

JYX



JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

This is a self-archived version of an original article. This version may differ from the original in pagination and typographic details.

Author(s): Bortoli, Laura; Ruiz, Montse C.; Robazza, Claudio

Title: Psychobiosocial Experiences in Physical Education : A Semantic Differential Scale

Year: 2023

Version: Accepted version (Final draft)

Copyright: © 2023 Taylor & Francis Group, LLC

Rights: CC BY-NC-ND 4.0

Rights url: <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Please cite the original version:

Bortoli, L., Ruiz, M. C., & Robazza, C. (2023). Psychobiosocial Experiences in Physical Education : A Semantic Differential Scale. *Measurement in Physical Education and Exercise Science*, 27(4), 317-331. <https://doi.org/10.1080/1091367X.2023.2186179>

1 Bortoli, L., Ruiz, M. C., & Robazza, C. (2023). Psychobiosocial experiences in physical education:
2 A semantic differential scale. *Measurement in Physical Education and Exercise Science*, 1–15.
3 <https://doi.org/10.1080/1091367X.2023.2186179>

5 **Psychobiosocial Experiences in Physical Education: A Semantic Differential Scale**

8 Laura Bortoli¹, Montse C. Ruiz², and Claudio Robazza^{1*}

10 ¹*BIND-Behavioral Imaging and Neural Dynamics Center, Department of Medicine and Aging*
11 *Sciences, “G. d’Annunzio” University of Chieti-Pescara, 66013 Chieti, Italy*

12 ²*Faculty of Sport and Health Sciences, University of Jyväskylä, 40014 Jyväskylä, Finland*

14 *Contact: Claudio Robazza c.robazza@unich.it, BIND-Behavioral Imaging and Neural Dynamics
15 Center, Department of Medicine and Aging Sciences, “G. d’Annunzio” University of Chieti-
16 Pescara, Via dei Vestini, 31, 66013 Chieti, Italy

17
18 Laura Bortoli <https://orcid.org/0000-0001-5610-4683>

19
20 Montse C. Ruiz <https://orcid.org/0000-0002-1116-206X>

21
22 Claudio Robazza <https://orcid.org/0000-0002-3639-1539>

23
24
25

26 **Psychobiosocial Experiences in Physical Education: A Semantic Differential Scale**

27

28

Abstract

29 The objective of this study was to develop and validate the Psychobiosocial Experience Semantic
30 Differential in Physical Education (PESD-PE) scale, a new holistic measure of discrete emotion-
31 related feelings (i.e., psychobiosocial experiences) as conceived within the individual zones of
32 optimal functioning (IZOF) framework. A preliminary version of the PESD-PE was administered to
33 336 students (171 girls, 165 boys), while the final version was administered to a new sample of 352
34 students (186 girls, 166 boys) aged 14–19 years. Overall, findings provided evidence of factorial
35 and construct validity for a model containing 33 items loading into 11 modalities, with 3 items
36 each. Convergent, discriminant, and nomological validity of the PESD-PE was also found. This
37 new measure of discrete experiences will help increase our knowledge about the reciprocal effects
38 between emotion-related feelings and performance, and will also inform practical interventions
39 aimed at creating more adaptive psychobiosocial experiences in accordance with physical education
40 goals.

41 *Keywords:* assessment, emotions, IZOF model, performance, scale development

42 **Psychobiosocial Experiences in Physical Education: A Semantic Differential Scale**

43 A substantial amount of research provides compelling evidence that students' emotional
44 experiences play a key role in academic engagement, motivation, learning, social interaction,
45 behavior, and psychological health (Linnenbrink-Garcia et al., 2016; Pekrun, 2017). This research
46 has clearly established that some emotions (e.g., enjoyment, happiness, pride, satisfaction) can
47 benefit a range of relevant cognitive and motivational processes associated with academic learning,
48 including attention, memory storage and retrieval, reasoning, problem solving, and decision
49 making, while other emotions (e.g., anger, anxiety, frustration, boredom) can hamper the same
50 processes (Pekrun, 2016; Pekrun et al., 2018).

51 The main focus of physical education research has been on the effect of student emotions on
52 learning, achievement, and behavior (e.g., Simonton & Garn, 2019), and the long-term impact on
53 physical activity during leisure time, health, and wellbeing (Di Battista et al., 2019; Shephard &
54 Trudeau, 2000). Findings provide physical educators with evidence-based teaching strategies to
55 create supportive contexts in which students experience enjoyment, feel competent, and learn motor
56 skills to engage in physical activity, thus, laying the foundation for an active lifestyle (Adank et al.,
57 2021). Therefore, emotions assessment can be helpful in increasing our understanding about student
58 engagement and in stimulating exercise habits throughout life (Simonton & Garn, 2019).

59 In physical education, several measures have been developed to assess anxiety (e.g.,
60 Barkoukis et al., 2012), enjoyment (e.g., Carraro et al., 2008; Morano et al., 2019), positive and
61 negative affect (e.g., Martin & Kulinna, 2005), boredom (Karagiannidis et al., 2015), anger
62 (Simonton & Garn, 2020), and a range of emotions (e.g., Robazza & Bortoli, 2005; Simonton et al.,
63 2023). Several instruments exist for the assessment of selected discrete emotions. For instance,
64 Trigueros et al. (2019) proposed the Scale of Emotions in Physical Education (SEPE) to measure
65 embarrassment, boredom, hopelessness, anxiety, confidence, pride, calmness, and enjoyment in a
66 sample of 13–19-year-old Spanish students, while Fierro-Suero et al. (2020), proposed the
67 Achievement Emotions Questionnaire for Physical Education (AEQ-PE) to measure pride,

68 enjoyment, anger, anxiety, hopelessness, and boredom in 11–17-year-old students. Moreover,
69 Simonton et al. (2018) developed the Discrete Emotions in Physical Education Scale (DEPES)
70 targeting three emotions students experience during an activity, namely, enjoyment, boredom, and
71 anger. The scale was later expanded to distinguish between process-related or in-activity emotions,
72 and outcome-related emotions with the addition of pride, shame, and relief (Simonton et al., 2023).
73 Both process- and outcome-related emotions are theoretically based on the control-value theory of
74 achievement emotions (Pekrun, 2006). A strength of these scales is that they target the assessment
75 of selected emotions commonly experienced by students. However, one limitation is that they do
76 not consider a number of important individual manifestations associated with emotions, such as
77 cognitive, motivational, somatic, motor, performance, and communication aspects that characterize
78 the emotional experiences of physical education students.

79 According to Pekrun's (2006) control-value theory, emotions are multifaceted phenomena
80 conceptualized as a set of interrelated psychological processes involving subjective feelings
81 (affective component of emotion), cognitions, motivational tendencies, physiological processes, and
82 expressive behavior (Shuman & Scherer, 2014). In physical education, for example, a student
83 involved in thrilling activities may feel energized, focused on the task, and eager to continue the
84 experience. The resulting increase in heart rate can further enhance fun and its overt expression. On
85 the other hand, tedious activities tend to cause boredom, disinterest, withdrawal tendencies, loss of
86 energy, and related bodily expressions. Therefore, it is important to provide physical educators and
87 researchers with reliable and sound measures to evaluate the multiple and different components of
88 student emotional experiences. Self-assessment tools are easy to administer and appropriate to
89 measure emotions and thoughts, which by definition, are subjective phenomena (Pekrun et al.,
90 2018).

91 The multifaceted feature of emotions is also characteristic of the so-called psychobiosocial
92 states (or emotion-related experiences) as construed within the individual zones of optimal
93 functioning (IZOF) model initially applied to sport (Hanin, 2000, 2007, 2010). Psychobiosocial

94 experiences are viewed as an array of situational (state-like) or relatively stable (trait-like)
95 emotional and non-emotional subjective manifestations of total human functioning linked to
96 performance. In the most recent conceptualization, psychobiosocial experiences encompass several
97 interrelated modalities including enjoyment, confidence, anxiety, motivation, volition,
98 assertiveness, and cognitive (psychological component), bodily-somatic, motor-behavioral
99 (biological component), operational, communicative, and social support (social component; for
100 complete description and review, see Ruiz et al., 2016, 2017, 2021; Ruiz & Robazza, 2020).
101 Emotions are key components of psychobiosocial experiences with specific valence (i.e., pleasant
102 or unpleasant experience) and functionality (i.e., functional or dysfunctional effects on
103 performance). Four categories of emotional experiences are identified: pleasant–functional,
104 unpleasant–functional, pleasant–dysfunctional, and unpleasant–dysfunctional. The perceived effect
105 of emotions and related psychobiosocial experiences on performance depends on the meaning and
106 value people attribute to their interaction with the environment and others, their perceived level of
107 available resources to manage the situation, and the ability to self-regulate (Hanin & Ekkekakis,
108 2014).

109 The multimodal conceptualization of psychobiosocial experiences concurs with views
110 typically endorsed in appraisal theories (Lazarus, 2001; Scherer et al., 2001), as well as in main
111 theoretical frameworks of emotions, including basic (primary, fundamental, discrete) and
112 dimensional (e.g., valence or arousal) theories of emotions (Coppin & Sander, 2021). This
113 perspective is useful for both conceptualizing and measuring emotions (Mauss & Robinson, 2009)
114 and related experiences. Numerous studies provide support to the multimodal conceptualization and
115 applied advantages of measuring a range of psychobiosocial states in physical education (e.g.,
116 Bortoli et al., 2015, 2017; Di Battista et al., 2019) and sport (e.g., Di Corrado et al., 2015;
117 Middleton et al., 2017; Nateri et al., 2020; Robazza et al., 2012, 218; Ruiz et al., 2019a). In
118 particular, three scales have been proposed for the assessment of functional and dysfunctional
119 psychobiosocial experiences, one targeting physical education (Bortoli et al., 2018) and two for

120 sport (Robazza et al., 2016; Ruiz et al., 2019b). An advantage of these scales is that they provide a
121 two-dimensional evaluation of functional and dysfunctional experiences. However, factor analyses
122 indicate that these are global assessments and, thus, do not capture the specific and discrete
123 psychobiosocial modalities. For example, the functional and dysfunctional dimensions of the
124 Psychobiosocial States in Physical Education (PBS-SPE) scale (Bortoli et al., 2018) are comprised
125 of eight items each, which are then collapsed in the two dimensions. What is currently missing is a
126 measure targeting discrete or separate psychobiosocial experiences of physical education students,
127 as conceptualized within the IZOF model (Hanin, 2007, 2010) and the control-value theory of
128 emotions (Pekrun, 2006). Both theoretical perspectives view emotions as a set of interconnected
129 psychological processes entailing subjective feelings, cognitions, motivational tendencies,
130 physiological processes, and expressive behavior. The present study, therefore, aims to extend the
131 current body of work on the assessment of emotions in physical education by proposing a new tool
132 to capture separate modalities of psychobiosocial experiences and, thus, going beyond assessment
133 of two global functional and dysfunctional dimensions which are assessed through existing
134 instruments. We believe a new discrete multimodality scale can offer more detailed information on
135 the emotion-related experiences of physical education students.

136 To overcome the limitations of existing dimensional scales with a measure of discrete
137 modalities, Robazza et al. (2021) developed the Psychobiosocial Experience Semantic Differential
138 scale (PESD-Sport) for use with athletes. A preliminary version of a 53-item scale using a semantic
139 differential format was administered to a sample of athletes to attain a clear and unequivocal
140 distinction between opposite experiences along the functionality distinction (see Rosenberg &
141 Navarro, 2018). The PESD-Sport was developed following the set of procedural guidelines for
142 semantic differentials recommended by Verhagen et al. (2015). In particular, a large sample of
143 bipolar items (adjectives and their opposites) was created, and agreement was reached on which
144 items to consider representing each of the 12 modalities of psychobiosocial experiences. The
145 preliminary version of the PESD-Sport was then administered to the athletes to select the best

146 indicators that would be retained in the final version of the scale. The final version was comprised
147 of 30 items loading into 10 modalities (i.e., enjoyment, confidence, anxiety, assertiveness,
148 cognitive, bodily-somatic, motor-behavioral, operational, communicative, and social support), 3
149 items each. The final PESD-Sport scale was then administered to a new sample of athletes to
150 examine factorial, construct, convergent, discriminant, and nomological validity. Several items of
151 the PESD-Sport are also included in the dimensional scale of psychobiosocial states in physical
152 education (PBS-SPE; Bortoli et al., 2018), as both instruments are based on the conceptual
153 framework of the IZOF model (Hanin 2000, 2007). With the aim of adopting the semantic
154 differential format, in the development of the new discrete measure of psychobiosocial experiences,
155 the 53 items contained in the preliminary version of the PESD-Sport we administered to students
156 with adapted instructions to fit the physical education setting.

157 **Study Purpose**

158 Grounded in the IZOF model (Hanin, 2000, 2007) and extensive research on psychobiosocial
159 experiences (see Ruiz et al., 2017), the purpose of this two-study investigation was to develop a
160 multimodality scale in Italian language to assess discrete psychobiosocial experiences in physical
161 education. Similar to the scale developed in sport (Robazza et al., 2021), and building upon the
162 existing two-dimensional measure of psychobiosocial experiences in physical education (Bortoli et
163 al., 2018), the new measure was intended to separately capture specific categories of
164 psychobiosocial modalities representing a variety of meaningful student experiences. The format of
165 this measure, called the Psychobiosocial Experience Semantic Differential scale in Physical
166 Education (PESD-PE), was aimed to minimize the time and psychological burden that participants
167 are subjected to during the data collection process. Therefore, the adjectives of the PESD-PE were
168 arranged in a semantic differential format instead of using separate antonyms to create a relatively
169 short measure easily applicable in the physical education context.

170

Method

171 In Study 1 we administered a large pool of items to high school students to identify the best
172 indicators of each of the different psychobiosocial modalities and still maintained the expected
173 factor structure. In Study 2 we cross validated the final version of the scale in a second sample of
174 students. Construct validity of the measure was assessed through correlations with an enjoyment
175 scale and two motivation scales often used in physical education. We expected to find support for
176 the measure of discrete psychobiosocial experiences in physical education, which would reflect
177 sound convergent, discriminant, and nomological validity.

