Without this, interventions are based on logic rather than theory. It is  
 139 therefore crucial that the specific key beliefs are identified.

140         Given the importance of identifying relevant beliefs and the vast number of studies  
 141 adopting the TPB, it is surprising that only a relatively small number have identified the key  
 142 beliefs of their respective behaviors. Nevertheless, the key beliefs underlying health  
 143 behaviors including food consumption (Spinks & Hamilton, 2015; Vayro & Hamilton, 2016),  
 144 sun protection (Hamilton et al., 2012), and physical activity (Cowie & Hamilton, 2014; Epton  
 145 et al., 2015; Rhodes et al., 2014) have been identified. For example, after undertaking an  
 146 elicitation study, Epton et al. (2015) and Cowie and Hamilton (2014) identified the key  
 147 beliefs underpinning physical activity in students transferring to university. The key  
 148 behavioral, normative, and control beliefs identified by Epton et al. (2015) included “health,”  
 149 “stress relief,” “family,” “friends,” “cost” and “facility access.” Cowie and Hamilton (2014)  
 150 found beliefs including “make me fitter,” “take up too much time,” and “cost” as critical  
 151 beliefs. These beliefs were then identified as key intervention targets.

152         Although some beliefs identified within the physical activity literature may share  
 153 similarities with recreational sport, as previously mentioned, it could be that sports  
 154 participation is underpinned by distinct beliefs. For example, Kilpatrick, Hebert, and  
 155 Bartholomew (2005) found affective beliefs, such as enjoyment, related more to sport than

156 physical activity. Thus, to develop an intervention targeting appropriate modifiable  
 157 psychological processes pertaining to recreational sport, it is important that the critical beliefs  
 158 underlying participation in the behavior are identified. As far as the authors are aware, no  
 159 study has identified the beliefs important for student participation in university recreational  
 160 sport.

161 ***The current study***

162 Given the need to promote student participation in recreational sport (Forrester, 2015) and the  
 163 utility of using health psychological theory in intervention development (Taylor et al., 2012),  
 164 the purpose of the study was to identify key intervention targets using TPB guidelines. As no  
 165 study has identified belief-based targets applicable to university recreational sport, the study  
 166 follows from a previous elicitation study (Author citation 1) to identify the key beliefs  
 167 underlying the behavior. This provides important information for the development of an  
 168 intervention targeting the number of university students participating in recreational sport.

169 **Methods**

170 ***Participants***

171 The study was conducted at a small sized University in the United Kingdom which has a  
 172 large number of students from low socio-economic backgrounds (Higher Education Review,  
 173 2015). In line with prior suggestions concerning sample size (e.g. Francis et al., 2004), at  
 174 least 80 participants were required to be recruited. Thus, contact was made with a number of  
 175 lecturers within different disciplines (e.g. Sport, Media, Psychology) to purposively recruit a  
 176 diverse sample of first year undergraduate students. These subject areas were also used within  
 177 the elicitation study, albeit from a different cohort. This sampling strategy resulted in a total  
 178 of 206 participants (age  $M = 19.04$  years,  $SD = 2.35$ , Male  $n = 88$ , Female  $n = 118$ ) providing  
 179 consent and completing the questionnaire at baseline (T0).

180 ***Design and procedure***

181 A cross-sectional design was used with a four-week follow-up. Once a convenient time was  
 182 arranged with lecturers for data collection, participants were approached at the end of classes  
 183 and asked to read the information sheet outlining the study purpose. Those agreeing to  
 184 participate read and signed the informed consent form. A behavioral definition was provided  
 185 within the questionnaire and stated verbally by the lead author. The lead author also  
 186 reinforced the definition of ‘recreational university sport’ and some examples of the  
 187 recreational sports offered at the university were given (e.g. Give it a go badminton).  
 188 Questionnaires were conducted in silence and lasted roughly fifteen minutes to complete.  
 189 Once complete, questionnaires were collected and the lead author reminded participants that  
 190 they would be asked to respond to the follow-up behavior questionnaire four weeks later at  
 191 time one (T1). Once the behavioral questionnaire was returned, participants were thanked for  
 192 their participation and provided a debrief sheet. Pseudo codes were used to match T0 and T1  
 193 questionnaires. The study received full ethical approval from the university ethics board.

