

**The Frustration of Novelty and Basic Psychological Needs as Predictors of
Maladaptive Outcomes in Physical Education**

David González-Cutre ^{a*}

Miguel Brugarolas-Navarro ^a

Vicente J. Beltrán-Carrillo ^a

Alejandro Jiménez-Loaisa ^b

^a *Department of Sport Sciences. Sports Research Centre. Miguel Hernández University of Elche. Avenida de la Universidad s/n, 03202 Elche (Alicante), Spain.*

^b *Department of Didactics of Physical Education, Artistic and Music. Faculty of Education. University of Castilla-La Mancha. Avenida Carlos III s/n, 45071 Toledo, Spain.*

Authors note

David González-Cutre  <https://orcid.org/0000-0002-8584-3992>  @davidgcutre

Vicente J. Beltrán-Carrillo  <https://orcid.org/0000-0001-8794-5901>

Alejandro Jiménez-Loaisa  <https://orcid.org/0000-0003-0033-2374>  @alejandrolj

* Correspondence regarding this study should be addressed to David González-Cutre, Department of Sport Sciences, Sports Research Centre, Miguel Hernández University of Elche. Tel: +34965222162. E-mail: dgonzalez-cutre@umh.es.

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

The authors appreciate the participation of all the schools and adolescents involved in the study. Alejandro Jiménez-Loaisa was supported by the grant *PTA2019-016766-I*, funded by MCIN/AEI/10.13039/501100011033.

Published version at:

<https://www.tandfonline.com/doi/abs/10.1080/17408989.2023.2167969?journalCode=cpe20>

Please, cite as follows: González-Cutre, D., Brugarolas-Navarro, M., Beltrán-Carrillo, V. J., & Jiménez-Loaisa. (2023). The frustration of novelty and basic psychological needs as predictors of maladaptive outcomes in physical education. *Physical Education & Sport Pedagogy*. <https://doi.org/10.1080/17408989.2023.2167969>

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

1 The Frustration of Novelty and Basic Psychological Needs as Predictors of Maladaptive
2 Outcomes in Physical Education

3

4 **Abstract**

5 *Background:* The need for novelty has been recently proposed as a candidate need
6 within basic psychological needs theory (BPNT). In physical education (PE), research
7 has shown that meeting students' need for novelty is often positively associated with
8 enhanced (and negatively associated with impaired) pupils' well-being. Frustrating
9 students' novelty has also been negatively related to achieving multiple positive
10 outcomes in PE. However, no research has explored whether frustration of novelty is
11 positively associated with maladaptive consequences for pupils in this educational
12 context, which is a necessary criterion to be included within BPNT.

13 *Purpose:* In this correlational study, we aimed to determine whether frustration of
14 novelty was associated with up to ten maladaptive outcomes in a similar way as the
15 frustration of the three basic psychological needs (autonomy, competence, and
16 relatedness). The maladaptive outcomes analyzed were amotivation, boredom, negative
17 affect, entity beliefs, fear of failure, worry, concentration disruption, somatic and social
18 physique anxiety, and oppositional defiance.

19 *Research design:* Cross-sectional study.

20 *Methods:* A total of 533 students ($M_{age} = 14.47$, $SD = 1.34$; 56.66% female) from eight
21 secondary schools completed online questionnaires assessing their basic psychological
22 needs frustration, novelty frustration and diverse maladaptive outcomes in PE.
23 Pearson's correlations and hierarchical regression analyses controlling by sex, age, and
24 race, were calculated to test the associations among these variables.

25 *Findings:* The correlation coefficients for novelty frustration were like those found for
26 the three basic psychological needs concerning maladaptive outcomes in PE students.
27 Particularly, hierarchical regression analyses showed that frustrating novelty in PE
28 predicted amotivation ($\beta = .11, p = .039$), boredom ($\beta = .23, p < .001$), entity beliefs (β
29 $= .12, p = .039$), and concentration disruption ($\beta = .12, p = .049$).

30 *Conclusions:* Results showed that novelty frustration was positively related to
31 experiencing some negative consequences in PE, which is an important criterion within
32 BPNT. Future training programs aimed at promoting optimal (and preventing
33 detrimental) motivational styles in PE teachers could use these results to optimize
34 students' PE experiences.

35 **Keywords:** Adolescents, self-determination theory, autonomy, competence, relatedness.

36

37

38

Introduction

39 Physical education (PE) teachers play a prominent role when promoting active
40 lifestyles in their students (Martins et al. 2018). The choice of some curricular contents
41 over others, the teaching methodologies and styles employed, as well as the affective
42 climate promoted by them during PE lessons are relevant factors that influence
43 students' engagement with learning and attitudes towards physical activity (Cheon and
44 Reeve 2013; Curran and Standage 2017). Teacher interventions can foster/prevent
45 desired or undesired emotional experiences in children and adolescents, both leading to
46 opposite results in terms of PE enjoyment and intentions for out-of-class physical
47 activity (Jiménez-Barbero et al. 2020; Ladwig et al. 2018). Therefore, it seems pertinent
48 to shed light on the psychosocial processes underlying teaching actions, in order to
49 optimize pupils' cognitive, affective, and behavioral outcomes.

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

50 Embedded in self-determination theory, the basic psychological needs mini-theory
51 (BPNT; Ryan and Deci 2017) has been widely applied to understand how psychological
52 and social-environmental factors support individuals' motivation in multiple contexts,
53 including school PE (Vasconcellos et al. 2020; White et al. 2021). According to the
54 BPNT sequence, educational agents (e.g., PE teachers) can support or thwart three basic
55 psychological needs (autonomy, competence, and relatedness) in their interactions with
56 students. Autonomy can be defined as the students' need to make decisions within the
57 teaching–learning process and to perceive a sense of willingness in their actions.
58 Competence refers to the students' need to feel effective and successful in the tasks that
59 are proposed, whereas relatedness implies the need to interconnect with other
60 classmates and feel valued and accepted by them, in addition to having a warm and
61 close relationship with the teacher. When PE teachers satisfy students' basic
62 psychological needs, more adaptive consequences (e.g., autonomous forms of
63 motivation, prosocial behaviors, enjoyment, increased physical activity levels) are
64 expected to be developed in their pupils (Sun, Li, and Shen 2017; Vasconcellos et al.
65 2020). However, when students feel their psychological needs persistently frustrated,
66 maladaptive outcomes like controlled forms of motivation, amotivation, antisocial
67 attitudes, poor interest in PE and sedentary behaviors tend to appear (White et al. 2021).

68 The need for novelty, defined as the need to experience something not previously
69 experienced or that differs from everyday routine, has recently been proposed as a new
70 candidate need within BPNT (González-Cutre et al. 2016, 2020). According to Ryan
71 and Deci (2017), a basic psychological need should fulfill six inclusion criteria: (1) The
72 satisfaction of a basic psychological need should be positively related to well-being and
73 negatively related to ill-being. The frustration of a basic psychological need should
74 show the opposite relations; (2) The definition of a basic psychological need must

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

75 include the specific experiences and behaviors that lead to well-being; (3) A basic
76 psychological need should be a mediator between social and personal factors and
77 outcomes; (4) Basic psychological needs should be positively correlated and work in
78 synergy. Therefore, a basic psychological need could not be a deficit need that only
79 works when other needs are frustrated; (5) A basic psychological need should be a
80 predictor of positive outcomes and not a consequence of basic psychological need
81 satisfaction; (6) A basic psychological need operates universally, for all people at all
82 ages in all cultures.