Study 1

179 Study 1 aimed to examine items characteristics, factor structure, construct validity, reliability,
180 convergent validity, and discriminant validity of the PESD-PE.

Participants

182 Participants were 336 students (171 girls, 165 boys), aged 14–19 years ($M = 16.82$, $SD =$
183 1.43), from 7 high schools in Central Italy. Students were involved in mandatory physical education
184 classes twice a week during the academic year. According to the Italian physical education
185 curriculum, a main goal is the development of physical, emotional, and cognitive skills of students
186 (Italian Ministry of Education, University, and Research, 2009). Frequently proposed activities are
187 aimed at developing postural control, flexibility, resistance, speed, physical fitness, and agility, as
188 well as teaching different motor and sport skills. Girls and boys are involved in individual and
189 group tasks, including preparatory skills for acrobatic gymnastics, track and field, and team sports
190 (e.g., basketball, football, handball, and volleyball). Competitive events are held separately.
191 Students are also taught how to achieve and maintain good fitness levels and a healthy lifestyle.

Measure

193 The preliminary 53 items included in the Italian version of the PESD-Sport (Robazza et al.,
194 2021) were administered, asking participants to think about how they usually felt during physical
195 education classes. The 53 bipolar items were derived from an initial list of 93 adjectives included in

196 individualized multidimensional profiling of psychobiosocial states in sport, which was proposed to
197 assess 12 functional and dysfunctional state modalities (Ruiz et al., 2021). Most of these items were
198 also contained in the PBS-SPE scale (Bortoli et al., 2018; for more details, see Robazza et al.,
199 2021). The 12 modalities were enjoyment, confidence, anxiety, motivation, volition, assertiveness,
200 and cognitive (psychological component), bodily-somatic, motor-behavioral (biological
201 component), operational, communicative, and social support (social component; Ruiz et al., 2021).
202 The enjoyment modality comprised unhappy, sad, and dejected, and their antonyms happy, joyful,
203 and cheerful. These emotions were also included in the dejection and happiness subscales of the
204 Sport Emotion Questionnaire (SEQ; Jones et al., 2005), while tense and nervous, comprised in the
205 anxiety modality, were also included in the anxiety subscale of the SEQ.

206 Each item was rated on a 9-point, bipolar Likert-type scale ranging from 4 (*very much*) to 0
207 (*neither... nor*) on the “dysfunctional” side and from 0 to 4 on the “functional” side. The scores on
208 the dysfunctional side are transformed into negative scores. Therefore, an item score could range
209 from –4 to 4, where 0 indicates no effect. Dysfunctional adjectives were placed on the left of the
210 Likert scale while their functional antonyms were placed on the right to facilitate respondents’
211 judgments and reduce their mental effort (Rosenberg & Navarro, 2018). Examples of bipolar items
212 are Unhappy–Happy and Unconfident–Confident. In the case of anxiety and communicative
213 modalities, antonyms were not used because research results have consistently shown that some
214 performers can perceive anxiety symptoms as being functional for performance, while others can
215 appraise the same symptoms as dysfunctional (Mellalieu et al., 2006; Neil et al., 2012).
216 Idiosyncratic perceptions were also observed for communication, with some individuals preferring
217 to isolate themselves to better focus on the task, while others seek support from peers or other
218 people (Rees & Freeman, 2012). Therefore, on the anxiety and communicative modalities bipolar
219 items were formulated as either “harmful” or “useful” (e.g., “Nervous in a harmful way–Nervous in
220 a useful way”, “Being sociable is harmful–Being sociable is useful”).

221 ***Procedure***

222 Both studies were conducted in accordance with the Declaration of Helsinki and after ethical
223 approval of the ethics committee of the local university (EC 19, 09/09/2021). School headmasters,
224 physical education teachers, and parents of minors were contacted and explained the general
225 purpose of the study. Those students who decided to participate and the parents of minors signed an
226 informed consent form. Individual assessments took place at school, in groups of four or five
227 students just before lessons, in a secluded location without the presence of the teacher. Those
228 students who were preparing for the physical education class and were not immediately involved in
229 the assessment waited briefly for their turn in the dressing room. Before scale administration,
230 students were advised that participation in the study was voluntary, they could end the session at
231 any time without any consequences, and individual responses would remain confidential. They were
232 also briefed on the overall purpose of the study and presented with instructions indicating that there
233 were no right or wrong answers. Students were then asked to complete the 53-item scale referring to
234 how they usually feel during physical education classes. For each row of items, they had to choose a
235 functional or dysfunctional descriptor representative of their experiences and evaluate its intensity
236 on the 4–0–4 scale. The whole procedure took approximately 20–30 min.

237 *Data Analysis*

238 The factor structure of the preliminary 53-item scale was examined using exploratory
239 structural equation modeling (ESEM; Marsh et al., 2009; Morin & Maïano, 2011) and Target
240 oblique rotation relying on a priori specification of the items pertaining to the psychobiosocial
241 modalities, with all cross-loadings being freely estimated but with a target value close to zero. The
242 use of Target rotation provides a way to rely on a more confirmatory than an exploratory approach
243 to the estimation of factors, but without imposing the highly restrictive feature of exactly zero
244 loadings that typify a more restrictive confirmatory factor analysis. Target rotation is appropriate
245 when researchers are guided by a nonmechanical exploratory process and, thus, have a clear view of
246 the predicted factor structure (see Myers et al., 2013, 2015). According to Myers et al.'s (2016,
247 2018) indications, sample size for ESEM was determined using the root mean square error of

248 approximation (RMSEA). We computed the minimum sample size for RMSEA using the code
249 developed by Preacher and Coffman (2006) for the R program (<https://cran.r-project.org/>). A
250 sample size of 205 resulted after setting type I error rate to $\alpha = .05$, power = .80, null RMSE = .05,
251 alternative RMSE = .04, and $df = 676$. Thus, the initial sample of 336 participants was adequate.

252 The parameters were estimated using the robust maximum likelihood estimator (MLR) for
253 non-normal data. Model fit was assessed using several criteria (Hu & Bentler, 1999; Schumacker &
254 Lomax, 2016), which included chi-square (χ^2) goodness-of-fit index, normed chi-square (χ^2/df),
255 comparative fit index (CFI), Tucker Lewis fit index (TLI), root mean square error of approximation
256 (RMSEA), and standardized root mean square residual (SRMR). To establish whether items were
257 reasonable indicators of latent factors, we considered statistically significant standardized values
258 above .50 (Hair et al., 2019). The fit of alternative models was compared using the Akaike's
259 Information Criterion (AIC) values and the parsimony comparative fit index (PCFI). Higher values
260 of CFI, TLI, and PCFI, and lower values of χ^2 , χ^2/df , RMSEA, SRMR, and AIC indicate model fit
261 improvement. All data analyses were performed in *Mplus* version 8.5 (Muthén & Muthén, 2017).

262 The internal consistency of the subscale scores was ascertained by Cronbach's alpha,
263 McDonald's omega, and composite reliability values. Alpha and omega coefficients should be at
264 least .50, preferably greater than .70 (Watkins, 2017). Convergence among a set of items
265 representing a latent construct was examined by the average variance extracted (AVE) of the latent
266 variables. AVE values close to or larger than .50 suggest adequate convergence of items (Hair et al.,
267 2019). Finally, discriminant validity was determined by comparing the AVE estimates for each
268 factor with the squared interconstruct correlations related to that factor. Discriminant validity is
269 assumed when variance extracted estimates are larger than the corresponding interconstruct squared
270 correlation values (Hair et al., 2019).

271 **Results**

272 Eight cases were removed because of missing values or identified as outliers (Mahalanobis'
273 distance, $p < .001$). Minimum and maximum values for skewness and kurtosis of the 53 items
274 ranged from -1.625 to -0.146 and from $-.828$ to 2.777 , respectively.

275 ESEM model for 12 modalities and 53 items configuration provided poor fit to the data
276 (Table 1). Several items had poor standardized factor loadings ($< .30$), cross-loadings on unintended
277 factors ($> .30$), and two or more moderate or large modification indices (over 15). Twenty items,
278 out of 53 items, were systematically removed in different iterations. The resulting final scale was
279 comprised of 33 items loading in 11 modalities consisting of 3 items each and represented in a first-
280 order factor model (see Table 1 and Supplemental Figure 1a). We retained three items in each
281 modality to ensure a relatively short measure easily applicable in the physical education context,
282 which at the same time provided coverage of the theoretical domain of a construct as well as
283 adequate identification of the construct in a factor analysis (Hair et al., 2019). The retained items
284 were the best indicators of latent factors reflecting 11 out of 12 theoretical constructs of the scale,
285 with standardized factor loadings greater than $.65$ (Supplemental Table 1). The 11 modalities were:
286 enjoyment, confidence, anxiety, assertiveness, cognitive, and motivational (psychological
287 modality); bodily-somatic and motor-behavioral (bodily modality); and operational,
288 communicative, and social support (social modality). The volitional modality was the only one
289 removed after inspection of the modification indices and because of cross-loadings indicating
290 substantial overlapping with the motivational modality. ESEM on the final 11-modality, 33-item
291 model showed good fit to the data. The PESD-PE is reported as Appendix 1 in the Supplemental
292 file.

293 All standardized factor loadings were above $.600$ ($\lambda = .662-.882$) and item residual variances
294 ranged from $\delta = .222$ to $.562$ (see Supplemental Table 1). Latent factor correlation values ranged
295 from $.349$ to $.801$. Six correlations were low (r between $.20$ and $.39$; Zhu, 2012), 24 were moderate
296 (r between $.40$ and $.59$), 24 were moderately high (r between $.60$ and $.79$), and 1 was high ($r > .80$).
297 Correlation coefficients and reliability indices are shown in Supplemental Table 2.

298 Discussion

299 Preliminary evidence of construct validity of the PESD-PE was found. ESEM yielded
300 satisfactory fit indices for the 11-modality, 33-item model supporting the factor structure of the
301 scale based on the theoretical conceptualization of psychobiosocial experiences. Scale reliability
302 was demonstrated via internal consistency values (α , ω , and CR), which were all higher than .70.
303 Adequate convergent validity of the scale modalities was also shown with standardized loading
304 estimates and AVE values higher than .50, with the exception of the AVE value for the
305 communicative modality that was .499. Taking as a reference this minimum AVE value, AVE
306 estimates were greater than the squared correlations between two modalities for 45 correlations out
307 of 55. The discriminant validity of the scale modalities was thus proved.

308 Study 2

309 The objectives of Study 2, in which a new sample was involved, were (a) to cross validate the
310 11-modality, 33-item solution resulting from Study 1, (b) to assess convergent and discriminant
311 validities through correlations with an emotion related measure, and (c) determine nomological
312 validity (i.e., the extent to which a scale relates to existing theory-based concepts) in comparison
313 with a perceived motivational climate scale and a motivational scale often used in physical
314 education.

315 Participants

316 Participants in Study 2 had similar demographic characteristics to those who took part in
317 Study 1. The sample consisted of 352 students (186 girls, 166 boys), aged 14–19 years ($M = 16.86$,
318 $SD = 1.41$), from 7 high schools in Central Italy.

319 Measures

320 The measures administered were the 11-modality, 33-item solution of the PESD-PE obtained
321 in Study 1 (see Appendix 1 in Supplemental file), the Physical Activity Enjoyment Scale (PACES;
322 Kendzierski & DeCarlo, 1991), the Teacher-Initiated Motivational Climate in Physical Education
323 Questionnaire (TIMCPEQ; Papaioannou, 1998), and the Basic Psychological Needs in Physical

324 Education scale (BPN-PE; Vlachopoulos et al., 2011). The PACES was used to evaluate convergent
325 and discriminant validity of the PESD-PE, while the TIMCPEQ and the BPN-PE were used to
326 evaluate nomological validity.

327 The PACES comprises 16 items gauging enjoyment feelings related to physical activity. Nine
328 items load onto a pleasant-feelings factor (e.g., “I enjoy it”) and other seven load onto an
329 unpleasant-feelings factor (e.g., “I dislike it”). Students rated the items on a 5-point Likert scale
330 ranging from 1 = *totally disagree* to 5 = *totally agree*, based on the feelings they usually experience
331 during physical education classes. Support to the two-factor solution was provided in Italian girls
332 and boys aged from 11 to 19 years (Carraro et al., 2008).

333 The TIMCPEQ includes 12 items assessing student perceptions of task-involving and ego-
334 involving motivational climates. Six items are designed to measure the task-involving climate
335 created when the teacher’s emphasis is placed on skill mastery and effort (e.g., “The physical
336 education teacher is most satisfied when every student learns something new”), and other six items
337 assess the ego-involving climate when the teacher’s emphasis is on social comparison and
338 competition (e.g., “Only the students with the best records are rewarded”). Students were asked to
339 think about the climate their teachers create in physical education classes and rate the items on a 5-
340 point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Confirmatory factor analysis
341 (CFA) supported the two-dimensional structure of the questionnaire translated and adapted into the
342 Italian language (Bortoli et al., 2008, 2017).

343 The BPN-PE consists of 12 items to measure student perceptions of autonomy, competence,
344 and relatedness. These are central constructs in self-determination theory and believed to be innate,
345 universal, and capable of affecting wellness and thriving outcomes (Ryan & Deci, 2017). The three
346 4-item subscales reflect the theorized constructs of autonomy (e.g., “I feel like the activities we are
347 doing have been chosen by me”), competence (e.g., “I feel that I improve even in the tasks
348 considered difficult by most of my peers”), and relatedness (e.g., “I feel like a valued member of a
349 group of close friends”). Ratings were made on a 7-point scale ranging from 1 = *does not*

350 *correspond at all to 7 = corresponds exactly*, thinking about themselves while engaging in physical
351 education classes. The factor structure, reliability, and nomological validity of the BPN-PE was
352 supported across samples of elementary, middle, and high school Greek students (Vlachopoulos et
353 al., 2011). For the purposes of this study, the items were adapted to the Italian language using the
354 backward translation procedures.

355 ***Procedure***

356 Assessment was conducted using the same procedure described in Study 1 (i.e., institutional
357 approval and administration of questionnaires). Students were asked to complete the measures by
358 thinking about their usual experiences and feelings during physical education classes.