194 ***Measures***

195 At T0, measures were taken of the previously identified salient beliefs and intention. Due to  
 196 utility and measurement concerns regarding the value component (French & Haskins, 2003;  
 197 Gagne & Godin, 2000), items measuring beliefs included the expectancy arm only rather than  
 198 a multiplicative approach. Behavioral beliefs were presented as statements and participants  
 199 rated how strongly they agreed with each statement (e.g. For me, participating in sport would  
 200 enable me to meet new friends, Strongly disagree-Strongly agree). Normative beliefs  
 201 comprised of injunctive and descriptive aspects and participants were again asked whether  
 202 they agreed with the statements (e.g. My friends think that I should participate in sport at  
 203 university, Strongly disagree-Strongly agree). To measure control beliefs, participants were  
 204 asked to identify whether certain factors would influence the likelihood of them carrying out  
 205 the behavior (e.g. How much would a lack of time make you more or less likely to participate

206 in sport at university, Less likely-More likely). Intention was measured using three items (e.g.  
 207 I intend to participate in sport at university, Strongly agree-Strongly disagree, Cronbach's  $\alpha =$   
 208 .96). The mean of each item representing intention were summed and averaged to give an  
 209 overall score. All items were assessed using 7-point Likert scales which varied in direction.  
 210 Participants also provided demographic characteristics of age, gender and program of study.

211 Four weeks later at T1, behavior was measured using three items. Two items used 7-  
 212 point Likert scales (e.g. During the past month, how often did you perform sport at university  
 213 at least once per week, for 30 minutes, Never-Almost always) and one item required  
 214 participants to identify the number of weeks the behavior was performed (scored 0 weeks – 4  
 215 weeks, Cronbach's  $\alpha = .97$ ). The three items were firstly converted to z-scores and then  
 216 summed and averaged to provide one overall score for behavior.

### 217 **Statistical analysis**

218 All data were analyzed using IBM SPSS (version 21.0). Negatively worded items were  
 219 reversed when required, meaning lower responses represented negative perceptions and  
 220 higher scores reflected positive perceptions. Key beliefs were identified using guidelines of  
 221 von Haeften, Fishbein, Kasprzyk, and Montano (2001) and Hornik and Woolf (1999). Data  
 222 was non-normally distributed and so Spearman's rank-order correlations were used to  
 223 identify the beliefs significantly correlating with intention and behavior. Those beliefs  
 224 significantly correlating with intention and behavior were then entered into a multiple linear  
 225 regression to identify the beliefs independently predicting the outcome variables. von Haeften  
 226 et al. (2001) suggest intention should be used as the dependent variable for identifying key  
 227 beliefs. However, the presence of a belief-behavior relationship is fundamental to the  
 228 development of an intervention targeting beliefs (Rhodes, Courneya, Blanchard, &  
 229 Plotnikoff, 2007; Sutton, 2002). As such, the study used the beliefs independently predicting  
 230 both intention and behavior as the key beliefs. Finally, a decision as to whether the belief

231 could be changed was made as, according to Hornik and Woolf (1999), it must be feasible to  
 232 alter the belief.

233 **Results**

234 *Participant characteristics*

235 206 participants completed T0 questionnaires and 95 participants completed questionnaires at  
 236 T1 (46.1% completion). This met the sample size suggested by Francis et al. (2004). Table 1  
 237 shows the descriptive statistics for the full sample. To check whether there were any  
 238 differences between those participants completing T1 questionnaires and those not, a  
 239 MANOVA was conducted with age, intention and the behavioral, normative and control  
 240 beliefs as the dependent variables and status of participation (completers and non-completers)  
 241 as the independent variables. There were no significant differences,  $F(17, 188) = .72$ ; Wilks'  
 242  $\Lambda = .93$ ,  $p > .05$ ;  $\eta p^2 = .06$ . A chi-square test also revealed no significant differences between  
 243 status of participation and gender,  $\chi^2(1, N = 206) = .02$ ,  $p > .05$ .