83 Novelty has fulfilled some of these criteria in previous research (see Bagheri and
84 Milyavskaya 2020; González-Cutre et al. 2020) in different contexts (e.g., general life,
85 work, English learning, physical exercise) and is receiving attention as an important
86 variable to achieve multiple positive outcomes in PE classes (Aibar et al. 2021;
87 Fernández-Espínola et al. 2020; Fierro-Suero et al., 2020; González-Cutre and Sicilia
88 2019). Among others, the satisfaction of the need for novelty has been positively related
89 to autonomous motivation (Fernández-Espínola et al. 2020), enjoyment (Fierro-Suero et
90 al. 2020), vitality and dispositional flow in PE (González-Cutre et al. 2019), and
91 intentions to be physically active outside school (Aibar et al. 2021). Likewise, satisfying
92 students' need for novelty has been negatively related to amotivation (González-Cutre
93 et al. 2016), boredom and anger (Fierro-Suero et al. 2020). These studies provide
94 valuable insight about novelty as a potential need to be considered, together with
95 autonomy, competence, and relatedness, within the 'bright side' of individuals
96 functioning (Ryan and Deci 2017).

97 The effects of students' novelty frustration have also been examined in the domain of
98 PE, although to a lesser extent than its satisfaction (Trigueros et al. 2019). Despite little
99 empirical work, novelty frustration has shown to be negatively associated with students'

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

100 emotional intelligence (Trigueros et al. 2019) and resilience (Trigueros et al. 2020a),
101 and positively associated with students' amotivation (Trigueros et al. 2020b). Precisely,
102 the study conducted by Trigueros et al. (2020b) represents the only example of research
103 linking novelty frustration with a maladaptive outcome, not only in PE but also in any
104 life context. Therefore, the way in which the frustration of novelty is also associated
105 with other negative consequences remains unexplored. In addition, although Trigueros
106 et al.'s (2020b) study provides the first attempt to explore these associations, it could be
107 limited by some of the novelty-related items developed in their scale, which could
108 partially overlap with other BPNT constructs such as competence (e.g., item 4; 'I don't
109 feel capable of doing new things') or relatedness (e.g., item 8; 'Sometimes I feel
110 rejected when trying to innovate').

111 Taking these aspects into account, this correlational study aimed to analyze whether
112 the frustration of novelty was positively associated with students' maladaptive
113 outcomes in PE settings, in a similar way than the frustration of the three basic
114 psychological needs (autonomy, competence, and relatedness). We selected up to ten
115 maladaptive outcomes which have been extensively studied in the field of BPNT and
116 PE, including amotivation (Abós et al. 2021), boredom (Min and Kawabata, 2021),
117 negative affect (White et al. 2021), entity beliefs (Wang and Liu, 2007), fear of failure
118 (Bartholomew et al. 2018), worry (Cox and Ullrich-French, 2010), concentration
119 disruption (Mastagli et al. 2021), somatic (Liukkonen et al. 2010) and social physique
120 anxiety (Ullrich-French et al. 2016), and oppositional defiance (Haerens et al. 2015).
121 Thus, the findings derived from this inquiry may be useful from a twofold perspective.
122 First, to progress in the novelty's journey towards BPNT, since we explore the
123 hypothetical positive relationships between the frustration of candidate needs and the
124 'dark side' of people's functioning, an essential part of the inclusion criteria established

125 by Ryan and Deci (2017) to describe BPNT's needs (first inclusion criterion; Ryan and
126 Deci, 2017; Vansteenkiste et al. 2020); and second, to design/implement future teaching
127 interventions aimed at minimizing novelty frustration and maladaptive outcomes in PE
128 students.

129 **Methods**

130 **Participants and Study Design**

131 Participants were 533 students (231 boys, 302 girls) aged 12 to 18 years ($M = 14.47$,
132 $SD = 1.34$) from eight secondary public schools located in the southeast of Spain. Of
133 these, 92 students (17.3%) belonged to first grade, 104 to second grade (19.5%), 168 to
134 third grade (31.5%) and 169 to fourth grade (31.7%). Most of the participants were
135 White (71.7%). All students received two weekly 50-minute PE lessons as part of their
136 compulsory education. They also performed physical exercise or sports outside of
137 school an average of 3.48 days a week ($SD = 1.68$) for 1.33 hours ($SD = .63$).

138 Ethical approval was obtained from the ethical board of the first author's university.
139 Data were collected through a free online survey platform (Google Forms), which
140 included all the questionnaires mentioned in the next section (see Measures).
141 Previously, the research group contacted the PE teachers of each school by phone. The
142 objective of these calls was to explain the aims and procedure of the study, and to
143 request authorization to administer the form to their students. PE teachers themselves
144 requested permission from the school boards and relatives for the adolescents'
145 participation and informed about the study. After consent, PE teachers from the
146 different schools distributed the access link to the participants, who had to complete the
147 activity as homework.

148 Before completion, the students were encouraged to ask their teachers for possible
149 doubts or questions about any aspect of the questionnaires that they did not fully

150 understand. The online form was headed by a statement informing students that they
151 were going to fill out several anonymous questionnaires about the motivation they had
152 during their PE lessons. It was necessary to respond to all the items to be able to submit
153 the online form. The completion time was around 20 minutes.

154 **Measures**

155 ***Frustration of Basic Psychological Needs.*** The 12-item Spanish version of the Basic
156 Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al. 2015)
157 adapted to PE (Haerens et al. 2015; Zamarripa et al. 2020) was used. BPNSFS assesses
158 frustration of autonomy (e.g., ‘I feel pressured to do too many exercises’), competence
159 (e.g., ‘I have serious doubts about whether I can do the exercises well’) and relatedness
160 (e.g., ‘I feel excluded from the group I want to belong to’), using 4 items per construct
161 which were answered on a Likert-scale from 1 (*not at all true for me*) to 5 (*very true for*
162 *me*). Cronbach’s alpha values (α) for autonomy, competence and relatedness were 0.84,
163 0.79 and 0.82, respectively.

164 ***Frustration of the Need for Novelty.*** This construct was measured using the 5 items
165 (e.g., ‘what I do is repetitive’) of the Novelty Need Satisfaction and Frustration Scale
166 (NNSFS; González-Cutre et al. 2020; González-Cutre et al. 2016), which were
167 interspersed with the items of the previously mentioned scale and answered on the same
168 Likert-scale. Cronbach’s α coefficient was 0.83.

169 ***Amotivation.*** The 4 items (e.g., ‘I really feel I am wasting my time in physical
170 education’) of the Perceived Locus of Causality Scale (PLOC; Goudas et al. 1994)
171 validated to the Spanish context (Ferriz et al. 2015) was employed to measure students’
172 amotivation during PE lessons. The PLOC is rated on a 7-point Likert-scale, from 1
173 (*totally disagree*) to 7 (*totally agree*). Cronbach’s α coefficient was 0.87.

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

174 **Boredom.** This construct was measured using the 3 items (e.g., ‘in physical
175 education classes, I am usually bored’) of the Sport Satisfaction Instrument (SSI; Duda
176 and Nicholls 1992) validated to the Spanish population and adapted to PE (Baena-
177 Extremera et al. 2012). The SSI is rated on a 5-point Likert-scale, from 1 (*totally*
178 *disagree*) to 5 (*totally agree*). Cronbach’s α coefficient was 0.80.

179 **Negative Affect.** The Spanish version (Zamarripa et al. 2016) of the questionnaire
180 developed by Ebbeck and Weiss (1998) was used to assess negative affect during PE
181 lessons through 4 items. In this instrument, students were asked to rate on a 5-point
182 Likert scale from 1 (*not at all*) to 5 (*extremely*) how unhappy, nervous, guilty, and angry
183 they felt in PE. Cronbach’s α coefficient was 0.78.

184 **Entity Beliefs.** The 6 items (e.g., ‘you have a certain level of ability in sport and you
185 cannot really do much to change that level’) of the Conceptions of the Nature of
186 Athletic Ability Questionnaire-2 (CNAAQ-2; Biddle et al. 2003) adapted to the Spanish
187 population (González-Cutre et al. 2007) were used to measure students’ entity beliefs.
188 This questionnaire is rated on a 5-point Likert-scale, from 1 (*strongly disagree*) to 5
189 (*strongly agree*). Cronbach’s α coefficient was 0.83.