359 ***Data Analysis***

360 The factorial validity of the PESD-PE resulting from Study 1 was assessed through CFA
361 using the maximum likelihood parameter estimates (MLM) with standard errors and a mean-
362 adjusted chi-square test statistic that is robust to non-normality (Byrne, 2012). CFA is more
363 restrictive than ESEM because cross-loadings are constraint to zero. A minimum sample size of 165
364 for RMSEA was found with $\alpha = .05$, power = .80, null RMSE = .05, alternative RMSE = .02, and df
365 = 154.

366 According to Robazza et al. (2021), and in line with theoretical assumptions, the
367 psychobiosocial modalities were expected to be correlated. As a consequence, different competing
368 first-order, higher-order, and nested-factor measurement models could represent the structure of the
369 instrument (Brunner et al., 2012; Canivez, 2016). We therefore tested several competing
370 measurement models that fall within the IZOF conceptual framework (Hanin, 2000, 2007) and
371 could reasonably reflect distinct structures of the new measure (see Supplemental file). In
372 particular, we compared seven competing measurement models possibly representing the final
373 version of the scale structure: (1) a first-order factor model with correlated psychobiosocial
374 modalities with paths leading to the observed variables (this model was tested using ESEM in Study
375 1 and CFA in Study 2; see Supplemental Figures 1a and 1b); (2) a second-order factor model with

376 paths specified from a second-order factor (i.e., global psychobiosocial experiences) to the first-
377 order factors (i.e., the psychobiosocial modalities) with paths leading to the observed indicators
378 (Supplemental Figure 2); (3) a second-order factor model with paths specified from three second-
379 order factors representing psychological, biological, and social components leading to the first-
380 order factors (Supplemental Figure 3a); (4) a second-order factor model with three second-order
381 factors in which the operational modality is included in the biological component rather than the
382 social component (Supplemental Figure 3b); (5) a nested-factor model (i.e., bifactor measurement
383 model) in which both a general factor and the first-order factors had direct paths to the observed
384 indicators (Supplemental Figure 4); (6) a nested-factor model with three factors, representing
385 psychological, biological, and social states, and the first-order factors having direct paths to the
386 observed indicators (Supplemental Figure 5a); and (7) a nested-factor model with three factors in
387 which the operational modality of the social component is included in the biological component
388 (Supplemental Figure 5b).

389 After computing descriptive statistics, correlation coefficients, and reliability values of the
390 study variables, we examined measurement and structural invariance of the scale across the two
391 study samples. To this purpose, multigroup CFAs were conducted increasing parameter constraints
392 one at a time (Byrne, 2012; Wang & Wang, 2020). Analysis began with an unconstrained or
393 configural model and continued step by step toward more restricted (nested) models so to evaluate
394 measurement and structural invariance between groups (Farmer & Farmer, 2014). Measurement
395 invariance was assessed through configural (i.e., same number of factors and factor loading patterns
396 across groups), weak or metric (i.e., equivalence of factor loadings), strong or scalar (i.e., equality
397 of factor loadings and intercepts), and strict (i.e., equality of factor loadings, intercepts, and error
398 variances) invariance. Structural invariance was ascertained through factor variance (i.e., equality of
399 variance of factor scores) and factor covariance (i.e., equality of covariance of factor scores)
400 invariance. The Satorra-Bentler scaled chi-square difference ($\Delta S-B \chi^2$) between models was used to
401 test model comparisons (i.e., configural model vs. a specified model). Non-significant $\Delta S-B \chi^2$ and

402 differences in CFI < .010, RMSEA < .015, and SRMR < .030 are considered criteria of invariance
403 (Chen, 2007; Cheung & Rensvold, 2002).

404 Invariance across gender and age categories (14-16 vs. 17-19 years) and their interaction was
405 assessed using a multiple indicator, multiple cause (MIMIC) model, also known as CFA with
406 covariates (Brown, 2015). The first and second age categories roughly correspond to early
407 adolescence and late adolescence, respectively (Haywood & Getchell, 2020). We were interested in
408 examining whether gender and age had an effect on the latent means and item intercepts. Following
409 Morin et al.'s (2016) indications, in a first step we performed a MIMIC model (null) in which the
410 predictors had no effect on the latent means and item intercepts. In a second (saturated) model, the
411 predictors were allowed to influence the item intercepts only. In a third (invariant) model, the
412 predictors were allowed to influence the latent means only. Gender and age were coded to represent
413 group membership (i.e., girl = 0, boy = 1; and 14-16 yrs. = 0, 17-19 yrs. = 1). We conducted
414 MIMIC modeling instead of multi-group CFA because of the relatively unbalanced sample sizes
415 across gender and age (i.e., girls, $n = 186$; boys, $n = 166$; 14-16 yrs., $n = 129$; 17-19 yrs., $n = 223$).
416 MIMIC modeling provides a robust and parsimonious test of measurement invariance (indicator
417 intercepts) and population heterogeneity (factor means) between groups.

418 Finally, we ascertained the factorial validity of the PACES, TIMCPEQ, and BPN-PE. Then,
419 the PACES was used to establish convergent and discriminant validity of the PESD-PE, while the
420 TIMCPEQ and BPN-PE served to determine its nomological validity.

421 **Results**

422 Data screening led to the removal of nine cases from further analyses due to missing values or
423 values identified as outliers (Mahalanobis' distance, $p < .001$). Minimum and maximum values for
424 skewness and kurtosis of the 33 items ranged from -1.571 to -0.164 and from -0.702 to 2.845 ,
425 respectively. Also, in this Study we used the robust maximum likelihood method for factor analysis.

426 CFA results supported the 11-modality, 33-item solution of the PESD-PE found in Study 1
427 (Table 1). Higher-order and nested-factor models did not fit the data well. All standardized factor

428 loadings were above .600 ($\lambda = .640-.863$) and item residual variances ranged from $\delta = .255$ to .591
429 (Supplemental Table 1). In both studies, mean item intensity ratings of the anxiety modality were
430 lower than mean item ratings of other modalities. Item mean values ranged from 0.66 to 2.34 in
431 Sample 1, and from 0.52 to 2.49 in Sample 2 (Supplemental Table 1). Latent factor correlation
432 values ranged from .365 to .837. (Supplemental Table 2). Four correlations were low (r between .20
433 and .39), 28 were moderate (r between .40 and .59), 21 were moderately high (r between .60 and
434 .79), and 2 were high ($r > .80$). Supplemental Table 2 contains correlation coefficients and
435 reliability values.

436 The adequate fit indices observed for the CFA configural model (Supplemental Table 3)
437 indicate a same factor structure (i.e., same number of factors and same patterns of free and fixed
438 factor loadings) of the PESD-PE across the two study samples. Full measurement and structural
439 invariance of the scale was also demonstrated with ΔCFI , $\Delta RMSEA$, and ΔSMR values smaller
440 than their thresholds (i.e., .010, .015, and .030 respectively) and non-significant $\Delta S-B \chi^2$ tests.

441 The null MIMIC model using gender, age (14-16 vs. 17-19 years), and their interaction as
442 covariates showed acceptable fit to the data. The saturated and invariant models provided small
443 improvements, indicating limited effects of the grouping variables (Supplemental Table 3). Results
444 suggest same factor structure and item functioning by gender and age even though significant
445 effects ($p < .01$) were observed for gender on all modalities, with boys reporting higher mean scores
446 than girls.

447 To examine convergent, discriminant, and nomological validity of PESD-PE, we first verified
448 the factorial validity and reliability of the PACES, TIMCPEQ, and BPN-PE (Supplemental Table
449 4). The hypothesized two-factor structure of the PACES was improved after specification of two
450 correlated errors on both the pleasant and unpleasant experiences subscales. Support for the two-
451 factor structure of the TIMCPEQ was also found after removal of two items with poor standardized
452 factor loadings from the performance climate subscale and then correlating two errors on the same

453 subscale. Finally, the four-factor structure of the BPN-PE was confirmed. Overall, acceptable fit
454 indices and reliability values of the three measures were shown (Supplemental Table 4).

455 The pattern of relationships between the PESD-PE and the criterion-related measures was in
456 the expected direction (see latent factor correlations in Supplemental Table 5). Psychobiosocial
457 modality scores related positively with scores of pleasant, mastery, competence, autonomy, and
458 relatedness subscales, and negatively with scores of unpleasant and performance subscales. In the
459 relationship with the PACES subscales, 5 correlations were moderately high, 12 were moderate, and
460 5 were low (Zhu, 2012). This pattern of correlations suggests convergent validity (i.e., the degree of
461 the relationship between two measures of similar concepts). The low to moderately high range of
462 correlation coefficients also suggests discriminant validity (i.e., the PESD-PE taps unique
463 constructs).

464 To examine nomological validity, two structural equation modeling (SEM) analyses were
465 performed by entering the TIMCPEQ and BPN-PE separately as antecedents of the PESD-PE
466 modalities. The measurement models yielded acceptable fit to the data: PESD-PE and TIMCPEQ,
467 $\chi^2/df = 1.686$, CFI = .932, TLI = .921, RMSE = .044 (.040–.048), SMR = .033; PESD-PE and BPN-
468 PE, $\chi^2/df = 1.766$, CFI = .928, TLI = .916, RMSE = .047 (.043–.050), SMR = .054. Significant
469 paths ($p < .01$) were observed between: mastery climate and emotion, assertiveness, cognitive,
470 motivational, bodily-somatic, communicative, and social support modalities (β ranging from .163 to
471 .398); competence and all modalities (β ranging from .252 to .791); autonomy and enjoyment,
472 cognitive, motivational, and support modalities (β ranging from .204 to .405); and relatedness with
473 enjoyment, cognitive, motivational, communicative, and social support modalities (β ranging from
474 .152 to .457).

475 **Discussion**

476 Study 2 findings supported the factor structure, full measurement invariance, and structural
477 invariance of the final 33-item PESD-PE. Gender and age variable scores included as covariates in
478 CFA did not alter the factor structure or influence item functioning, although boys reported higher

479 mean scores than girls in six modalities. Construct validity and reliability of the PESD-PE was
480 found, with acceptable CFA fit indices and internal consistency values (α , ω , and CR) all above .70.
481 Standardized loading estimates higher than .60 and AVE values higher than .50 on all modalities,
482 except one, indicated adequate convergent validity of the scale modalities. The discriminant validity
483 of the PESD-PE modalities was also supported. Taking as a reference the minimum AVE value of
484 .445 for the communicative modality, AVE estimates were higher than the squared correlations
485 between two modalities for 42 correlations out of 55.

486 The low to moderate correlation values between the PESD-PE modalities and the subscales of
487 the criterion-related measure (i.e., the PACES) suggest both convergent validity and discriminant
488 validity. Finally, mastery climate, competence, autonomy, and relatedness scores were significant
489 predictors of most of the psychobiosocial modalities, thereby indicating nomological validity.

490 **General Discussion**

491 Emotions and related feelings are widely acknowledged as an inherent part of the academic
492 setting and continue to receive extensive research attention (Pekrun, 2016; Pekrun et al., 2011,
493 2018; Simonton & Garn, 2019). In physical education and sport contexts, psychobiosocial
494 experiences have been previously assessed using two-dimensional measures of functional and
495 dysfunctional experiences, one in physical education (Bortoli et al., 2018) and two in sport
496 (Robazza et al., 2016; Ruiz et al., 2019b). A further instrument (the PESD-Sport; Robazza et al.,
497 2021) was later proposed for the assessment of discrete modalities of psychobiosocial experiences
498 of athletes. An equivalent measure to be used in physical education was missing. Therefore, the aim
499 of this study was to integrate the existing dimensional measure (Bortoli et al., 2018) with a new
500 measure of discrete modalities of students' psychobiosocial experiences. The scale was constructed
501 in agreement with the multimodal view emphasized in the IZOF model (Hanin, 2007) as applied to
502 sport, as well as in appraisal, basic emotion, and dimensional theories of emotions in mainstream
503 psychology (see Coppin & Sander, 2021).

504 PESD-PE Modalities

505 In the construction of the PESD-PE, we administered the preliminary 53-item version of the
506 PESD-Sport (Robazza et al., 2021), which included the adjectives proposed by Ruiz et al. (2021)
507 for individualized assessments of 12 functional and dysfunctional modalities of psychobiosocial
508 experiences. The final version of the PESD-PE deriving from both ESEM and CFA consists of 33
509 items loading into 11 modalities (see Appendix 1 in Supplemental file). Ten of these are the same
510 contained in the PESD-Sport, plus the motivational modality. The volitional modality was removed
511 because of substantial overlapping with items contained in the motivational modality. Although
512 motivational and volitional aspects entail different processes related to predecisional states (e.g.,
513 unmotivated–motivated) or postdecisional states (e.g., undetermined–determined) of the course of
514 action, respectively, participants in this study were not able to discern such a subtle distinction, and
515 therefore may have perceived feelings included in the motivation and volition modalities as
516 comparable.

517 Based on the IZOF model (Hanin, 2007, 2010), which informed the instrument development,
518 we examined several first-order, higher-order, and nested-factor models to identify the best
519 structure of the scale. In line with Robazza et al.'s (2021) study, we found the correlated first-order
520 model to yield the best fit to the data compared to a second-order factor representing global
521 psychobiosocial experiences and three second-order factors representing global psychological,
522 biological, and social components. Thus, inclusion of psychobiosocial experiences in higher-order
523 psychological, biological, and social latent factors as conceived in the IZOF model was not
524 supported. On the other hand, support was found for the multimodal representation of emotion and
525 related feelings as construed in the IZOF model. For practical purposes, the scores of the three items
526 comprised in each of the 11 modalities of the PESD-PE can be used to form complete or aggregated
527 multimodal profiles displaying the level of psychobiosocial experiences at the individual or group
528 level (see Appendix 1 in Supplemental file). PESD-PE data and their display can help teachers

529 identify potential areas of intervention aimed at creating, developing, and maintaining adaptive
530 psychobiosocial experiences in their students.