244 [Table 1 near here]

245 *Key belief analysis*

246 Means, standard deviations, and correlations with intention and behavior are shown in Table  
 247 2. Significantly correlated beliefs were then entered into a multiple regression. Table 3 shows  
 248 the key beliefs that independently predicted intention and behavior.

249 *Intention*

250 All beliefs significantly correlated with intention: six behavioral beliefs ( $r_s(204) = -$   
 251  $0.25$  to  $0.66$ ), five normative beliefs ( $r_s(204) = 0.25$  to  $0.58$ ), and four control beliefs ( $r_s$   
 252  $(204) = -0.19$  to  $-0.23$ ). Multiple regression analyses identified two behavioral beliefs  
 253 (Enjoyable,  $\beta = 0.58$ , and Time consuming,  $\beta = -0.23$ ) and three normative beliefs (Friends

254 (injunctive),  $\beta = 0.21$ , Friends (descriptive),  $\beta = 0.17$ , and Family (injunctive),  $\beta = 0.33$ ) as  
 255 key beliefs relating to intention.

256 *Behavior*

257 Two behavioral beliefs ( $r_s(93) = -0.26$ , and  $0.33$ ), and five normative beliefs ( $r_s(93) =$   
 258  $0.18$  to  $0.30$ ) significantly correlated with behavior. No control beliefs significantly correlated  
 259 with behavior. Multiple regression analyses identified both behavioral beliefs (Enjoyable,  $\beta =$   
 260  $0.28$ , and Time consuming,  $\beta = -0.27$ ) as key beliefs relating to behavior. None of the  
 261 significantly correlated normative beliefs predicted behavior. Intention to participate in sport  
 262 significantly correlated with behavior ( $r_s(93) = 0.51$ ,  $p < .001$ ).

263 [Table 2 and Table 3 near here]

264 **Discussion**

265 The aim of the study was to identify the key beliefs associated with recreational sports  
 266 participation using the TPB. The identification of such beliefs should then be used as  
 267 intervention targets. The study found all behavioral, normative and control beliefs correlated  
 268 with intention and two behavioral and five normative beliefs correlated with behavior. The  
 269 multiple regression highlighted two behavioral beliefs and three normative beliefs as  
 270 independently predicting intention, and two behavioral beliefs independently predicting  
 271 behavior.

272 *Behavioral beliefs*

273 The correlation between all behavioral beliefs and intention suggests a number of attitudinal  
 274 factors influence student participation in recreational sport. More significantly, the findings  
 275 revealed two beliefs predicting intention and behavior. Participation in recreational sport has  
 276 been found to be underpinned by factors of enjoyment (Cooper et al., 2012; Webb &  
 277 Forrester, 2015), thus it is not surprising this was a significant behavioral belief. Indeed, these

278 types of campus recreational activities provide students with a fun experience outside of  
 279 academic study (Forrester, 2015). The key belief relating to time constraints is also  
 280 unsurprising given a lack of time has been found to be the most important barrier to  
 281 participation in recreational activities (Spivey & Hritz, 2013; Young et al., 2003). Indeed,  
 282 first-year students have the choice of many academic and social activities whilst also making  
 283 significant life transitions and adapting to new environments (Bray & Born, 2004). Thus,  
 284 such time constraints have an influence over whether recreational sport is undertaken.