190 **Fear of Failure.** Students’ fear of failure in PE lessons was measured with the short
191 Spanish version (Moreno-Murcia and Conte 2011) of the Performance Failure Appraisal
192 Inventory (PFAI; Conroy et al. 2002). This version consisted of 5 items (e.g., ‘when I
193 am failing in physical education, I am afraid that I might not have enough talent’) which
194 were answered on a Likert scale from 1 (*do not believe at all*) to 5 (*believe 100% of the*
195 *time*). Cronbach’s α coefficient was 0.81.

196 **Anxiety.** The 15-item Spanish version (Ramis et al. 2010) of the Sport Anxiety
197 Scale-2 (SAS-2; Smith et al. 2006) was adapted to measure students’ anxiety in PE
198 lessons. Headed by the statement ‘In my physical education classes’, this scale

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

199 comprises 3 subscales of 5 items each: worry (e.g., ‘I worry that I am not doing my
200 best’), concentration disruption (e.g., ‘I cannot think clearly’) and somatic anxiety (e.g.,
201 ‘I feel tense in my stomach’), which were answered on a Likert-scale from 1 (*not at all*)
202 to 4 (*very much*). Furthermore, social physique anxiety was measured with the 6 direct
203 items (e.g., ‘I am sometimes annoyed because I think that others are judging my weight
204 or physical fitness negatively’) of the Spanish version (Sáenz-Álvarez et al. 2013) of the
205 Social Physique Anxiety Scale (SPAS; Motl and Conroy 2000). The items used a Likert
206 scale from 1 (*never*) to 5 (*always*). Cronbach’s α coefficients were 0.90 for worry, 0.87
207 for concentration disruption, 0.87 for somatic anxiety and 0.93 for physical social
208 anxiety.

209 ***Oppositional Defiance.*** This disruptive behavior was measured with the 4 items
210 (e.g., ‘I had the tendency to do exactly the opposite of what the teacher expected me to
211 do during my physical education lessons’) of the validated Spanish version (Abós et al.,
212 2016) of the scale adapted to PE by Haerens et al. (2015). This scale is rated on a 5-
213 point Likert-scale from 1 (*not at all true for me*) to 5 (*very true for me*). Cronbach’s α
214 coefficient was 0.83.

215 The mean of the different items that compose each construct was calculated to obtain
216 the scores of all variables in this study. Therefore, scores were lower or higher as they
217 were close to the Likert-scale anchors.

218 **Data Analysis**

219 All statistical analyses were performed using SPSS 25.0 (IBM Corp., Armonk, NY,
220 USA) software. To examine associations between frustration of basic psychological
221 needs, frustration of novelty and maladaptive consequences, Pearson’s correlations were
222 calculated. A hierarchical regression analysis for each maladaptive consequence as
223 dependent variable was also performed. Frustrations of the three basic psychological

224 needs were introduced as independent variables in the first model and frustration of
225 novelty was added in the second model. With the inclusion of novelty frustration in the
226 second model, we tried to analyze if this variable explained significantly more variance
227 in the outcomes and if the previous relations found between the frustration of the three
228 basic psychological needs and the maladaptive consequences changed. To control their
229 effect, sex, age, and race were also introduced as independent variables within the
230 model.

231 Findings

232 Descriptive values ($M \pm SD$) and bivariate correlations among the study variables are
233 presented in Table 1. All mean scores of the variables were below the midpoint of their
234 respective scale. Likewise, the correlation analysis showed positive and statistically
235 significant ($p < .05$) relations among all the variables, except for the association
236 between worry and oppositional defiance ($r = .06, p = .14$). The correlation coefficients
237 for novelty frustration were like those found for the frustration of the three basic
238 psychological needs (autonomy, competence, and relatedness) when related to
239 maladaptive consequences in PE, ranging from moderate to relatively large values.

240

241 [INSERT TABLE 1 ABOUT HERE]

242

243 The results of the hierarchical regression analyses are displayed in Table 2. Variance
244 Inflation Factor (VIF) and tolerance ranged from 1.06 to 2.45 and .41 to .95,
245 respectively, indicating the absence of collinearity between independent variables. After
246 controlling by sex, age, and race, novelty frustration was a significant positive predictor
247 of amotivation, boredom, entity beliefs, and concentration disruption. Changes in R^2
248 from model 1 to model 2 were small but significant. Moreover, some relations between

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

249 frustration of basic psychological needs and maladaptive outcomes were reduced and
250 even stopped being significant after including novelty frustration in the regression
251 model.

252 As Table 2 shows, competence and relatedness frustration positively predicted the
253 highest number of maladaptive outcomes: negative affect, entity beliefs, fear of failure,
254 worry, concentration disruption, somatic and social physique anxiety. Competence
255 frustration also positively predicted boredom and relatedness frustration positively
256 predicted oppositional defiance. Finally, autonomy frustration positively predicted
257 amotivation, boredom, negative affect, entity beliefs, and oppositional defiance.

258

259 [INSERT TABLE 2 ABOUT HERE]

260

261 **Discussion**

262 The aim of this study was to examine whether frustration of novelty was associated
263 with students' maladaptive outcomes in PE in a similar way than the frustration of the
264 three basic psychological needs (autonomy, competence, and relatedness). Our results
265 could support this claim, since the correlation coefficients found for novelty frustration
266 were like those found for the frustration of basic psychological needs when relating
267 them to up to ten negative consequences in PE. In addition, hierarchical regression
268 analyses revealed that novelty frustration was a significant positive predictor of
269 students' amotivation, boredom, entity beliefs, and concentration disruption during PE
270 lessons beyond the three basic psychological needs.

271 The need for novelty, like other candidate needs (e.g., morality, novelty-variety),
272 must pass an 'entrance exam' to be included within BPNT (Ryan and Deci, 2017;
273 Vansteenkiste et al. 2020). To do this, it is critical to fulfill six inclusion criteria that

274 define what a basic need is and how it should operate (Ryan and Deci, 2017). The
275 present study joins previous research that attempted to address these criteria for the need
276 for novelty (González-Cutre et al. 2016, 2020). According to the first and most
277 important inclusion criterion, the satisfaction of basic psychological needs should be
278 positively related to well-being outcomes and negatively related to ill-being outcomes.
279 The opposite relation is expected for the frustration of basic psychological needs. We
280 present novel preliminary evidence that support the fulfillment of this first criterion,
281 revealing that the frustration of the need for novelty is not only negatively related to
282 psychological integrity and well-being (Birdsell, 2018; González-Cutre et al. 2020;
283 Trigueros et al. 2019; Trigueros et al. 2020a), but also positively related to maladaptive
284 outcomes and impoverished functioning (dark side of people's functioning).

285 In the specific context of PE, some important insights could emerge from these
286 findings. First, it seems that not introducing novel stimuli into the PE classroom could
287 lead to students' amotivation and boredom. This is consistent with several studies that
288 have explored the factors surrounding pupils' experiences of amotivation and boredom
289 in PE settings (Abós et al. 2021; Min and Kawabata 2021; Shen et al. 2010; Trigueros et
290 al. 2020b). For instance, Min and Kawabata (2021) found that 'monotony', 'being
291 under-challenged' by doing always the same activities or 'over-challenged'
292 (competence frustration) were recurring responses when students were asked why PE
293 was boring for them. Student's novelty frustration could also play an influential role in
294 some dimensions of the taxonomy of amotivation proposed by Shen et al. (2010) for
295 PE. Thus, if teachers carry out repetitive and non-stimulating activities/dynamics on an
296 ongoing basis, pupils may experience little desire to expend energy on these tasks
297 ('effort beliefs'), give tasks little value ('values placed on tasks'), and not feel pleasure
298 or interest in doing the proposed behaviors ('characteristics on the tasks'), emerging

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

299 feelings of amotivation. Future PE studies could explore the associations between
300 novelty frustration and such dimensions. Autonomy frustration was also a significant
301 predictor of both amotivation and boredom for PE students. This study's result is in line
302 with previous research (García-González et al. 2019; Haerens et al. 2015), showing that
303 pupils who feel pressured to participate in PE are likely to consider the activities
304 proposed by teachers as a waste of time and boring.