531 Among the 11 interrelated modalities, the enjoyment modality is a key component of
532 psychobiosocial experiences (Hanin, 2000, 2007) deriving from the interaction between valence
533 (i.e., pleasant or unpleasant experience) and functionality (i.e., adaptive or maladaptive effect). This
534 interaction leads to pleasant–adaptive feelings or unpleasant–maladaptive feelings reflecting the
535 meaning students attribute to their interaction with the physical education environment and their
536 perceived resources to manage the situation. In this view, pleasant–adaptive feelings can be useful
537 in mobilizing resources to face a physical education task, while unpleasant–maladaptive feelings
538 (e.g., dejected, worried) may indicate low energy or failure to activate resources.

539 It is interesting to note that the item intensity scores of the anxiety modality were positive and
540 low in magnitude. They were lower than those of all other modalities across the two samples of
541 students (Supplemental Table 1), indicating that a low level of worry, tension, and nervousness was
542 perceived as useful for performance at the group level. This finding concurs with empirical
543 evidence in sport showing that athletes can perceive anxiety as either functional or dysfunctional
544 based on the individual perception of the impact of the symptoms on performance (Mellalieu et al.,
545 2006; Neil et al., 2012). It is also noteworthy that the mean scores of all PESD-PE items were
546 positive at the group level, meaning that adaptive experiences of students involved in physical
547 education classes prevail over maladaptive ones. These findings are consistent with the objectives
548 of the national physical education curriculum (Ministry of Education, University, and Research,
549 2009) and previous studies conducted within the Italian physical education context, which found
550 students reporting higher scores in functional versus dysfunctional psychobiosocial experiences
551 (e.g., Bortoli et al., 2015, 2018).

552 Along with emotions, functionality (i.e., helpful vs. harmful effects) is inherent in all
553 modalities of psychobiosocial experiences included in the PESD-PE. Feelings of confidence (or
554 self-confidence) share similarities with the notion of self-efficacy, with the two terms (confidence

555 and self-efficacy) being often used interchangeably. In particular, self-confidence refers to the
556 degree of certainty individuals possess about their capability to be successful in a domain (Feltz &
557 Moss, 2019), such as physical education and sport, while self-efficacy refers to the belief of being
558 successful in performing an activity to achieve a certain result, and therefore is more task-specific
559 (Bandura, 1977, 1997). Self-efficacy has been identified as an important correlate of physical
560 activity and fitness in supporting achievement strivings of youngsters (Barnett et al., 2011;
561 McAuley & Blissmer, 2000). Confidence and self-efficacy can relate to feelings of motivation and
562 assertiveness. These can manifest themselves overtly, for example in a fighting spirit and a gritty
563 attitude aimed at energizing achievement behavior toward the mastery of a task and goal attainment
564 (Strycharczyk et al., 2020).

565 The cognitive, bodily-somatic, motor-behavioral, and operational modalities of the PESD-PE
566 are also instrumental to enable students to achieve the goals of school physical education. Indeed,
567 being focused on the task and feeling physically ready, coordinated, and skillful are key conditions
568 for motor learning and performance. Finally, being communicative and feeling supported are
569 fundamental components of the emotional experience. It is widely acknowledged that emotions and
570 related feelings are social phenomena that are experienced, expressed, and regulated within social
571 contexts in interaction with significant others, such as teachers and peers (Tamminen & Gaudreau,
572 2014; Tamminen & Neely, 2021). Social support has been found to exert beneficial effects on self-
573 confidence (Freeman & Rees, 2010), burnout and self-determined motivation (DeFreese & Smith,
574 2013), well-being (DeFreese & Smith, 2014), and performance (Freeman & Rees, 2009).

575 **Measurement Invariance and Construct Validity**

576 Support was found to the factor structure, full measurement invariance, and structural
577 invariance of the PESD-PE across the two study samples. Substantial differences in item responses
578 with the inclusion of gender and age categories as covariates were not found, although boys
579 reported higher mean scores than girls in some modalities (i.e., enjoyment, confidence,
580 assertiveness, bodily-somatic, motor-behavioral, and social support) suggesting they experience

581 higher levels of adaptive feelings. These differences are similar to those shown in the PESD-Sport
582 scores (Robazza et al., 2021). They likely derive from gender-stereotyped beliefs and behaviors
583 formed during the socialization process mediated by significant others, such as parents, peers, and
584 teachers, which shape emotions and perceived competence (Gill, 2020).

585 Convergent, discriminant, and nomological validity of the PESD-PE was also supported.
586 Convergent and discriminant validity was determined in both studies with high standardized
587 loading estimates, cross-loadings on unintended factors smaller than the target factor loadings, and
588 AVE values greater than the squared correlation between two modalities for most correlations.
589 Moreover, the pattern from low to moderately high correlations of the PESD-PE modalities with the
590 PACES subscales observed in Study 2 was in the expected direction, thus indicating both
591 convergent and discriminant validity. In particular, the latent factor correlations between the PESD-
592 PE and the PACES (i.e., the criterion-related measure) were as expected, with all psychobiosocial
593 modalities correlating positively and negatively with the pleasant and unpleasant scales of the
594 PACES, respectively.

595 Nomological validity was established in the relationship of the TIMCPEQ and the BPN-PE
596 with the PESD-PE. Indeed, mastery climate scores from the TIMCPEQ, and competence,
597 autonomy, and relatedness scores from the BPN-PE were found to predict most of the
598 psychobiosocial modalities. These findings are consistent with the extant research showing a clear
599 relationship between functional psychobiosocial experiences and mastery climate in physical
600 education (Bortoli et al., 2015, 2018; Di Battista et al., 2019) as well as basic psychological needs
601 of competence, autonomy, and relatedness in young athletes (Morano et al., 2020).

602 **Limitations and Future Research**

603 The validity of the scale developed in Italian language should be examined across students of
604 different cultures, also taking into consideration factors that can influence psychobiosocial
605 experiences, such as the possible amount of sport experience and different competitive levels.
606 Convergent, discriminant, and nomological validity should be further investigated in comparison

607 with other measures specifically developed to assess relevant discrete emotions in the physical
608 education domain, such as the SEPE (Trigueros et al., 2019), the AEQ-PE (Fierro-Suero et al.,
609 2020), and the DEPES (Simonton et al., 2023). It would be also worth investigating the
610 commonalities and differences between the current scale, developed as a discrete measure of
611 psychobiosocial experiences, and the PBS-SPE scale (Bortoli et al., 2018) developed as a
612 dimensional measure of same experiences. Longitudinal data collection and intervention studies are
613 also recommended to evaluate trends and reciprocal relationships between psychobiosocial
614 experiences, learning, and behavior of physical education students, and the predictive validity of the
615 single and interactive effects of the psychobiosocial modalities on performance process and
616 outcome.

617 **Conclusion**

618 The PESD-PE was developed to assess relevant psychobiosocial experiences of students
619 participating in physical education classes. Grounded in a substantive theoretical framework (i.e.,
620 the IZOF model; Hanin, 2000, 2007), the purpose of this study was to provide researchers and
621 teachers with a new tool to evaluate a range of discrete emotion-related feelings. With this new
622 measure, we intend to contribute to the current body of knowledge on psychobiosocial experiences,
623 stimulate further research in this area, and provide teachers with useful information about their
624 students. Indeed, data collected through the PESD-PE could deepen our understanding of the
625 reciprocal effects of emotions and performance, and also inform applied interventions aimed at
626 creating adaptive psychobiosocial experiences aligned with physical education objectives. The
627 overall findings support the construct, convergent, discriminant, and nomological validity of the
628 measure, as well as the invariance across gender and age categories, but further research is
629 warranted.

630

References

631

Adank, A. M., Van Kann, D. H., Remmers, T., Kremers, S. P., & Vos, S. B. (2021). Longitudinal

632

perspectives on children's physical activity patterns: "Do physical education-related factors

633

matter?" *Journal of Physical Activity and Health*, *18*(10), 1199–1206.

634

<https://doi.org/10.1123/jpah.2020-0859>

635

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological*

636

Review, *84*(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>

637

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

638

Barkoukis, V., Rodafinos, A., Koidou, E., & Tsorbatzoudis, H. (2012). Development of a scale

639

measuring trait anxiety in physical education. *Measurement in Physical Education and*

640

Exercise Science, *16*(4), 237–253. <https://doi.org/10.1080/1091367x.2012.716724>

641

Barnett, L. M., Morgan, P. J., Van Beurden, E., Ball, K., & Lubans, D. R. (2011). A reverse

642

pathway? Actual and perceived skill proficiency and physical activity. *Medicine and Science*

643

in Sports and Exercise, *43*(5), 898–904. <https://doi.org/10.1249/MSS.0b013e3181fdfadd>

644

Bortoli, L., Bertollo, M., Filho, E., di Fronso, S., & Robazza, C. (2017). Implementing the

645

TARGET model in physical education: Effects on perceived psychobiosocial and

646

motivational states in girls. *Frontiers in Psychology*, *8*(1517).

647

<https://doi.org/10.3389/fpsyg.2017.01517>

648

Bortoli, L., Bertollo, M., Vitali, F., Filho, E., & Robazza, C. (2015). The effects of motivational

649

climate interventions on psychobiosocial states in high school physical education. *Research*

650

Quarterly for Exercise and Sport, *86*(2), 196–204.

651

<https://doi.org/10.1080/02701367.2014.999189>

652

Bortoli, L., Colella, D., Morano, M., Berchicci, M., Bertollo, M., & Robazza, C. (2008). Teacher-

653

Initiated Motivational Climate in Physical Education questionnaire in an Italian sample.

654

Perceptual and Motor Skills, *106*(1), 207-214. <https://doi.org/10.2466/pms.106.1.207-214>

- 655 Bortoli, L., Vitali, F., Di Battista, R., Ruiz, M. C., & Robazza, C. (2018). Initial validation of the
656 Psychobiosocial States in Physical Education (PBS-SPE) scale. *Frontiers in Psychology*,
657 9(2446). <https://doi.org/10.3389/fpsyg.2018.02446>
- 658 Brown, T. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). The Guilford Press.
- 659 Brunner, M., Nagy, G., & Wilhelm, O. (2012). A tutorial on hierarchically structured constructs.
660 *Journal of Personality*, 80(4), 796–846. <https://doi.org/10.1111/j.1467-6494.2011.00749.x>
- 661 Byrne, B. M. (2012). *Structural equation modeling with Mplus: Basic concepts, applications, and*
662 *programming*. Routledge.
- 663 Canivez, G. L. (2016). Bifactor modeling in construct validation of multifaceted tests: Implications
664 for multidimensionality and test interpretation. In K. Schweizer & C. DiStefano (Eds.),
665 *Principles and methods of test construction: Standards and recent advancements* (pp. 247–
666 271). Hogrefe.
- 667 Carraro, A., Young, M. C., & Robazza, C. (2008). A contribution to the validation of the Physical
668 Activity Enjoyment Scale in an Italian sample. *Social Behavior and Personality*, 36(7), 911–
669 918. <https://doi.org/10.2224/sbp.2008.36.7.911>
- 670 Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance.
671 *Structural Equation Modeling*, 14(3), 464–504. <https://doi.org/10.1080/10705510701301834>
- 672 Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing
673 measurement invariance. *Structural Equation Modeling*, 9(2), 233–255.
674 https://doi.org/10.1207/S15328007SEM0902_5
- 675 Coppin, G., & Sander, D. (2021). Theoretical approaches to emotion and its measurement. In H. L.
676 Meiselman (Ed.), *Emotion measurement* (2nd ed., pp. 3–37). Woodhead Publishing.
677 <https://doi.org/10.1016/B978-0-12-821124-3.00001-6>
- 678 DeFreese, J. D., & Smith, A. L. (2013). Teammate social support, burnout, and self-determined
679 motivation in collegiate athletes. *Psychology of Sport and Exercise*, 14(2), 258–265.
680 <https://doi.org/10.1016/j.psychsport.2012.10.009>

- 681 DeFreese, J. D., & Smith, A. L. (2014). Athlete social support, negative social interactions, and
682 psychological health across a competitive sport season. *Journal of Sport and Exercise*
683 *Psychology*, 36(6), 619–630. <https://doi.org/10.1123/jsep.2014-0040>
- 684 Di Battista, R., Robazza, C., Ruiz, M. C., Bertollo, M., Vitali, F., & Bortoli, L. (2019). Student
685 intention to engage in leisure-time physical activity: The interplay of task-involving climate,
686 competence need satisfaction and psychobiosocial states in physical education. *European*
687 *Physical Education Review*, 25(3), 761–777. <https://doi.org/10.1177/1356336X18770665>
- 688 Di Corrado, D., Vitali, F., Robazza, C., & Bortoli, L. (2015). Self-efficacy, emotional states, and
689 performance in carom billiards. *Perceptual and Motor Skills*, 121(1), 14-25.
690 <https://doi.org/10.2466/30.PMS.121c11x6>
- 691 Farmer, A. Y., & Farmer, G. L. (2014). *Research with diverse groups: Research designs and*
692 *multivariate latent modeling for equivalence*. Oxford University Press.
- 693 Feltz, D. L. & Moss, T. (2019). Self-confidence. In D. Hackfort, R. J. Schinke, & B. Strauss (Eds.),
694 *Dictionary of sport psychology: Sport, exercise, and performing arts* (pp. 257–258).
695 Academic Press.
- 696 Fierro-Suero, S., Almagro, B. J., & Sáenz-López, P. (2020). Validation of the Achievement
697 Emotions Questionnaire for Physical Education (AEQ-PE). *International Journal of*
698 *Environmental Research and Public Health*, 17(12), 4560.
699 <http://doi.org/10.3390/ijerph17124560>
- 700 Freeman, P., & Rees, T. (2009). How does perceived support lead to better performance? An
701 examination of potential mechanisms. *Journal of Applied Sport Psychology*, 21(4), 429–441.
702 <https://doi.org/10.1080/10413200903222913>
- 703 Freeman, P., & Rees, T. (2010). Perceived social support from team-mates: Direct and
704 stressbuffering effects on self-confidence. *European Journal of Sport Science*, 10(1), 59–67.
705 <https://doi.org/10.1080/17461390903049998>