285 *Normative beliefs*

286 The findings identified a number of normative beliefs to be associated with student  
 287 participation in recreational sport. Beliefs relating to friends, family members, and academic  
 288 staff all correlated with intention and behavior, thus suggesting these referents influence  
 289 students' decision participation. The three beliefs found to predict intention offer guidance on  
 290 the most influential referents. The approval of both friends and family members suggests  
 291 these referents exert great influence on students' decision to participate in sport. Due to the  
 292 opportunities recreational sport provides for social groups, particularly amongst those  
 293 students adjusting to life in their first academic year, the findings suggest students are more  
 294 likely to participate in sport if friends approve of their participation. With regards to family  
 295 members, it is clear that these referents still exert influence over students' decisions during  
 296 the first year of study. Students are still making the transition to university during this period  
 297 and the opinion of family members can influence rates of participation. Thus, doing what  
 298 family members and friends would approve of appears to be influential in this decision.  
 299 Finally, the importance of friends' participation rates was also a key predictor. This suggests  
 300 student participation in recreational sport is influenced by whether friends themselves  
 301 participate. That is, students may only participate in this type of sport if they believe friends  
 302 do also.

303 ***Control beliefs***

304 The study found all control beliefs correlated with intention, although none were predictive of  
 305 intention or behavior. These findings suggest participation in recreational sport is influenced  
 306 by behavioral and normative factors rather than issues of control. Nevertheless, these beliefs  
 307 could still be influential in students' decision to participate. For example, with regards to  
 308 awareness, it is important that students are aware of the recreational sports as an offering  
 309 (Masmanidis Gargalianos & Kosta, 2009), especially as students making the transition into  
 310 university are not familiar with their surroundings and are presented with vast amounts of  
 311 information. Furthermore, the unpredictable nature of first year study and the availability of  
 312 other activities may lead motivation towards recreational sports participation to fluctuate.  
 313 Similar to Cowie and Hamilton (2014), it could be that the transition into university leaves  
 314 students feeling demotivated.

315 ***Can these beliefs be changed?***

316 In addition to identifying the key beliefs, it is also important to establish whether there is  
 317 scope to change the beliefs (i.e. there is no ceiling effect) and whether it is actually possible  
 318 to change the beliefs (Hornik & Woolf, 1999). As the behavioral belief related to issues of  
 319 time showed a low mean score (mean = 2.91 out of 7), there is clear room to improve this  
 320 belief within interventions. However, the mean score concerning the enjoyable nature of  
 321 recreational sport was above the scale mid-point (mean = 4.67 out of 7) which perhaps  
 322 suggests students already hold this belief. Despite this, the belief did demonstrate the lowest  
 323 mean score when compared to the other behavioral belief advantages. This suggests the belief  
 324 is a fruitful target for intervention as other advantages of recreational sport are perceived  
 325 more strongly amongst the population. Regarding the normative beliefs, the low mean score  
 326 of perceptions of friends' rates of participation (mean = 3.27 out of 7) suggests this belief has  
 327 scope for improvement within an intervention. Moreover, the approval of both friends and



328 family members demonstrated mean scores around the mid-point, with scores of 4 and 4.25  
 329 gained (out of 7), respectively. This suggests that interventions targeting the perceptions of  
 330 these referents have room to manipulate the key normative beliefs.

331         Compared to the decision about the scope for change that can be made quantitatively,  
 332 judging the possibility of changing the beliefs is a decision made subjectively (Hornik &  
 333 Woolf, 1999). Changing perceptions of the enjoyable nature of recreational sport may prove  
 334 possible given students in their first year of study would lack previous experience of  
 335 participating in this type of sport at university. Thus, given students would not necessarily be  
 336 aware of the positive experiences that could be achieved from participation and would  
 337 perhaps equate previous experiences of sport with competitive sport, interventions may find it  
 338 possible to alter this belief. This could be achieved through allowing students to experience  
 339 participation in the behavior, with positive experiences resulting in the realization that sports  
 340 participation is enjoyable. Given the many responsibilities students have, particularly in the  
 341 first year of study, it is evident why a lack of time may be a concern. However, due to the fact  
 342 students are experiencing new situations, these beliefs (potentially inaccurate) may be  
 343 modifiable, potentially through time management (McDermott, Oliver, Iverson, & Sharma,  
 344 2016) and planning strategies (Gollwitzer, 1999). Finally, students may be unaware of those  
 345 who participate in recreational sport, especially given the novelty of the behavior. The same  
 346 reasoning can be given for the approval of family members and friends. That is, since  
 347 recreational sport is a novel behavior, students may incorrectly perceive these referents to not  
 348 approve. Thus, interventions providing normative information about the participation and  
 349 approval of significant referents could effectively attend to the identified normative beliefs.  
 350 This could be achieved by having friends demonstrate the behavior or by drawing attention to  
 351 the behavior of others to allow comparison with their own behavior.