305 Students' beliefs about the malleability of their abilities were also related to the
306 frustration of their need for novelty in the present study. Based on our findings, the lack
307 of novel aspects in PE could contribute to reinforce students' perceptions that their
308 athletics abilities are stable and not easily modifiable with practice (i.e., underpinning
309 entity beliefs). This is to be expected, because if teachers do not provide new learning
310 situations that allow students to experience progress, pupils may think that their
311 aptitudes cannot be improved and are fixed over time. According to previous research
312 (Biddle et al. 2003; Shen et al. 2010), these thoughts would be motivationally
313 maladaptive and closely linked with demotivating outcomes. Autonomy, competence,
314 and relatedness frustration also significantly predicted PE students' entity beliefs, being
315 consistent with other BPNT-based studies (Vermote et al. 2020; Wang and Liu, 2007).
316 If students perceive that they are not successful in the PE tasks (competence
317 frustration), they must do these difficult tasks mandatorily (autonomy frustration), and
318 they are rejected by their classmates for their low level of ability (relatedness
319 frustration), they may think then that their ability is fixed, which would hinder their
320 engagement in PE.

321 The last maladaptive consequence predicted by novelty frustration in the present
322 study was concentration disruption. Presumably, when PE teachers repeat the same
323 approaches (and ways of experiencing them), it is logical that students may end up

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

324 losing attention and interest in what they should do. Although more studies on BPNT
325 and in-class concentration are needed (Vasconcellos et al. 2020), some authors such as
326 González-Cutre and Sicilia (2019) have shown the importance of satisfying novelty
327 when predicting optimal psychological states characterized by a total concentration of
328 PE students on activities (e.g., dispositional flow). In fact, students' favorite lessons are
329 often those that include unusual tasks that powerfully grab their attention (White et al.
330 2021). Along with novelty, students' frustration of the need for competence and
331 relatedness were also predictors of being distracted in class. It is thus likely that pupils
332 who fail to experience achievable challenges and efficacy when participating in PE, and
333 are not physically and/or socially involved in the proposed activities, tend to focus their
334 attention on other purposes than those desired by the teachers. In this regard, Mastagli et
335 al. (2021) found positive associations between concentration (and negative associations
336 between distraction) and satisfying students' need for competence. We recommend
337 further research about the cognitive constructs that could surround the frustration of the
338 three basic psychological needs, together with novelty frustration, and their associations
339 with concentration/distraction in the PE context.

340 Whereas some maladaptive outcomes were predicted by students' novelty frustration
341 in the context of PE, others were not. It was the case of negative affect, which was
342 predicted by the frustration of the three basic psychological needs. These associations
343 are well documented in the recent systematic review by White et al. (2021), which
344 shows that negative affect could be developed if students perform tasks individually in
345 front of peers, do not have confidence or do not know anyone in class, and perform
346 overly competitive activities that create division between students. Teachers' decisions
347 about how groups are formed could also have an impact on the experience of negative
348 affect. Future research should continue exploring the relations between novelty

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

349 frustration and negative affect in the PE context, considering that novelty-variety
350 satisfaction was negatively related to negative affect in other life domains (Bagheri and
351 Milyavskaya 2020).

352 Fear of failure was predicted by the frustration of competence and relatedness,
353 agreeing with Bartholomew et al. (2018). This could mean that students' perceived lack
354 of competence to complete a specific task or to achieve the required performance would
355 increase their fears about failing. At the same time, students' concern about being
356 'scolded' or 'ridiculed' by the teacher or their peers (i.e., undermining relatedness need)
357 could also increase their fears of failing in PE (Bartholomew et al. 2018). With respect
358 to the three of the four consequences that made up the anxiety variable and that remain
359 to be discussed (worry, somatic and social physique anxiety), again only competence
360 and relatedness frustration emerged as significant predictors of all of them. Liukkonen
361 et al. (2010) showed similar results, indicating that PE environments in which students
362 failed to demonstrate competence and compared/evaluated themselves to each other
363 (i.e., ego-involving climates), were associated with higher levels of all anxiety
364 dimensions. It seems logical that competence and relatedness frustration have a greater
365 influence than other needs in explaining worry, somatic and physique anxiety, and fear
366 of failure. Competence and relatedness frustration stand out among the rest because
367 social comparison based on the ability level is a key aspect to promote students' worry
368 about performance, tension, concern of their physique appearance, and fear of being
369 unsuccessful (Mitchell et al. 2015).

370 Lastly, the defensive and compensatory behaviors of pupils to do the opposite of
371 what PE teachers expect (i.e., oppositional defiance; Haerens et al. 2015) were predicted
372 by autonomy and relatedness' frustration. An imposing climate where students cannot
373 take initiative (autonomy frustration), coupled with an atmosphere of loneliness and

374 alienation (relatedness frustration), may lead pupils to defy teacher's pressuring requests
375 (Haerens et al. 2015).

376 We have to admit that novelty frustration only predicted four maladaptive outcomes
377 out of ten (with low to moderate regression coefficients), while competence and
378 relatedness frustration predicted eight, and autonomy frustration five. This could be due
379 to the specific characteristics of each maladaptive outcome that may be more related to
380 one need or another, such as our discussion of the results shows. However, novelty
381 seems a different construct from autonomy, competence, and relatedness, but that works
382 in a similar way than them, and its inclusion in BPNT could help to better explain
383 motivational processes and refine the rationale behind certain associations like those
384 found in the present study.

385 The research reported here is not without limitations. First, the cross-sectional nature
386 of our study prevents us to establish causal pathways from the frustration of novelty and
387 the three basic psychological needs to the selected maladaptive outcomes. Moreover,
388 the fact that our interest was placed in studying so many PE maladaptive outcomes
389 within the same report impeded us from making more complex analysis (e.g., mediation
390 models). More studies exploring, for instance, differences between boys and girls are
391 pertinent. It would also be interesting to inquire how the frustration of the three basic
392 psychological needs and novelty are associated with maladaptive consequences in
393 students with 'vulnerable characteristics' in the PE classroom (e.g., pupils with
394 overweight or obesity, LGBTI pupils, etc.). Finally, longitudinal and experimental
395 studies including novelty-support interventions are required. This could help to gain
396 insight into the directionality of the relationships between the variables used in the
397 current research.

398

399

Conclusion

400 The present study makes a valuable contribution to the long but exciting novelty's
401 journey towards BPNT. Particularly, our findings add novel evidence to previous works
402 supporting the fulfillment of the first inclusion criterion established by Ryan and Deci
403 (2017) to consider novelty as a new basic psychological need, since its frustration was
404 positively associated with the 'dark side' of individuals' functioning. This study also
405 suggests interesting implications for the field of BPNT and PE. From a practical
406 perspective, it could be helpful for future training programs aimed at promoting optimal
407 (and preventing detrimental) motivational styles in PE teachers. Training teachers to
408 avoid novelty thwarting behaviors (i.e., teaching always the same contents, repeating
409 activities excessively, and using always the same spaces, materials and methodologies)
410 would be relevant for optimizing students' cognitive, affective, and behavioral
411 outcomes derived from school PE.

412

413

References

- 414 Abós, A., L. García-González, A. Aibar, and J. Sevil-Serrano. 2021. "Towards a Better
415 Understanding of the Role of Perceived Task Variety in Physical Education: A
416 Self-Determination Theory Approach." *Psychology of Sport and Exercise* 56:
417 101988. [doi:10.1016/j.psychsport.2021.101988](https://doi.org/10.1016/j.psychsport.2021.101988).
- 418 Aibar, A., A. Abós, L. García-González, D. González-Cutre, and J. Sevil-Serrano. 2021.
419 "Understanding Students' Novelty Satisfaction in Physical Education:
420 Associations with Need-Supportive Teaching Style and Physical Activity
421 Intention." *European Physical Education Review*. Advance Online Publication
422 [doi:10.1177/1356336X221992791](https://doi.org/10.1177/1356336X221992791).