- 706 Gill, D. L. (2020). Gender and culture. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport*
707 *psychology* (4th ed., pp. 1131–1151). Wiley.
- 708 Hair, J. F. Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th
709 ed.). Cengage.
- 710 Hanin, Y. L. (Ed.). (2000). *Emotions in sport*. Human Kinetics.
- 711 Hanin, Y. L. (2007). Emotions in sport: Current issues and perspectives. In G. Tenenbaum & R. C.
712 Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 31–58). John Wiley & Sons.
- 713 Hanin, Y. L. (2010). Coping with anxiety in sport. In A. Nicholls (Ed.), *Coping in sport: Theory,*
714 *methods, and related constructs* (pp. 159–175). Nova Science Publishers.
- 715 Hanin, J., & Ekkekakis, P. (2014). Emotions in sport and exercise settings. In A. G. Papaioannou &
716 D. Hackfort (Eds.), *Routledge companion to sport and exercise psychology: Global*
717 *perspectives and fundamental concepts* (pp. 83–104). Routledge.
- 718 Haywood, K. M., & Getchell, N. (2020). *Life span motor development* (7th ed.). Human Kinetics.
- 719 Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:
720 Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55.
721 <https://doi.org/10.1080/10705519909540118>
- 722 Italian Ministry of Education, University, and Research (2009). *Linee guida per le attività di*
723 *educazione fisica, motoria e sportiva nelle scuole secondarie di primo e secondo grado*
724 [Physical education and sport guidelines in primary and secondary school]. Rome: Italian
725 Ministry of Education, University, and Research.
- 726 Jones, M., Lane, A., Bray, S., Uphill, M., & Catlin, J. (2005). Development and validation of the
727 sport emotion questionnaire. *Journal of Sport and Exercise Psychology*, 27(4), 407–431.
728 <https://doi.org/10.1123/jsep.27.4.407>
- 729 Karagiannidis, Y., Barkoukis, V., Gourgoulis, V., Kosta, G., & Antoniou, P. (2015). The role of
730 motivation and metacognition on the development of cognitive and affective responses in

- 731 physical education lessons: A self-determination approach. *Motricidade*, 11(1), 135–150.
732 <https://doi.org/10.6063/motricidade.3661>
- 733 Kendzierski, D., & DeCarlo, K. J. (1991). Physical activity enjoyment scale: Two validation
734 studies. *Journal of Sport and Exercise Psychology*, 13(1), 50–64.
735 <https://doi.org/10.1123/jsep.13.1.50>
- 736 Lazarus, R. S. (2001). Relational meaning and discrete emotions. In K. R. Scherer, A. Schorr, & T.
737 Johnstone (Eds.), *Appraisal processes in emotion* (pp. 37–67). Oxford University Press.
- 738 Linnenbrink-Garcia, L., Patall, E. A., & Pekrun, R. (2016). Adaptive motivation and emotion in
739 education: Research and principles for instructional design. *Policy Insights from the*
740 *Behavioral and Brain Sciences*, 3(2), 228–236. <https://doi.org/10.1177/2372732216644450>
- 741 Marsh, H. W., Muthén, B., Asparouhov, T., Lüdtke, O., Robitzsch, A., Morin, A. J. S., &
742 Trautwein, U. (2009). Exploratory structural equation modeling, integrating CFA and EFA:
743 Application to students' evaluations of university teaching. *Structural Equation Modeling: A*
744 *Multidisciplinary Journal*, 16(3), 439–476. <https://doi.org/10.1080/10705510903008220>
- 745 Martin, J. J., & Kulinna, P. H. (2005). A social cognitive perspective of physical-activity-related
746 behavior in physical education. *Journal of Teaching in Physical Education*, 24(3), 265–281.
747 <https://doi.org/10.1123/jtpe.24.3.265>
- 748 Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition and Emotion*,
749 23(2), 209–237. <https://doi.org/10.1080/02699930802204677>
- 750 McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical
751 activity. *Exercise and Sport Sciences Reviews*, 28(2), 85-88.
- 752 Mellalieu, S. D., Hanton, S., & Fletcher, D. (2006). A competitive anxiety review: Recent directions
753 in sport psychology research. In S. Hanton & S. D. Mellalieu (Eds.), *Literature reviews in*
754 *sport psychology* (pp. 1–145). Nova Science.

- 755 Middleton, T. R. F., Ruiz, M. C., & Robazza, C. (2017). Regulating preperformance
756 psychobiosocial states with music. *The Sport Psychologist, 31*(3), 227–236.
757 <https://doi.org/10.1123/tsp.2016-0081>
- 758 Morano, M., Bortoli, L., Ruiz, M. C., & Robazza, C. (2020). Psychobiosocial states as mediators of
759 the effects of basic psychological need satisfaction on burnout symptoms in youth sport.
760 *International Journal of Environmental Research and Public Health, 17*(12), 4447.
761 <https://doi.org/10.3390/ijerph17124447>
- 762 Morano, M., Bortoli, L., Ruiz, M. C., Vitali, F., & Robazza, C. (2019). Self-efficacy and enjoyment
763 of physical activity in children: Factorial validity of two pictorial scales. *PeerJ, 7*, e7402.
764 <https://doi.org/10.7717/peerj.7402>
- 765 Morin, A. J. S., Arens, A. K., & Marsh, H. W. (2016). A bifactor exploratory structural equation
766 modeling framework for the identification of distinct sources of construct-relevant
767 psychometric multidimensionality. *Structural Equation Modeling: A Multidisciplinary*
768 *Journal, 23*(1), 116–139. <https://doi.org/10.1080/10705511.2014.961800>
- 769 Morin, A. J. S., & Maïano, C. (2011). Cross-validation of the short form of the Physical Self-
770 Inventory (PSI-S) using exploratory structural equation modeling (ESEM). *Psychology of*
771 *Sport and Exercise, 12*(5), 540–554. <https://doi.org/10.1016/j.psychsport.2011.04.003>
- 772 Muthén, L. K., & Muthén, B. O. (2017). *Mplus user's guide* (8th ed.). Muthén & Muthén.
- 773 Myers, N. D., Ahn, S., & Jin, Y. (2013). Rotation to a partially specified target matrix in
774 exploratory factor analysis: How many targets? *Structural Equation Modeling: A*
775 *Multidisciplinary Journal, 20*(1), 131-147. <https://doi.org/10.1080/10705511.2013.742399>
- 776 Myers, N. D., Celimli, S., Martin, J. J., & Hancock, G. R. (2016). Sample size determination and
777 power estimation in structural equation modeling. In N. Ntoumanis & N.D. Myers (Eds.), *An*
778 *introduction to intermediate and advanced statistical analyses for sport and exercise*
779 *scientists* (pp. 267-284). Wiley.

- 780 Myers, N. D., Jin, Y., Ahn, S., Celimli, S., & Zopluoglu, C. (2015). Rotation to a partially specified
781 target matrix in exploratory factor analysis in practice. *Behavior Research Methods*, *47*(2),
782 494-505. <https://doi.org/10.3758/s13428-014-0486-7>
- 783 Myers, N. D., Ntoumanis, N., Gunnell, K. E., Gucciardi, D. F., & Lee, S. (2018). A review of some
784 emergent quantitative analyses in sport and exercise psychology. *International Review of*
785 *Sport and Exercise Psychology*, *11*(1), 70-100.
786 <https://doi.org/10.1080/1750984X.2017.1317356>
- 787 Nateri, R., Robazza, C., Tolvanen, A., Bortoli, L., Hatzigeorgiadis, A., & Ruiz, M. C. (2020).
788 Emotional intelligence and psychobiosocial states: Mediating effects of intra-team
789 communication and role ambiguity. *Sustainability*, *12*(21), 9019.
790 <https://doi.org/10.3390/su12219019>
- 791 Neil, R., Wilson, K., Mellalieu, S. D., Hanton, S., & Taylor, J. (2012). Competitive anxiety
792 intensity and interpretation: A two-study investigation into their relationship with
793 performance. *International Journal of Sport and Exercise Psychology*, *10*(2), 96-111.
794 <https://doi.org/10.1080/1612197x.2012.645134>
- 795 Papaioannou, A. (1998). Students' perceptions of the physical education class environment for boys
796 and girls and the perceived motivational climate. *Research Quarterly for Exercise and*
797 *Sport*, *69*(3), 267-275. <https://doi.org/10.1080/02701367.1998.10607693>
- 798 Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries,
799 and implications for educational research and practice. *Educational Psychology Review*,
800 *18*(4), 315–341. <https://doi.org/10.1007/s10648-006-9029-9>
- 801 Pekrun, R. (2016). Academic emotions. In K. R. Wentzel & D. B. Miele (Eds.), *Handbook of*
802 *motivation at school* (2nd ed., pp. 120–144). Routledge.
803 <https://doi.org/10.4324/9781315773384-8>
- 804 Pekrun, R. (2017). Emotion and achievement during adolescence. *Child Development Perspectives*,
805 *11*(3), 215–221. <https://doi.org/10.1111/cdep.12237>

- 806 Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in
807 students' learning and performance: The Achievement Emotions Questionnaire (AEQ).
808 *Contemporary Educational Psychology*, *36*(1), 36–48.
809 <https://doi.org/10.1016/j.cedpsych.2010.10.002>
- 810 Pekrun, R., Muis, K.R., Frenzel, A.C., & Goetz, T. (2018). *Emotions at school*. Routledge.
811 <https://doi.org/10.4324/9781315187822>
- 812 Preacher, K. J., & Coffman, D. L. (2006, May). *Computing power and minimum sample size for*
813 *RMSEA* [Computer software]. <http://quantpsy.org/>
- 814 Rees, T., & Freeman, P. (2012). Coping in sport through social support. In J. Thatcher, M. Jones, &
815 D. Lavallee (Eds.), *Coping and emotion in sport* (2nd ed., pp. 102–117). Routledge.
- 816 Robazza, C., Bertollo, M., Ruiz, M. C., & Bortoli, L. (2016). Measuring psychobiosocial states in
817 sport: Initial validation of a trait measure. *PLoS One*, *11*(12), e0167448.
818 <https://doi.org/10.1371/journal.pone.0167448>
- 819 Robazza, C., & Bortoli, L. (2005). Changing students' attitudes towards risky motor tasks: An
820 application of the IZOF model. *Journal of Sports Sciences*, *23*(10), 1075–1088.
821 <https://doi.org/10.1080/02640410500128205>
- 822 Robazza, C., Gallina, S., D'Amico, M. A., Izzicupo, P., Bascelli, A., Di Fonso, A., Mazzaufu, C.,
823 Capobianco, A., & Di Baldassarre, A. (2012). Relationship between biological markers and
824 psychological states in elite basketball players across a competitive season. *Psychology of*
825 *Sport and Exercise*, *13*(4), 509-517. <https://doi.org/10.1016/j.psychsport.2012.02.011>
- 826 Robazza, C., Izzicupo, P., D'Amico, M. A., Ghinassi, B., Crippa, M. C., Di Cecco, V., Ruiz, M. C.,
827 Bortoli, L., & Di Baldassarre, A. (2018). Psychophysiological responses of junior orienteers
828 under competitive pressure. *PLoS One*, *13*(4), e0196273.
829 <https://doi.org/10.1371/journal.pone.0196273>

- 830 Robazza, C., Ruiz, M. C., & Bortoli, L. (2021). Psychobiosocial experiences in sport: Development
831 and initial validation of a semantic differential scale. *Psychology of Sport and Exercise*, *55*,
832 101963. <https://doi.org/10.1016/j.psychsport.2021.101963>
- 833 Rosenberg, B. D., & Navarro, M. A. (2018). Semantic differential scaling. In B. B. Frey (Ed.), *The*
834 *SAGE encyclopedia of educational research, measurement, and evaluation* (pp. 1503–1507).
835 SAGE Publications. <https://doi.org/10.4135/9781506326139.n624>
- 836 Ruiz, M. C., Bortoli, L., & Robazza, C. (2021). The multi-states (MuSt) theory for emotion- and
837 action-regulation in sports. In M. C. Ruiz & C. Robazza (Eds.), *Feelings in sport: Theory,*
838 *research, and practical implications for performance and well-being* (pp. 3–17). Routledge.
839 <https://doi.org/10.4324/9781003052012-2>
- 840 Ruiz, M. C., Hanin, Y., & Robazza, C. (2016). Assessment of performance-related experiences: An
841 individualized approach. *The Sport Psychologist*, *30*(3), 201-218.
842 <https://doi.org/10.1123/tsp.2015-0035>
- 843 Ruiz, M. C., Raglin, J. S., & Hanin, Y. L. (2017). The individual zones of optimal functioning
844 (IZOF) model (1978-2014): Historical overview of its development and use. *International*
845 *Journal of Sport and Exercise Psychology*, *15*(1), 41–63.
846 <https://doi.org/10.1080/1612197X.2015.1041545>
- 847 Ruiz, M. C., & Robazza, C. (2020). Emotion regulation. In D. Hackfort & R. J. Schinke (Eds.), *The*
848 *Routledge international encyclopedia of sport and exercise psychology: Volume 2: Applied*
849 *and practical measures* (pp. 263–280). Routledge.
- 850 Ruiz, M. C., Robazza, C., Tolvanen, A., Haapanen, S., & Duda, J. L. (2019a). Coach-created
851 motivational climate and athletes' adaptation to psychological stress: Temporal motivation-
852 emotion interplay. *Frontiers in Psychology*, *10*(617).
853 <https://doi.org/10.3389/fpsyg.2019.00617>

- 854 Ruiz, M. C., Robazza, C., Tolvanen, A., & Hanin, J. (2019b). The Psychobiosocial States (PBS-S)
855 scale: Factor structure and reliability. *European Journal of Psychological Assessment*, 35(5),
856 658–665. <https://doi.org/10.1027/1015-5759/a000454>
- 857 Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in*
858 *motivation, development, and wellness*. The Guilford Press.
- 859 Scherer, K. R., Schorr, A., & Johnstone, T. (Eds.) (2001). *Appraisal processes in emotion: Theory,*
860 *methods, research*. Oxford University Press.
- 861 Schumacker, R. E., & Lomax, R.G. (2016). *A beginner's guide to structural equation modeling* (4th
862 ed.). Routledge.
- 863 Shephard, R. J., & Trudeau, F. (2000). The legacy of physical education: Influences on adult
864 lifestyle. *Pediatric Exercise Science*, 12(1), 34-50. <https://doi.org/10.1123/pes.12.1.34>
- 865 Shuman, V., & Scherer, K. R. (2014). Concepts and structures of emotions. In R. Pekrun & L.
866 Linnenbrink- Garcia (Eds.), *International handbook of emotions in education* (pp. 13– 35).
867 Routledge.
- 868 Simonton, K. L., Mercier, K., & Garn, A. C. (2018). *Development of the Discrete Emotions in*
869 *Physical Education Scale (DEPES)* [Paper presentation]. National Conference of the Society
870 of Health and Physical Educators (SHAPE) America, Nashville, TN.
- 871 Simonton, K. L., & Garn, A. (2019). Exploring achievement emotions in physical education: The
872 potential for the control-value theory of achievement emotions. *Quest*, 71(4), 434–446.
873 <https://doi.org/10.1080/00336297.2018.1542321>
- 874 Simonton, K. L., & Garn, A. C. (2020). Negative emotions as predictors of behavioral outcomes in
875 middle school physical education. *European Physical Education Review*, 26(4), 764–781.
876 <https://doi.org/10.1177/1356336X19879950>
- 877 Simonton, K. L., Garn, A. C., & Mercier, K. J. (2023). Expanding the Discrete Emotions in
878 Physical Education Scale (DEPES): Evaluating emotions with behavior and learning.