352 *Strengths and limitations*

353 There are a number of strengths attached to the study. The main strength of the studies was  
 354 the adoption of a relevant theoretical framework to identify specific belief-based intervention  
 355 targets. The majority of studies using the TPB to develop behavioral interventions fail to  
 356 undertake the relevant formative research and thus may not necessarily target appropriate  
 357 beliefs. This work is vital for the development of behavior change interventions. Second, the  
 358 behavior of interest was one that, despite its many benefits, has received little theoretical  
 359 attention. Third, the studies targeted a subgroup of the student population that despite often  
 360 undertaking unhealthy behaviors, are amendable to change. Indeed, students transitioning to  
 361 university are in the process of developing behavioral habits and interventions intervening  
 362 during this period can thus have significant health benefits.

363 Despite these strengths, the study is not without limitations. First, the study used an  
 364 initial small sample size, with attrition at T1 (53.9%) resulting in an even smaller number of  
 365 participants eligible for full analysis. Nevertheless, the study achieved the suggested  
 366 minimum sample size (Francis et al., 2004) and there were no significant differences between  
 367 those completers and non-completers at T1 regarding key psychological measures. Second,  
 368 the study used a cross-sectional design meaning casual statements cannot be made (Weinstein  
 369 & Rothman, 2005). Experimental work is needed to provide this evidence. Third, the study  
 370 used self-report to assess behavior and discrepancies between self-report and objective  
 371 measures have been found (Basterfield et al., 2008). Future research should seek to utilize  
 372 more objective measures of behavior such as registers or swipe cards. Fourth, study findings  
 373 may not be generalizable to other institutions, particularly as beliefs were obtained from a  
 374 specific sample of interest. Finally, the study only considered the expectancy arm of beliefs,  
 375 rather than both expectancy and value components. Although the multiplicative approach and  
 376 expectancies often show no significant difference (Chan et al., 2015), there is the possibility  
 377 that the value component within some beliefs did not align with the expectancy component.

378 For example, students may be unaware that family members approve of their participation in  
379 recreational sports, yet simply do not value their opinion.

380 **Conclusion**

381 The study identified the key behavioral, normative, and control beliefs associated with  
382 student's participation in recreational sport. Interventions developed to promote participation  
383 in recreational sport should specifically target the beliefs relating to the enjoyable nature of  
384 sport, the approval of friends and family members, the participation of friends, and time  
385 constraints. Successfully manipulating these beliefs could lead to an increase in the number  
386 of students participating in recreational sport at university.

387

388 **Declaration of interest**

389 The authors declare no conflict of interest

390

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Table 1. *Descriptive statistics of study participants.*

Demographic		(N = 206)	Percentage (%)	M	±s
Age (years)				19.04	2.35
Sex	Male	88	42.7		
	Female	118	57.3		
Area of study	Business	30			
	Childhood Studies	37			
	Film and Television Production	25			
	Media	22			
	Philosophy, Ethics and Religion	12			
	Physical Education and Sports Coaching	31			
	Psychology	30			
	Sport, Exercise, Health and Nutrition	19			

Table 2. Means, SD, and correlations of behavioral, normative, and control beliefs related to university students' sporting participation.