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 423 Bagheri, L., and M. Milyavskaya. 2020. "Novelty–Variety as a Candidate Basic
424 Psychological Need: New Evidence Across Three Studies." *Motivation and*
425 *Emotion* 44 (1): 32–53. [doi:10.1007/s11031-019-09807-4](https://doi.org/10.1007/s11031-019-09807-4).
- 426 Baena-Extremera, A., A. Granero-Gallegos, C. Bracho-Amador, and F. J. Pérez-Quero.
427 2012. "Spanish Version of the Sport Satisfaction Instrument (SSI) Adapted to
428 Physical Education." *Revista de Psicodidáctica* 17 (2): 377–396.
- 429 Bartholomew, K. J., N. Ntoumanis, A. Mouratidis, E. Katartzi, C. Thøgersen-Ntoumani,
430 and S. Vlachopoulos. 2018. "Beware of Your Teaching Style: A School-Year
431 Long Investigation of Controlling Teaching and Student Motivational
432 Experiences." *Learning and Instruction* 53: 50–63.
433 [doi:10.1016/j.learninstruc.2017.07.006](https://doi.org/10.1016/j.learninstruc.2017.07.006).
- 434 Biddle, S. J. H., C. K. J. Wang, N. L. D. Chatzisarantis, and C. M. Spray. 2003.
435 "Motivation for Physical Activity in Young People: Entity and Incremental
436 Beliefs about Athletic Ability." *Journal of Sports Sciences* 21 (12): 973–989.
437 [doi:10.1080/02640410310001641377](https://doi.org/10.1080/02640410310001641377).
- 438 Birdsell, B. J. 2018. "Understanding Students' Psychological Needs in an English
439 Learning Context." *Journal of Liberal Arts Development and Practices* 2: 1–14.
- 440 Chen, B., M. Vansteenkiste, W. Beyers, L. Boone, E. L. Deci, J. Van der Kaap-Deeder,
441 B. Duriez, et al. 2015. "Basic Psychological Need Satisfaction, Need Frustration,
442 and Need Strength Across Four Cultures." *Motivation and Emotion* 39: 216–
443 236. [doi:10.1007/s11031-014-9450-1](https://doi.org/10.1007/s11031-014-9450-1).
- 444 Cheon, S. H., and J. Reeve. 2013. "Do the Benefits from Autonomy-Supportive PE
445 Teacher Training Programs Endure?: A One-Year Follow-Up Investigation."
446 *Psychology of Sport and Exercise* 14 (4): 508–518.
447 [doi:10.1016/j.psychsport.2013.02.002](https://doi.org/10.1016/j.psychsport.2013.02.002).

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 448 Conroy, D. E., J. P. Willow, and J. N. Metzler. 2002. "Multidimensional Fear of Failure
449 Measurement: The Performance Failure Appraisal Inventory." *Journal of*
450 *Applied Sport Psychology* 14 (2): 76–90. [doi:10.1080/10413200252907752](https://doi.org/10.1080/10413200252907752).
- 451 Cox, A. E., and S. Ullrich-French. 2010. "The Motivational Relevance of Peer and
452 Teacher Relationship Profiles in Physical Education." *Psychology of Sport and*
453 *Exercise* 11 (5): 337–344. [doi:10.1016/j.psychsport.2010.04.001](https://doi.org/10.1016/j.psychsport.2010.04.001).
- 454 Curran, T., and M. Standage. 2017. "Psychological Needs and the Quality of Student
455 Engagement in Physical Education: Teachers as Key Facilitators." *Journal of*
456 *Teaching in Physical Education* 36 (3): 262–276. [doi:10.1123/jtpe.2017-0065](https://doi.org/10.1123/jtpe.2017-0065).
- 457 Duda, J. L., and J. G. Nicholls. 1992. "Dimensions of Achievement Motivation in
458 Schoolwork and Sport." *Journal of Educational Psychology* 84 (3): 290–299.
459 [doi:10.1037/0022-0663.84.3.290](https://doi.org/10.1037/0022-0663.84.3.290).
- 460 Ebbeck, V., and M. R. Weiss. 1998. "Determinants of Children's Self-Esteem: An
461 Examination of Perceived Competence and Affect in Sport." *Pediatric Exercise*
462 *Science* 10 (3): 285–298. [doi:10.1123/pes.10.3.285](https://doi.org/10.1123/pes.10.3.285).
- 463 Fernández-Espínola, C., B. J. Almagro, J. A. Tamayo-Fajardo, and P. Sáenz-López.
464 2020. "Complementing the Self-Determination Theory with the Need for
465 Novelty: Motivation and Intention to Be Physically Active in Physical Education
466 Students." *Frontiers in Psychology* 11:1535. [doi:10.3389/fpsyg.2020.01535](https://doi.org/10.3389/fpsyg.2020.01535).
- 467 Ferriz, R., D. González-Cutre, and A. Sicilia. 2015. "Revisión de la Escala del Locus
468 Percibido de Causalidad (PLOC) para la Inclusión de la Medida de la
469 Regulación Integrada en Educación Física [Revision of the Perceived Locus of
470 Causality Scale (PLOC) to Include the Measure of Integrated Regulation in
471 Physical Education]." *Revista de Psicología del Deporte* 24: 329–338.

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 472 Fierro-Suero, S., J. A. Almagro, and P. Sáenz-López. 2020. "Validation of the
473 Achievement Emotions Questionnaire for Physical Education (AEQ-PE).
474 *International Journal of Environmental Research and Public Health* 17:4560.
475 [doi:10.3390/ijerph17124560](https://doi.org/10.3390/ijerph17124560).
- 476 García-González, L., J. Sevil-Serrano, A. Abós, N. Aelterman, and L. Haerens. 2019.
477 "The Role of Task and Ego-Oriented Climate in Explaining Students' Bright and
478 Dark Motivational Experiences in Physical Education." *Physical Education and
479 Sport Pedagogy* 24 (4): 344–358. [doi:10.1080/17408989.2019.1592145](https://doi.org/10.1080/17408989.2019.1592145).
- 480 González-Cutre, D., and A. Sicilia. 2019. "The Importance of Novelty Satisfaction for
481 Multiple Positive Outcomes in Physical Education." *European Physical
482 Education Review* 25 (3): 859–875. [doi:10.1177/1356336X18783980](https://doi.org/10.1177/1356336X18783980).
- 483 González-Cutre, D., A. Sicilia, A. C. Sierra, R. Ferriz, and M. S. Hagger. 2016.
484 "Understanding the Need for Novelty from the Perspective of Self-
485 Determination Theory." *Personality and Individual Differences* 102: 159–169.
486 [doi:10.1016/j.paid.2016.06.036](https://doi.org/10.1016/j.paid.2016.06.036).
- 487 González-Cutre, D., C. Martínez-Galindo, N. Alonso, E. Cervelló, L. Conte, and J. A.
488 Moreno. 2007. "Las creencias implícitas de habilidad y los mediadores
489 psicológicos como variables predictoras de la motivación autodeterminada en
490 deportistas adolescentes [Implicit Ability Beliefs and Psychological Mediators
491 as Predictor Variables of Self-Determined Motivation in Adolescent Athletes]."
492 In *Investigación en la Actividad Física y el Deporte II [Research in Physical
493 Activity and Sport]*, edited by J. Castellano and O. Usabiaga. 407–417. Vitoria:
494 Universidad del País Vasco.
- 495 González-Cutre, D., M. Romero-Elías, A. Jiménez-Loaisa, V. J. Beltrán-Carrillo, and
496 M. S. Hagger. 2020. "Testing the Need for Novelty as a Candidate Need in