- 879 *Research Quarterly for Exercise and Sport*, 94(1), 35–44.
880 <https://doi.org/10.1080/02701367.2021.1935434>
- 881 Strycharczyk, D., Clough, P., Wall, T., & Perry, J. (2020). Mental toughness. In W. L. Filho, T.
882 Wall, A. M. Azul, L. Brandli, & P. G. Özuyar (Eds.), *Good health and well-being* (pp. 471–
883 483). Springer.
- 884 Tamminen, K. A., & Gaudreau, P. (2014). Coping, social support, and emotion regulation in teams.
885 In M. R. Beauchamp & M. A. Eys (Eds.), *Group dynamics in exercise and sport psychology*
886 (2nd ed., pp. 222–239). Routledge.
- 887 Tamminen, K. A., & Neely, K. C. (2021). We're in this together: Dyadic and interpersonal aspects
888 of emotions, coping, and emotion regulation in sport. In M. C. Ruiz & C. Robazza (Eds.),
889 *Feelings in sport: Theory, research, and practical implications for performance and well-*
890 *being* (pp. 58–69). Routledge. <https://doi.org/10.4324/9781003052012-8>
- 891 Trigueros, R., Aguilar-Parra, J. M., Cangas, A. J., & Álvarez, J. F. (2019). Validation of the scale of
892 emotional states in the physical education context. *Sustainability*, 11, 5006.
893 <https://doi.org/10.3390/su11185006>
- 894 Verhagen, T., van den Hooff, B., & Meents, S. (2015). Toward a better use of the semantic
895 differential in IS research: An integrative framework of suggested action. *Journal of the*
896 *Association for Information Systems*, 16(2), 108–143. <https://doi.org/10.17705/1jais.00388>
- 897 Vlachopoulos, S. P., Katartzi, E. S., & Kontou, M. G. (2011). The Basic Psychological Needs in
898 Physical Education scale. *Journal of Teaching in Physical Education*, 30(3), 263–280.
899 <https://doi.org/10.1123/jtpe.30.3.263>
- 900 Wang, J., & Wang, X. (2020). *Structural equation modeling: Applications using Mplus* (2nd ed.).
901 John Wiley & Sons.
- 902 Watkins, M. W. (2017). The reliability of multidimensional neuropsychological measures: From
903 alpha to omega. *The Clinical Neuropsychologist*, 31(6–7), 1113–1126.
904 <https://doi.org/10.1080/13854046.2017.1317364>

- 905 Zhu, W. (2012). Sadly, the earth is still round ($p < 0.05$). *Journal of Sport and Health Science*, 1(1),
906 9–11. <https://doi.org/10.1016/j.jshs.2012.02.002>

Table 1*Fit Indices for the Factor Models of the PESD-PE from Study 1 (N = 336) and Study 2 (N = 352)*

Model	χ^2 (df)	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	PCFI
Study 1								
12 mod, 53 items, ESEM	1880.070 (808)	2.327	.885	.805	.063 (.059–.067)	.019	59722.400	.740
11 mod, 33 items, ESEM	303.990 (220)	1.382	.984	.962	.034 (.024–.043)	.013	36106.398	1.673
Study 2								
11 mod, 33 items, CFA – first-order	806.731 (440)	1.833	.936	.923	.049 (.043–.054)	.042	37877.589	.328
11 mod, 33 items, CFA – higher-order	1358.540 (495)	2.745	.850	.840	.070 (.066–.075)	.082	38590.280	.170
11 mod, 33 items, CFA – 3 higher-order	1372.935 (495)	2.774	.847	.837	.071 (.067–.075)	.171	38601.896	.169
11 mod, 33 items, CFA – 3 higher-order ¹	1369.261 (495)	2.766	.848	.838	.071 (.066–.075)	.147	38599.230	.170
11 mod, 33 items, CFA – nested-factor	1186.764 (473)	2.509	.876	.861	.065 (.061–.070)	.070	38372.906	.224
11 mod, 33 items, CFA – 3 nested-factor	1096.340 (470)	2.333	.891	.877	.062 (.057–.066)	.075	38241.022	.235
11 mod, 33 items, CFA – 3 nested-factor ¹	1032.420 (470)	2.197	.902	.890	.058 (.053–.063)	.065	38148.726	.238

Note. Mod = modalities, ESEM = Exploratory Structural Equation Modeling, CFA = Confirmatory Factor Analysis, χ^2 (df) = chi-square (degrees of freedom), CFI = comparative fit index, TLI = Tucker Lewis fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual, AIC = Akaike's Information Criterion, PCFI = Parsimony comparative fit index. ¹The operational modality of the social component is included in the biological component.

Supplemental Table 1

Descriptive Statistics and Factor Loadings of the PESD-PE for Study 1 and Study 2

Modality Item	Sample 1 (N = 336)						Sample 2 (N = 352)					
	<i>M</i>	<i>SD</i>	SK	K	λ	δ	<i>M</i>	<i>SD</i>	SK	K	λ	δ
Enjoyment												
1	2.300	1.845	-1.555	2.364	.845	.286	2.290	1.701	-1.254	1.466	.863	.255
12	2.110	1.651	-1.234	1.868	.882	.222	2.110	1.525	-0.950	0.899	.859	.261
23	2.290	1.636	-1.462	2.651	.861	.258	2.200	1.608	-1.232	1.366	.858	.263
Confidence												
2	2.140	1.804	-1.625	2.667	.798	.364	2.110	1.746	-1.462	2.080	.846	.284
13	1.740	1.948	-1.168	0.698	.827	.316	1.760	2.067	-1.170	0.611	.815	.335
24	1.790	1.872	-1.105	0.702	.761	.420	1.740	1.919	-0.979	0.284	.832	.308
Anxiety												
3	0.890	1.534	-0.183	0.311	.756	.429	0.780	1.566	-0.232	0.626	.751	.435
14	0.990	1.499	-0.199	-0.139	.782	.388	0.760	1.666	-0.283	0.144	.839	.297
25	0.660	1.644	-0.502	0.558	.690	.524	0.520	1.772	-0.357	0.294	.833	.306
Assertiveness												
4	1.910	1.776	-1.033	0.973	.747	.442	1.920	1.671	-0.614	-0.351	.655	.571
15	2.040	1.802	-1.135	0.908	.769	.409	1.890	1.825	-1.001	0.582	.819	.329
26	1.580	1.750	-0.627	0.061	.727	.471	1.510	1.920	-0.682	-0.073	.690	.524
Cognitive												
5	1.420	2.169	-0.970	0.025	.792	.373	1.430	2.003	-0.878	-0.062	.721	.480
16	1.960	1.934	-1.433	1.610	.852	.274	1.910	1.808	-1.339	1.310	.856	.268
27	1.860	1.823	-1.526	2.174	.809	.346	1.970	1.659	-1.453	2.055	.828	.314
Motivational												
6	2.000	1.812	-1.260	1.464	.826	.318	1.970	1.850	-1.136	0.700	.767	.411
17	2.040	1.911	-1.582	2.145	.831	.310	2.090	1.752	-1.470	2.304	.852	.275
28	2.030	1.877	-1.469	1.932	.852	.275	2.190	1.709	-1.571	2.744	.856	.267

Supplemental Table 1 Continues

Supplemental Table 1 Continued

Bodily-somatic												
7	1.690	2.050	-0.868	-0.113	.823	.323	1.770	2.017	-0.940	0.135	.814	.337
18	1.820	1.934	-0.983	0.329	.882	.223	1.970	1.797	-1.166	1.120	.831	.309
29	2.050	1.622	-1.454	2.777	.786	.383	2.040	1.677	-1.335	1.947	.813	.339
Motor-behavioral												
8	1.870	1.974	-1.137	0.561	.817	.332	1.930	1.964	-1.156	0.704	.831	.309
19	2.080	1.476	-1.148	1.470	.794	.370	2.080	1.572	-1.133	1.307	.826	.318
30	1.830	1.835	-1.172	0.985	.776	.398	1.820	1.924	-1.271	1.059	.784	.385
Operational												
9	1.900	1.752	-1.429	1.891	.799	.361	1.910	1.719	-1.116	0.914	.842	.292
20	1.970	1.639	-1.270	1.777	.857	.265	1.990	1.642	-1.079	0.973	.846	.284
31	1.920	1.576	-1.211	1.663	.778	.395	1.950	1.618	-1.361	1.971	.782	.388
Communicative												
10	1.990	1.787	-1.222	1.336	.706	.502	2.120	1.607	-1.020	0.882	.670	.551
21	1.600	1.491	-0.642	0.640	.662	.562	1.540	1.576	-0.412	0.021	.691	.523
32	2.340	1.620	-1.298	1.839	.748	.441	2.490	1.513	-1.467	2.845	.640	.591
Social support												
11	2.050	1.379	-1.006	0.928	.839	.296	1.810	1.667	-1.091	0.953	.842	.292
22	1.960	1.434	-0.916	1.120	.785	.384	1.870	1.595	-0.962	1.079	.789	.377
33	2.130	1.551	-1.147	1.462	.818	.331	1.990	1.662	-1.036	0.853	.794	.369

Note. M = mean, SD = standard deviation, SK = skewness, K = kurtosis, λ = standardized factor loading, δ = standardized residual variance.

Supplemental Table 2

Pearson Product Moment Correlations Between Latent Factors and Reliability Indices

Modality	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Sample 1 (N = 336)				Sample 2 (N = 352)				
											(11)	α	ω	CR	AVE	α	ω	CR	AVE
(1) Enjoyment	—	.792 [§]	.636 [§]	.587 [#]	.552 [#]	.711 [§]	.643 [§]	.588 [#]	.677 [§]	.481 [#]	.695 [§]	.895	.896	.897	.744	.894	.895	.895	.740
(2) Confidence	.780 [§]	—	.639 [§]	.740 [§]	.565 [#]	.696 [§]	.761 [§]	.724 [§]	.780 [§]	.434 [#]	.619 [§]	.837	.843	.838	.633	.872	.880	.870	.691
(3) Anxiety	.514 [#]	.523 [#]	—	.582 [#]	.444 [#]	.457 [#]	.469 [#]	.394 [*]	.466 [#]	.510 [#]	.468 [#]	.785	.785	.787	.553	.848	.852	.850	.654
(4) Assertiveness	.540 [#]	.700 [§]	.461 [#]	—	.487 [#]	.606 [§]	.654 [§]	.576 [#]	.617 [§]	.375 [*]	.484 [#]	.794	.796	.792	.559	.773	.773	.767	.525
(5) Cognitive	.656 [§]	.624 [§]	.480 [#]	.540 [#]	—	.745 [§]	.552 [#]	.523 [#]	.597 [#]	.424 [#]	.548 [#]	.855	.856	.858	.669	.841	.843	.845	.646
(6) Motivational	.746 [§]	.741 [§]	.472 [#]	.644 [§]	.797 [§]	—	.626 [§]	.557 [#]	.659 [§]	.432 [#]	.637 [§]	.874	.877	.875	.700	.861	.861	.865	.682
(7) Bodily-somatic	.558 [#]	.723 [§]	.406 [#]	.684 [§]	.575 [#]	.692 [§]	—	.796 [§]	.809 [†]	.405 [#]	.568 [#]	.861	.875	.870	.691	.856	.861	.860	.671
(8) Motor-behavioral	.538 [#]	.694 [§]	.349 [*]	.609 [§]	.592 [#]	.665 [§]	.801 [†]	—	.837 [†]	.365 [*]	.481 [#]	.829	.835	.838	.633	.849	.852	.855	.662
(9) Operational	.627 [§]	.737 [§]	.432 [#]	.655 [§]	.694 [§]	.736 [§]	.782 [§]	.799 [§]	—	.428 [#]	.583 [#]	.850	.853	.853	.659	.861	.864	.864	.679
(10) Communicative	.487 [#]	.415 [#]	.360 [*]	.358 [*]	.386 [*]	.411 [#]	.375 [*]	.399 [*]	.412 [#]	—	.398 [*]	.746	.752	.748	.499	.704	.709	.706	.445
(11) Social support	.691 [§]	.633 [§]	.441 [#]	.421 [#]	.548 [#]	.628 [§]	.450 [#]	.457 [#]	.543 [#]	.402 [#]	—	.853	.855	.855	.663	.848	.850	.850	.654

Note. Sample 1 correlations are below the diagonal and Sample 2 correlations are above; α = Cronbach’s alpha values, ω = omega values, CR = composite reliability, AVE = average variance extracted. Correlation ^{*}low, [#]moderate, [§]moderately high, [†]high.