Beliefs	Mean $\pm$ s Total (N = 206)	Intention (r <sub>s</sub> ) Total (N = 206)	Behavior (r <sub>s</sub> ) Total (n = 95)
<b>Behavioral beliefs</b>			
Health and fitness	5.46 (1.43)	0.35***	0.11
Enjoyable	4.67 (1.58)	0.66***	0.33**
Opportunities to meet new friends	5.26 (1.41)	0.40***	0.05
Improves mental well-being	4.72 (1.57)	0.45***	0.20
Time consuming	2.91 (1.49)	-0.28***	-0.26**
Study distractions	3.71 (1.55)	-0.25***	-0.13
<b>Normative beliefs</b>			
Friends (injunctive)	4.00 (1.74)	0.58***	0.27**
Family (injunctive)	4.25 (1.89)	0.58***	0.30**
Academic staff (injunctive)	3.60 (1.85)	0.40***	0.20*
Friends (descriptive)	3.27 (1.85)	0.42***	0.18*
Academic staff (descriptive)	3.12 (1.56)	0.25***	0.18*
<b>Control beliefs</b>			
Time restrictions	3.14 (1.76)	-0.21**	-0.00
Lack of motivation	3.15 (1.49)	-0.23**	-0.10
Study related	3.25 (1.83)	-0.19**	-0.01
Awareness	3.32 (1.81)	-0.23**	-0.14

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Table 3. *Summary of the multiple regression analyses.*

	Key beliefs	$\beta$	R <sup>2</sup>	Adjusted R <sup>2</sup>
Intention (N = 206)	Behavioral beliefs		0.49	0.47
	Health and fitness	0.04		
	Enjoyable	0.58***		
	Opportunities to meet new friends	-0.09		
	Improves mental well-being	0.11		
	Time consuming	-0.23***		
	Attention taken away from studies	-0.06		
	Normative beliefs		0.41	0.39
	Friends (injunctive)	0.21*		
	Family (injunctive)	0.33***		
	Academic staff (injunctive)	0.07		
	Friends (descriptive)	0.17*		
	Academic staff (descriptive)	-0.05		
	Control beliefs		0.07	0.05
Time restrictions	-0.07			
Lack of motivation	-0.14			
Study related	-0.05			
Awareness	-0.16			
Behavior (n = 95)	Behavioral beliefs		0.16	0.14
	Enjoyable	0.28**		
	Time consuming	-0.27**		
	Normative beliefs		0.14	0.09
	Friends (injunctive)	-0.00		
	Family (injunctive)	0.26		
	Academic staff (injunctive)	0.04		
Friends (descriptive)	0.03			
Academic staff (descriptive)	0.16			

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

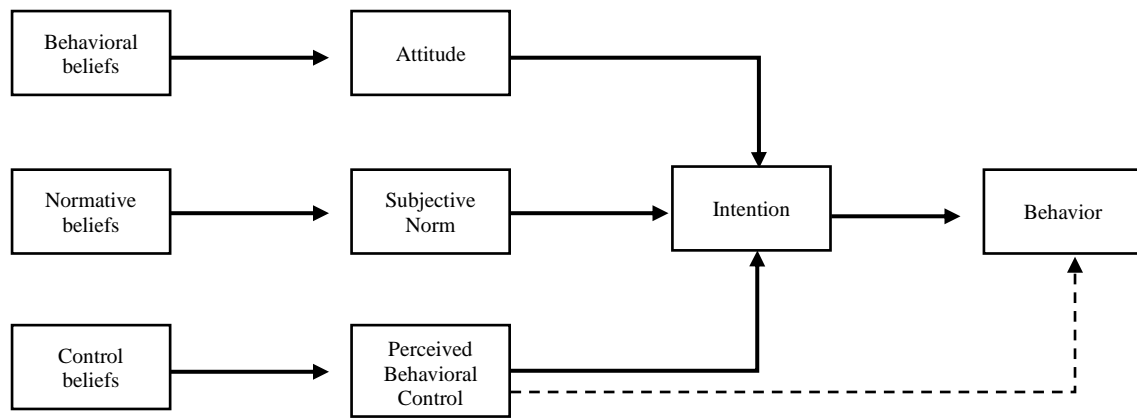


Figure 1. The Theory of Planned Behavior (Ajzen, 1985).