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 497 Basic Psychological Needs Theory.” *Motivation and Emotion* 44 (2): 295–314.
498 [doi:10.1007/s11031-019-09812-7](https://doi.org/10.1007/s11031-019-09812-7).
- 499 Goudas, M., S. Biddle, and K. Fox. 1994. “Perceived Locus of Causality, Goal
500 Orientations and Perceived Competence in School Physical Education Classes.”
501 *British Journal of Educational Psychology* 64: 453–463. [doi:10.1111/j.2044-
502 8279.1994.tb01116.x](https://doi.org/10.1111/j.2044-8279.1994.tb01116.x).
- 503 Haerens, L., N. Aelterman, M. Vansteenkiste, B. Soenens, and S. van Petegem. 2015.
504 “Do Perceived Autonomy-Supportive and Controlling Teaching Relate to
505 Physical Education Students' Motivational Experiences Through Unique
506 Pathways? Distinguishing Between the Bright and Dark Side of Motivation.”
507 *Psychology of Sport and Exercise* 16: 26–36.
508 [doi:10.1016/j.psychsport.2014.08.013](https://doi.org/10.1016/j.psychsport.2014.08.013).
- 509 Jiménez-Barbero, J. A., A. Jiménez-Loaisa, D. González-Cutre, V. J. Beltrán-Carrillo,
510 L. Llor-Zaragoza, and J. A. Ruiz-Hernández. 2020. “Physical Education and
511 School Bullying: A Systematic Review.” *Physical Education and Sport
512 Pedagogy* 25: 79–100. [doi:10.1080/17408989.2019.1688775](https://doi.org/10.1080/17408989.2019.1688775).
- 513 Ladwig, M. A., S. Vazou, and P. Ekkekakis. 2018. “My Best Memory is when I was
514 Done with It: PE Memories are Associated with Adult Sedentary Behavior.”
515 *Translational Journal of the American College of Sports Medicine* 3 (16): 119–
516 129. [doi:10.1249/TJX.0000000000000067](https://doi.org/10.1249/TJX.0000000000000067).
- 517 Liukkonen, J., V. Barkoukis, A. Watt, and T. Jaakkola. 2010. “Motivational Climate
518 and Students' Emotional Experiences and Effort in Physical Education.” *The
519 Journal of Educational Research* 103 (5): 295–308.
520 [doi:10.1080/00220670903383044](https://doi.org/10.1080/00220670903383044).

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 521 Martins, J., A. Marques, A. Rodrigues, H. Sarmento, M. Onofre, and F. C. da Costa.
522 2018. “Exploring the Perspectives of Physically Active and Inactive
523 Adolescents: How does Physical Education Influence their Lifestyles?” *Sport,*
524 *Education and Society* 23 (5): 505–519. [doi:10.1080/13573322.2016.1229290](https://doi.org/10.1080/13573322.2016.1229290).
- 525 Mastagli, M., A. Van Hoye, J. P. Hainaut, and B. Bolmont. 2021. The Role of an
526 Empowering Motivational Climate on Pupils’ Concentration and Distraction in
527 Physical Education. *Journal of Teaching in Physical Education*. Advance Online
528 Publication. [doi:10.1123/jtpe.2020-0252](https://doi.org/10.1123/jtpe.2020-0252).
- 529 Min, L. C., and M. Kawabata. 2021. “Perception of Boredom in Physical Education
530 Lessons: What Factors are Associated with Students’ Boredom Experiences?”
531 *Journal of Teaching in Physical Education*. Advance Online Publication.
- 532 Mitchell, F., S. Gray, and J. Inchley. 2015. ““This Choice Thing Really Works ... ’
533 Changes in Experiences and Engagement of Adolescent Girls in Physical
534 Education Classes, During a School-Based Physical Activity Programme.”
535 *Physical Education and Sport Pedagogy* 20 (6): 593–611.
536 [doi:10.1080/17408989.2013.837433](https://doi.org/10.1080/17408989.2013.837433).
- 537 Moreno-Murcia, J. A., and L. Conte. 2011. “Predicción del Miedo a Equivocarse en
538 Jugadores de Baloncesto a Través del Clima Tarea de los Iguales y la
539 Motivación Intrínseca [Prediction of Fear to Err in Basketball Players Through
540 the Peer Motivational Climate and Intrinsic Motivation].” *Revista Mexicana de*
541 *Psicología* 28 (1): 43–52.
- 542 Motl, R. W., and D. E. Conroy. 2000. “Validity and Factorial Invariance of the Social
543 Physique Anxiety Scale.” *Medicine and Science in Sports and Exercise* 32 (5):
544 1007–1017. [doi:10.1097/00005768-200005000-00020](https://doi.org/10.1097/00005768-200005000-00020).

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 545 Ramis, Y., M. Torregrosa, C. Viladrich, and J. Cruz. 2010. "Adaptación y Validación de
546 la Versión Española de la Escala de Ansiedad Competitiva SAS-2 para
547 Deportistas de Iniciación [Adaptation and Validation of the Spanish Version of
548 the Sport Anxiety Scale SAS-2 for Young Athletes]." *Psicothema* 22 (4): 1004–
549 1009.
- 550 Ryan, R. M., and E. L. Deci. 2017. *Self-Determination Theory: Basic Psychological*
551 *Needs in Motivation, Development, and Wellness*. New York: Guilford Press.
- 552 Sáenz-Álvarez, P., A. Sicilia, D. González-Cutre, and R. Ferriz. 2013. "Psychometric
553 Properties of the Social Physique Anxiety Scale (SPAS-7) in Spanish
554 Adolescents." *Spanish Journal of Psychology* 16: 1–9. [doi:10.1017/sjp.2013.86](https://doi.org/10.1017/sjp.2013.86).
- 555 Shen, B., R. K. Wingert, W. Li, H. Sun, and P. B. Rukavina. 2010. "An Amotivation
556 Model in Physical Education." *Journal of Teaching in Physical Education* 29
557 (1): 72–84. [doi:10.1123/jtpe.29.1.72](https://doi.org/10.1123/jtpe.29.1.72).
- 558 Smith, R. E., F. L. Smoll, S. P. Cumming, and J. R. Grossbard. 2006. "Measurement of
559 Multidimensional Sport Performance Anxiety in Children and Adults: The Sport
560 Anxiety Scale-2." *Journal of Sport and Exercise Psychology* 28 (4): 479–501.
561 [doi:10.1123/jsep.28.4.479](https://doi.org/10.1123/jsep.28.4.479).
- 562 Su, H., W. Li, and B. Shen. "Learning in Physical Education: A Self-Determination
563 Theory Perspective." *Journal of Teaching in Physical Education* 36: 277–291.
564 [doi:10.1123/jtpe.2017-0067](https://doi.org/10.1123/jtpe.2017-0067).
- 565 Trigueros, R., J. M. Aguilar-Parra, R. López-Liria, and P. Rocamora. 2019. "The Dark
566 Side of the Self-Determination Theory and Its Influence on the Emotional and
567 Cognitive Processes of Students in Physical Education." *International Journal of*
568 *Environmental Research and Public Health* 16: 4444.
569 [doi:10.3390/ijerph16224444](https://doi.org/10.3390/ijerph16224444).

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

- 570 Trigueros, R., J. J. Maldonado, F. Vicente, J. J. González-Bernal, L. Ortiz, and J.
571 González-Santos. 2020b. “Adaptación y Validación al Contexto de la Educación
572 Física de la Escala de la Frustración de las Necesidades Psicológicas en el
573 Ejercicio Físico, con la Inclusión de la Novedad como Necesidad Psicológica
574 [Adaptation and Validation to the Physical Education Context of the
575 Psychological Need Frustration Scale in Physical Exercise, with the Inclusión of
576 Novelty as a Psychological Need].” *Revista de Psicología del Deporte* 29 (3):
577 91–99.
- 578 Trigueros, R., L. A. Mínguez, J. J. González-Bernal, J. M. Aguilar-Parra, R. Soto-
579 Cámara, J. F. Álvarez, and P. Rocamora. 2020a. “Physical Education Classes as
580 a Precursor to the Mediterranean Diet and the Practice of Physical Activity.”
581 *Nutrients* 12: 239. [doi:10.3390/nu12010239](https://doi.org/10.3390/nu12010239).
- 582 Ullrich-French, S., A. E. Cox, and B. R. Cooper. 2016. “Examining Combinations of
583 Social Physique Anxiety and Motivation Regulations Using Latent Profile
584 Analysis.” *Measurement in Physical Education and Exercise Science* 20 (1): 63–
585 74. [doi:10.1080/1091367X.2015.1107571](https://doi.org/10.1080/1091367X.2015.1107571).
- 586 Vansteenkiste, M., R. M. Ryan, and B. Soenens. 2020. “Basic Psychological Need
587 Theory: Advancements, Critical Themes, and Future Directions.” *Motivation
588 and Emotion* 44: 1–31. [doi:10.1007/s11031-019-09818-1](https://doi.org/10.1007/s11031-019-09818-1).
- 589 Vasconcellos, D., P. D. Parker, T. Hilland, et al. 2020. “Self-Determination Theory
590 applied to Physical Education: A Systematic Review and Meta-Analysis.”
591 *Journal of Educational Psychology* 112 (7): 1444–1469.
592 [doi:10.1037/edu0000420](https://doi.org/10.1037/edu0000420).
- 593 Vermote, B., N. Aelterman, W. Beyers, L. Aper, F. Buyschaert, and M. Vansteenkiste.
594 2020. “The Role of Teachers’ Motivation and Mindsets in Predicting a