Supplemental Table 3

Fit Indices for Multi-group Confirmatory Factor Analyses of the PESD-PE

Independent variable	Model	$\chi^2(df)$	χ^2/df	CFI	ΔCFI	TLI	RMSEA (90% CI)	$\Delta RMSEA$	SRMR	ΔSMR	$\Delta S-B \chi^2 (\Delta df)$	p value
Study group	Configural	1597.344 (880)	1.815	.936		.923	.049 (.045–.052)		.042			
	Weak measurement	1623.707 (902)	1.800	.935	.001	.924	.048 (.044–.052)	.001	.046	.004	22.900 (22)	.407
	Strong measurement	1664.371 (935)	1.780	.935	.001	.926	.048 (.044–.051)	.001	.047	.005	64.123 (55)	.187
	Strict measurement	1677.388 (957)	1.753	.935	.001	.929	.047 (.043–.050)	.002	.047	.005	76.361 (77)	.499
	Factor variance	1665.793 (934)	1.784	.934	.002	.926	.048 (.044–.051)	.001	.053	.011	65.779 (54)	.131
	Factor covariance	1712.233 (979)	1.749	.934	.002	.929	.047 (.043–.050)	.002	.059	.017	111.822 (99)	.178
Gender, Age, Gender × Age from Study 2	MIMIC Null	996.711 (539)	1.849	.926		.914	.049 (.044–.054)		.068			
	MIMIC Saturated	813.435 (440)	1.849	.940		.914	.049 (.044–.054)		.038			
	MIMIC Invariant	914.328 (506)	1.807	.934		.918	.048 (.043–.053)		.041			

Note. $\chi^2(df)$ = chi-square (degree of freedom), χ^2/df = chi-square/degree of freedom, CFI = comparative fit index, ΔCFI = CFI difference, TLI = Tucker Lewis fit index, RMSEA = root mean square error of approximation, $\Delta RMSEA$ = RMSEA difference, SRMR = standardized root mean square residual, ΔSMR = SRMR difference, $\Delta S-B \chi^2 (\Delta df)$ = Satorra-Bentler scaled chi-square difference test (degree of freedom difference), MIMIC = multiple indicator, multiple causes model.

Supplemental Table 4*Confirmatory Factor Analysis Fit Indices and Reliability Values from Study 2*

Instrument	Factor	$\chi^2(df)$	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR	α	ω	CR	AVE
PACES ¹		236.027 (101)	2.337	.951	.941	.062 (.051–.072)	.050				
	Pleasant experience (9 items)							.941	.941	.941	.640
	Unpleasant experience (7 items)							.866	.878	.868	.495
TIMCPEQ ²		37.719 (33)	1.143	.996	.994	.020 (.000–.046)	.031				
	Mastery climate (6 items)							.883	.885	.886	.570
	Performance climate (4 items)							.794	.796	.770	.461
BPN-PE		146.775 (51)	2.878	.955	.942	.073 (.059–.087)	.075				
	Competence (4 items)							.891	.897	.811	.690
	Autonomy (4 items)							.876	.882	.818	.665
	Relatedness (4 items)							.885	.890	.872	.677

Note. PACES = Physical Activity Enjoyment Scale, TIMCPEQ = Teacher-Initiated Motivational Climate in Physical Education Questionnaire, BPN-PE = Basic Psychological Needs in Physical Education Scale, $\chi^2(df)$ = chi-square (degrees of freedom), CFI = comparative fit index, TLI = Tucker Lewis fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual, α = Cronbach's alpha values, ω = omega values, CR = composite reliability, AVE = average variance extracted. ¹Two correlated errors on the Pleasant experience scale and two correlated errors on the Unpleasant experience scale. ²Two correlated errors on the Performance climate scale.

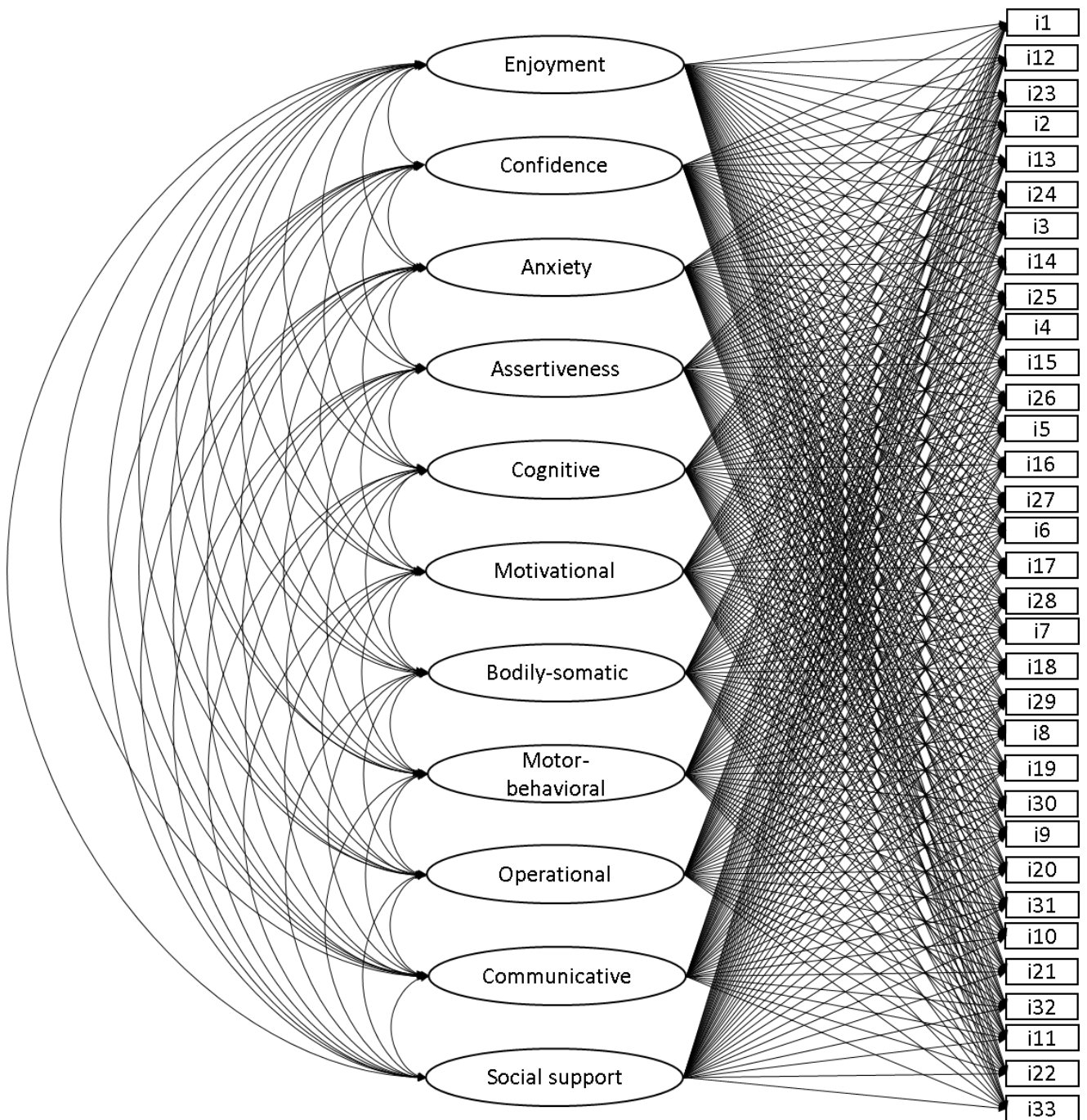
Supplemental Table 5*Latent Variable Correlations Between the PESD-PE Modalities and Measures from Study 2*

Modality	PACES		TIMCPEQ		BPN-PE		
	Pleasant	Unpleasant	Mastery	Performance	Competence	Autonomy	Relatedness
Enjoyment	.720 [†]	-.572 [§]	.325 [*]	-.285 [*]	.602 [†]	.532 [§]	.463 [§]
Confidence	.580 [§]	-.413 [§]	.155	-.170	.752 [†]	.371 [*]	.308 [*]
Anxiety	.411 [§]	-.266 [*]	.099	-.077	.475 [§]	.302 [*]	.248 [*]
Assertiveness	.608 [†]	-.418 [§]	.218 [*]	-.168	.677 [†]	.373 [*]	.334 [*]
Cognitive	.491 [§]	-.445 [§]	.274 [*]	-.121	.456 [§]	.415 [§]	.337 [*]
Motivational	.758 [†]	-.629 [†]	.382 [*]	-.208 [*]	.516 [§]	.595 [§]	.399 [*]
Bodily-somatic	.603 [†]	-.334 [*]	.157	-.085	.724 [†]	.376 [*]	.356 [*]
Motor-behavioral	.531 [§]	-.283 [*]	.135	-.133	.773 [†]	.341 [*]	.295 [*]
Operational	.558 [§]	-.372 [*]	.192	-.213 [*]	.747 [†]	.365 [*]	.330 [*]
Communicative	.541 [§]	-.372 [*]	.282 [*]	-.179	.451 [§]	.364 [*]	.568 [§]
Social support	.584 [§]	-.519 [§]	.391 [*]	-.313 [*]	.494 [§]	.499 [§]	.559 [§]

Note. PACES = Physical Activity Enjoyment Scale, TIMCPEQ = Teacher-Initiated Motivational Climate in Physical Education Questionnaire, BPN-PE = Basic Psychological Needs in Physical Education Scale. Correlation ^{*}low, [§]moderate, [†]moderately high.