- 595 (De)motivating Teaching Style in Higher Education: A Circumplex Approach.”
596 *Motivation and Emotion* 44: 270–294. [doi:10.1007/s11031-020-09827-5](https://doi.org/10.1007/s11031-020-09827-5).
- 597 Wang, C. K. J., and W. C. Liu. 2007. “Promoting Enjoyment in Girls’ Physical
598 Education: The Impact of Goals, Beliefs, and Self-Determination.” *European*
599 *Physical Education Review* 13 (2): 145–164. [doi:10.1177/1356336X07076875](https://doi.org/10.1177/1356336X07076875).
- 600 White, R. L., A. Bennie, D. Vasconcellos, R. Cinelli, T. Hilland, K. B. Owen, and C.
601 Lonsdale. 2021. “Self-Determination Theory in Physical Education: A
602 Systematic Review of Qualitative Studies.” *Teaching and Teacher Education*
603 99: 103247. [doi:10.1016/j.tate.2020.103247](https://doi.org/10.1016/j.tate.2020.103247).
- 604 Zamarripa, J., I. Castillo, I. Tomás, J. Tristán, and O. Álvarez. 2016. “El Papel del
605 Profesor en la Motivación y la Salud Mental de los Estudiantes de Educación
606 Física [The Teacher’s Role on the Motivation and Mental Health in Physical
607 Education Students].” *Salud Mental* 39 (4): 221–227.
- 608 Zamarripa, J., R. Rodríguez-Medellín, J. A. Pérez-García, F. Otero-Saborido, and M.
609 Delgado. 2020. “Mexican Basic Psychological Need Satisfaction and Frustration
610 Scale in Physical Education.” *Frontiers in Psychology* 11: 253.
611 [doi:10.3389/fpsyg.2020.00253](https://doi.org/10.3389/fpsyg.2020.00253)

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

Table 1. Descriptive statistics and Pearson correlations among study variables in the PE context.

Variable	Range	<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Sex ^a	1–2	–	–	.13**	.01	.05	.17**	.03	.02	.13**	.16**	.21**	.05	.18**	.17**	.18**	.24**	.29**	.01
2. Age	12–18	14.47	1.34		.22**	.13**	.01	.04	.15**	.17**	.19**	.10*	.07	.01	-.04	.06	-.01	.02	.19**
3. Race ^b	1–2	–	–			.01	.02	.14**	.04	-.01	.03	.04	.07	-.06	-.08	-.04	.01	.01	.08
4. Autonomy frustration	1–5	2.30	1.00				.60**	.46**	.73**	.59**	.54**	.46**	.46**	.37**	.19**	.34**	.35**	.36**	.31**
5. Competence frustration	1–5	2.31	0.96					.54**	.58**	.44**	.44**	.53**	.43**	.50**	.40**	.42**	.48**	.50**	.22**
6. Relatedness frustration	1–5	1.86	0.89						.50**	.37**	.32**	.45**	.38**	.44**	.26**	.32**	.36**	.35**	.27**
7. Novelty frustration	1–5	2.38	0.88							.50**	.52**	.42**	.43**	.34**	.18**	.35**	.32**	.32**	.28**
8. Amotivation	1–7	1.98	1.30								.63**	.54**	.47**	.34**	.15**	.41**	.38**	.36**	.43**
9. Boredom	1–5	2.07	1.00									.51**	.39**	.36**	.19**	.49**	.37**	.41**	.37**
10. Negative affect	1–5	1.52	0.72										.47**	.53**	.37**	.55**	.61**	.52**	.39**
11. Entity beliefs	1–5	1.92	0.84											.41**	.28**	.39**	.40**	.40**	.37**
12. Fear of failure	1–5	1.89	0.89												.62**	.48**	.57**	.59**	.21**
13. Worry	1–4	2.25	0.88													.47**	.57**	.47**	.06
14. Concentration disruption	1–4	1.69	0.71														.69**	.47**	.37**
15. Somatic anxiety	1–4	1.55	0.70															.59**	.24**
16. Social physique anxiety	1–5	2.24	1.21																.21**
17. Oppositional defiance	1–5	1.35	0.59																

Note. *M* = Mean, *SD* = Standard deviation. ^a Sex codified as 1 = Boys, 2 = Girls. ^b Race codified as 1 = White, 2 = Others. **p* < .05; ***p* < .01

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

Table 2. Hierarchical regression analyses in which maladaptive outcomes were regressed on need frustration constructs.

Variable	Model 1							Model 2						
	<i>B</i> [95% CI]	<i>SEB</i>	β	<i>t</i>	<i>R</i> ²	ΔR^2	ΔF	<i>B</i> [95% CI]	<i>SEB</i>	β	<i>t</i>	<i>R</i> ²	ΔR^2	ΔF
Amotivation	-1.56 [-2.55, -.57]	.50		-3.11	.378	.378	53.13***	-1.57 [-2.55, -.58]	.50		-3.13	.383	.005	4.28*
Sex	.20 [.01, .38]	.09	.08*	2.12				.21 [.03, .39]	.09	.08*	2.28			
Age	.10 [.03, .17]	.04	.10**	2.86				.09 [.02, .16]	.04	.10**	2.61			
Race	-.13 [-.34, .07]	.10	-.05	-1.29				-.13 [-.34, .07]	.10	-.05	-1.31			
Autonomy frustration	.59 [.48, .71]	.06	.46***	10.24				.51 [.38, .65]	.07	.40***	7.39			
Competence frustration	.14 [.01, .27]	.06	.10*	2.17				.11 [-.01, .24]	.07	.09	1.76			
Relatedness frustration	.15 [.03, .27]	.06	.10*	2.37				.12 [-.01, .25]	.06	.08	1.93			
Novelty frustration								.17 [.01, .32]	.08	.11*	2.07			
Boredom	-.92 [-1.71, -.14]	.40		-2.31	.339	.339	44.85***	-.94 [-1.71, -.16]	.39		-2.38	.360	.021	17.49***
Sex	.20 [.05, .34]	.07	.10**	2.65				.22 [.08, .36]	.07	.11**	3.02			
Age	.09 [.04, .15]	.03	.12**	3.22				.08 [.02, .13]	.03	.10**	2.77			
Race	-.01 [-.16, .16]	.08	-.01	-.05				-.01 [-.16, .15]	.08	-.01	-.07			
Autonomy frustration	.40 [.31, .49]	.05	.40***	8.71				.27 [.17, .38]	.06	.27***	5.02			
Competence frustration	.17 [.07, .27]	.05	.17***	3.37				.13 [.03, .23]	.05	.13*	2.59			
Relatedness frustration	.04 [-.06, .14]	.05	.04	.84				.01 [-.10, .10]	.05	.01	.02			
Novelty frustration								.26 [.14, .38]	.06	.23***	4.18			
Negative affect	-.25 [-.80, .31]	.28		-.87	.363	.363	49.80***	-.25 [-.80, .31]	.28		-.88	.363	.001	.43
Sex	.21 [.10, .31]	.05	.14***	3.94				.21 [.11, .31]	.05	.14***	3.98			
Age	.03 [-.01, .06]	.02	.05	1.27				.02 [-.02, .06]	.02	.04	1.18			
Race	-.01 [-.13, .10]	.06	-.01	-.25				-.01 [-.13, .10]	.06	-.01	-.25			
Autonomy frustration	.12 [.06, .19]	.03	.17***	3.82				.11 [.03, .19]	.04	.15**	2.80			
Competence frustration	.22 [.15, .29]	.04	.30***	6.12				.22 [.14, .29]	.04	.29***	5.89			
Relatedness frustration	.17 [.10, .24]	.04	.21***	4.80				.16 [.09, .23]	.04	.20***	4.58			
Novelty frustration								.03 [-.06, .12]	.05	.04	.66			
Entity beliefs	.57 [-.13, 1.26]	.35		1.61	.265	.265	31.62***	.56 [-.13, 1.25]	.35		1.60	.271	.006	4.29*
Sex	-.01 [-.14, .12]	.07	-.01	-1.14				.01 [-.13, .13]	.07	.01	.02			

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

Age	.01 [-.04, .06]	.03	.01	.32				.01 [-.05, .05]	.03	.01	.09			
Race	.07 [-.07, .21]	.07	.04	.99				.07 [-.07, .21]	.07	.04	.98			
Autonomy frustration	.24 [.16, .32]	.04	.28***	5.78				.18 [.08, .28]	.05	.21***	3.66			
Competence frustration	.16 [.07, .25]	.05	.18***	3.51				.14 [.05, .23]	.05	.16**	3.08			
Relatedness frustration	.14 [.05, .23]	.04	.15**	3.21				.12 [.04, .21]	.04	.13**	2.75			
Novelty frustration								.12 [.01, .23]	.06	.12*	2.07			
Fear of failure	.57 [-.14, 1.28]	.36		1.57	.316	.316	40.44***	.57 [-.14, 1.28]	.36		1.58	.316	.000	.11
Sex	.21 [.08, .34]	.07	.12**	3.12				.21 [.07, .34]	.07	.12**	3.08			
Age	.01 [-.05, .05]	.03	-.01	-.01				.01 [-.05, .05]	.03	.01	.02			
Race	-.20 [-.34, -.05]	.07	-.10**	-2.65				-.20 [-.34, -.05]	.07	-.10**	-2.65			
Autonomy frustration	.05 [-.04, .13]	.04	.05	1.13				.06 [-.04, .16]	.05	.06	1.12			
Competence frustration	.30 [.21, .39]	.05	.32***	6.40				.30 [.21, .39]	.05	.32***	6.35			
Relatedness frustration	.25 [.16, .34]	.05	.25***	5.62				.25 [.16, .34]	.05	.25***	5.57			
Novelty frustration								-.02 [-.13, .09]	.06	-.02	-.33			
Worry	1.61 [.84, 2.37]	.39		4.13	.191	.191	20.64***	1.61 [.84, 2.37]	.39		4.13	.191	.001	.33
Sex	.20 [.06, .34]	.07	.12**	2.84				.20 [.06, .34]	.07	.11**	2.79			
Age	-.02 [-.07, .04]	.03	-.03	-.63				-.02 [-.07, .04]	.03	-.02	-.56			
Race	-.19 [-.34, -.03]	.08	-.10*	-2.33				-.19 [-.34, -.03]	.08	-.10*	-2.32			
Autonomy frustration	-.08 [-.17, .01]	.05	-.09	-1.85				-.07 [-.17, .04]	.05	-.07	-1.21			
Competence frustration	.35 [.25, .44]	.05	.38***	6.97				.35 [.25, .45]	.05	.38***	6.95			
Relatedness frustration	.11 [.02, .20]	.05	.11*	2.29				.12 [.02, .21]	.05	.12*	2.36			
Novelty frustration								-.04 [-.16, .09]	.06	-.04	-.58			
Concentration disruption	.49 [-.12, 1.09]	.31		1.58	.217	.217	24.22***	.48 [-.12, 1.09]	.31		1.57	.223	.006	3.89*
Sex	.17 [.06, .28]	.06	.12**	2.95				.18 [.07, .29]	.06	.12**	3.11			
Age	.02 [-.02, .06]	.02	.03	.83				.01 [-.03, .06]	.02	.03	.61			
Race	-.11 [-.23, .02]	.06	-.07	-1.70				-.11 [-.23, .02]	.06	-.07	-1.72			
Autonomy frustration	.08 [.01, .15]	.04	.12*	2.31				.04 [-.05, .12]	.04	.05	.83			
Competence frustration	.20 [.12, .27]	.04	.27***	4.99				.18 [.10, .26]	.04	.25***	4.55			
Relatedness frustration	.10 [.03, .17]	.04	.13**	2.62				.08 [.01, .16]	.04	.11*	2.19			
Novelty frustration								.10 [.01, .19]	.05	.12*	1.97			
Somatic anxiety	.61 [.04, 1.18]	.29		2.11	.282	.282	34.33***	.61 [.04, 1.18]	.29		2.10	.282	.000	.07

NOVELTY FRUSTRATION AND PHYSICAL EDUCATION

Sex	.25 [-.14, .35]	.05	.18***	4.64				.25 [.14, .35]	.05	.18***	4.64			
Age	-.02 [-.06, .02]	.02	-.04	-1.13				-.02 [-.06, .02]	.02	-.05	-1.15			
Race	-.01 [-.12, .11]	.06	-.01	-.11				-.01 [-.12, .11]	.06	-.01	-.12			
Autonomy frustration	.06 [-.01, .13]	.03	.09	1.80				.05 [-.03, .13]	.04	.08	1.34			
Competence frustration	.24 [.17, .31]	.04	.33***	6.43				.24 [.16, .31]	.04	.33***	6.26			
Relatedness frustration	.11 [.04, .18]	.04	.14**	3.08				.11 [.04, .18]	.04	.14**	2.97			
Novelty frustration								.01 [-.08, .10]	.05	.02	.27			
Social physique anxiety	.19 [-.77, 1.16]	.49		.39	.314	.314	40.03***	.20 [-.77, 1.16]	.49		.40	.314	.000	.09
Sex	.56 [.39, .74]	.09	.23***	6.23				.56 [.38, .74]	.09	.23***	6.18			
Age	-.02 [-.09, .04]	.03	-.03	-.68				-.02 [-.09, .05]	.04	-.03	-.64			
Race	-.04 [-.24, .16]	.10	-.01	-.38				-.04 [-.24, .16]	.10	-.01	-.38			
Autonomy frustration	.11 [.01, .23]	.06	.09*	2.01				.13[-.01, .26]	.07	.10	1.84			
Competence frustration	.43 [.31, .55]	.06	.34***	6.85				.43 [.31, .56]	.06	.35***	6.78			
Relatedness frustration	.16 [.04, .28]	.06	.12**	2.64				.16 [.04, .29]	.06	.12**	2.64			
Novelty frustration								-.02 [-.18, .13]	.08	-.02	-.31			
Oppositional defiance	-.10 [-.63, .43]	.27		-.38	.136	.136	13.81***	-.10 [-.64, .43]	.27		-.38	.138	.001	.89
Sex	-.05 [-.14, .05]	.05	-.04	-.93				-.04 [-.14, .06]	.05	-.04	-.86			
Age	.07 [.03, .11]	.02	.16***	3.63				.07 [.03, .10]	.02	.15***	3.50			
Race	.03 [-.08, .14]	.06	.03	.61				.03 [-.08, .14]	.06	.03	.60			
Autonomy frustration	.12 [.06, .19]	.03	.21***	3.96				.10 [.03, .18]	.04	.18**	2.76			
Competence frustration	.01 [-.06, .08]	.04	.02	.36				.01 [-.06, .08]	.04	.01	.18			
Relatedness frustration	.10 [.03, .16]	.03	.14**	2.88				.09 [.02, .16]	.03	.13**	2.64			
Novelty frustration								.04 [-.04, .13]	.04	.06	.95			

Note. * $p < .05$; ** $p < .01$; *** $p < .001$