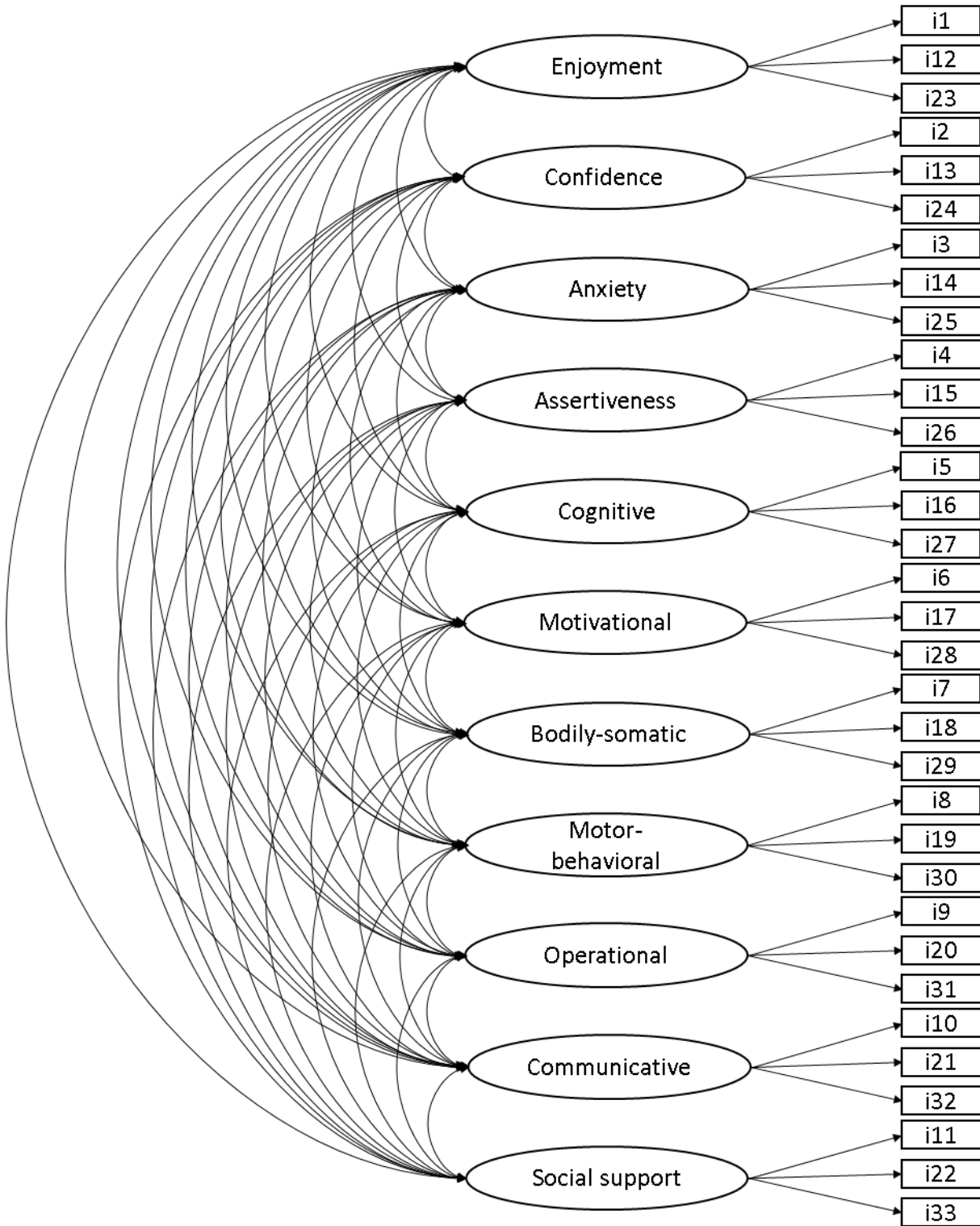
Supplemental Figure 1a

First-Order Factor Model, Exploratory Form



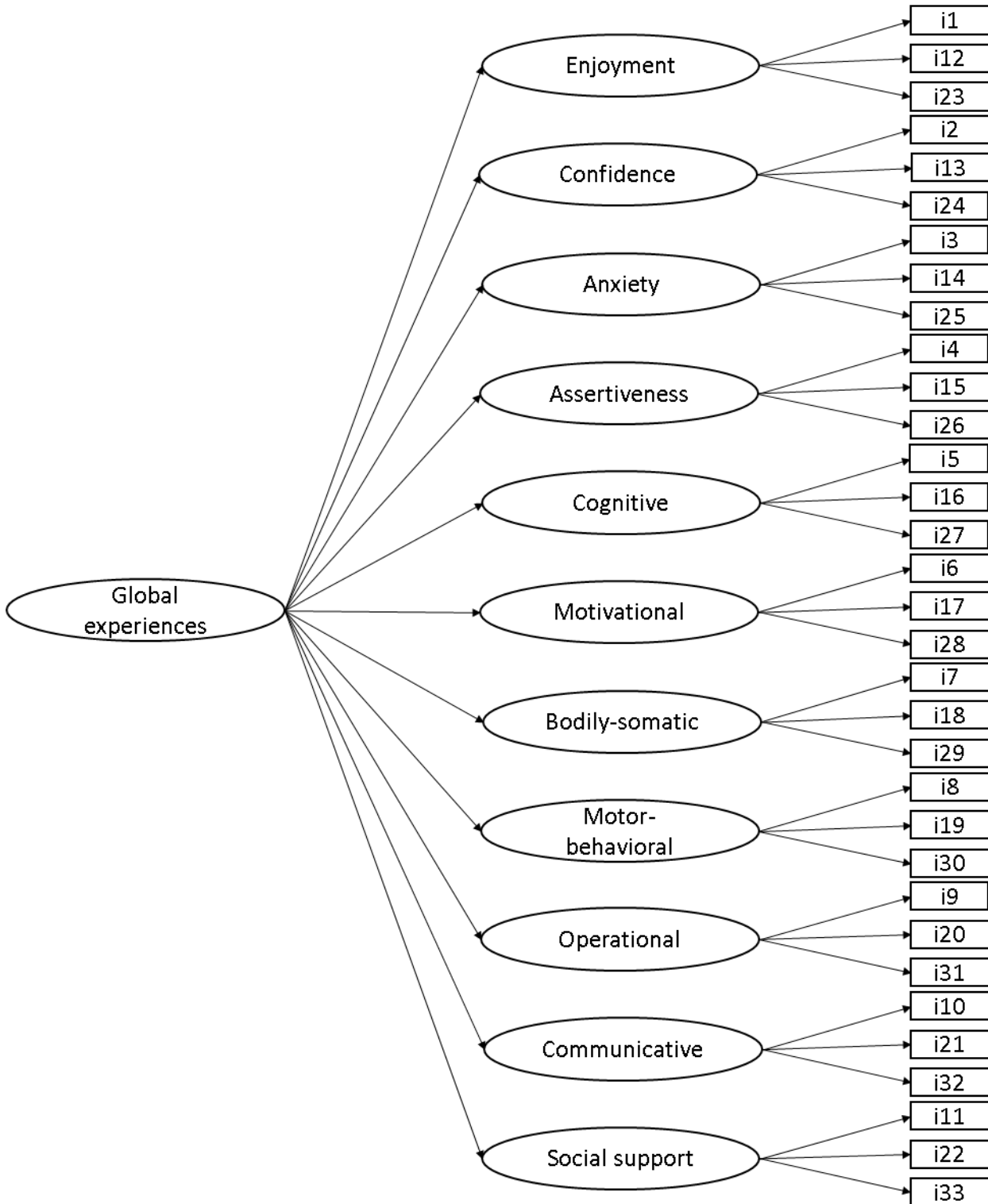
Supplemental Figure 1b

First-Order Factor Model, Confirmatory Form



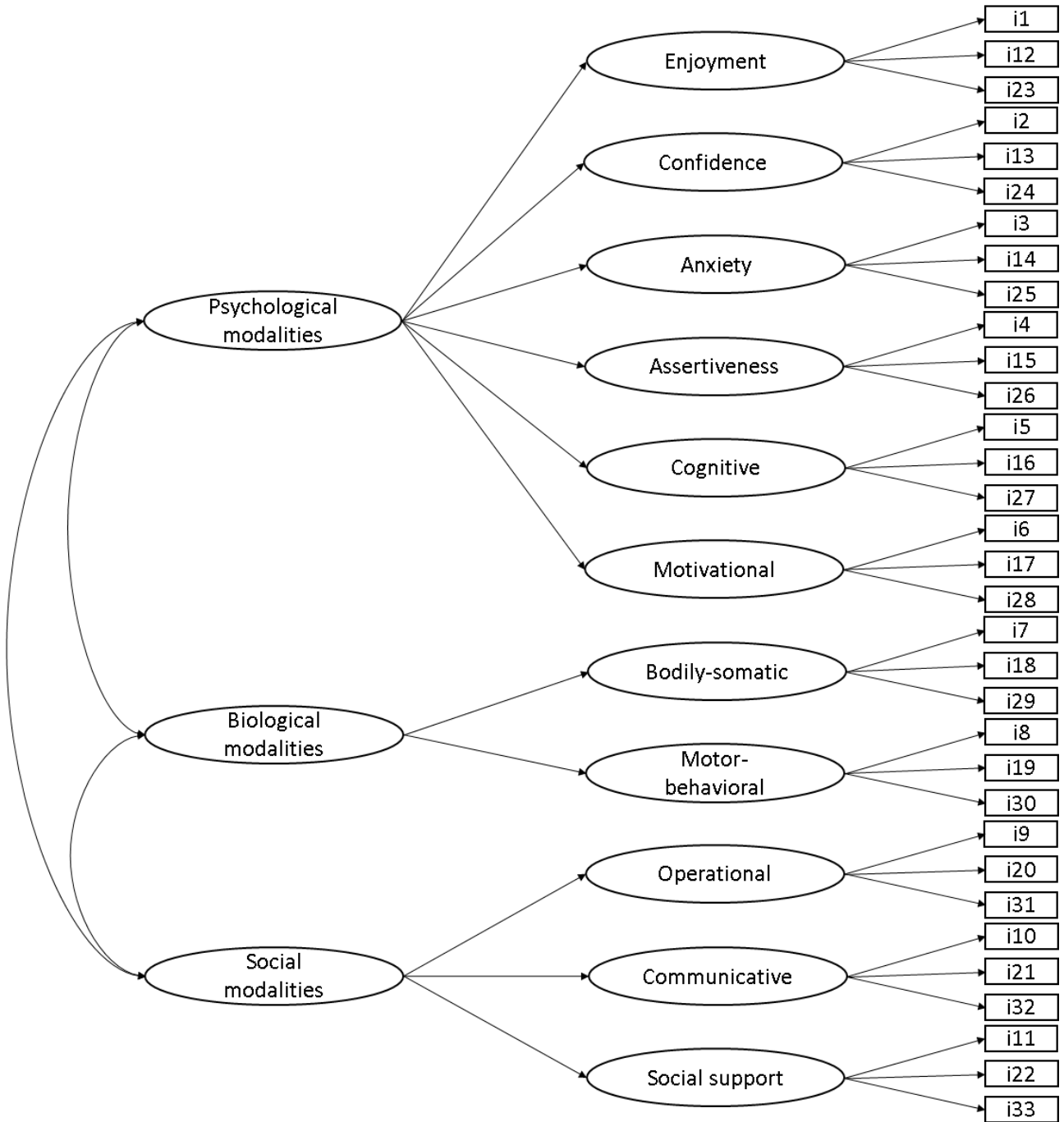
Supplemental Figure 2

Second-Order Factor Model



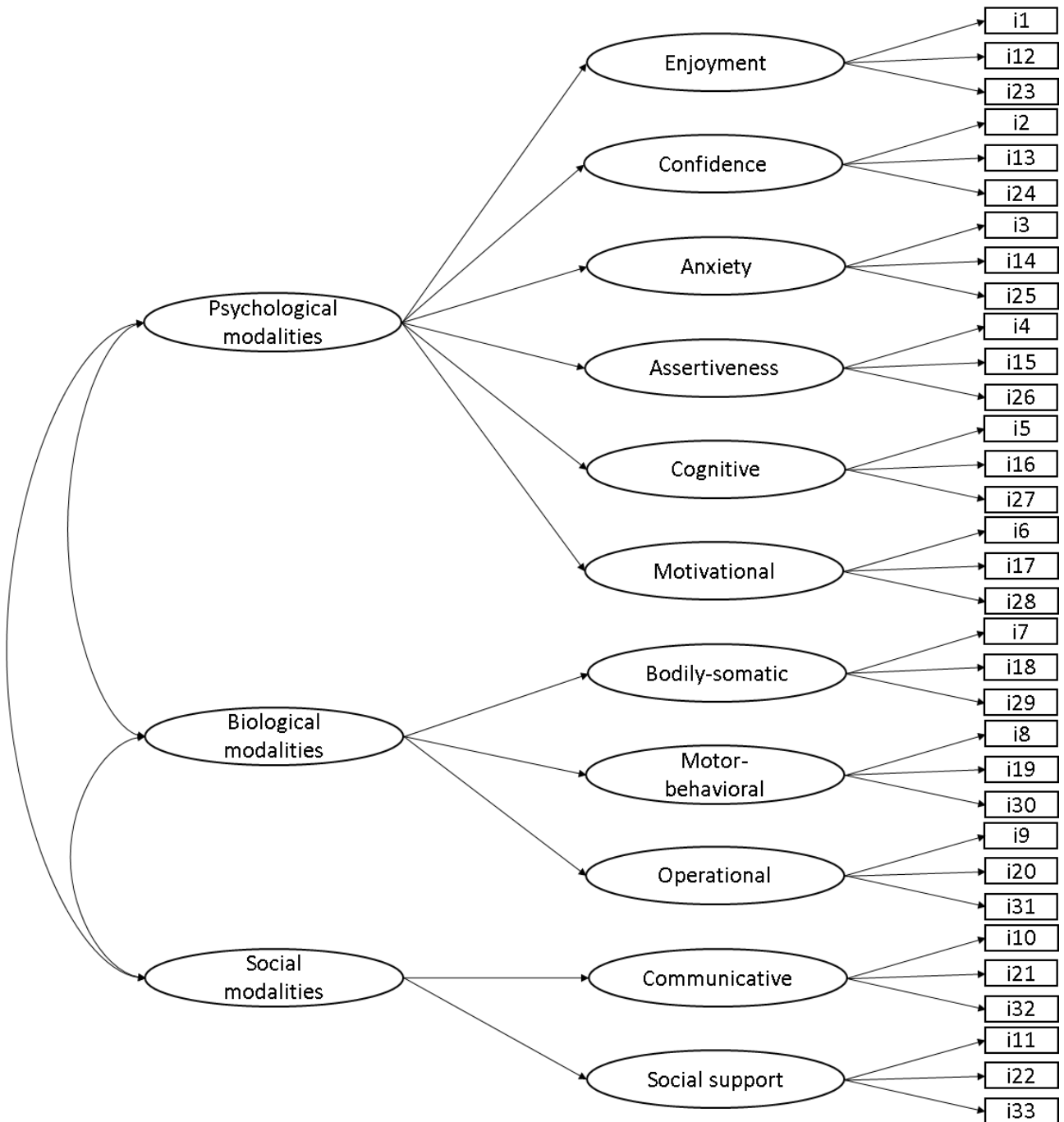
Supplemental Figure 3a

Three-second-Order Factor Model



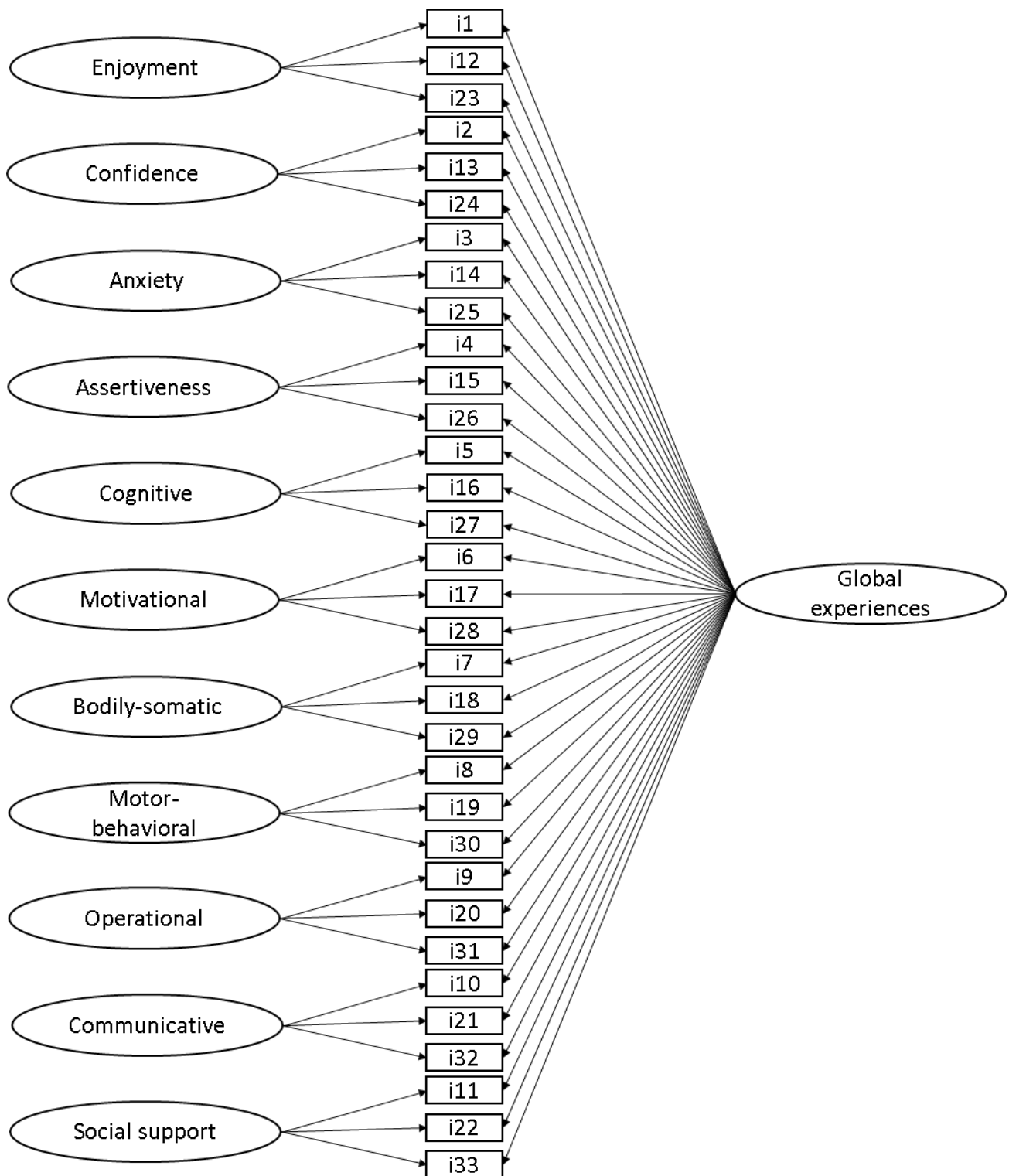
Supplemental Figure 3b

Modified Three-second-Order Factor Model



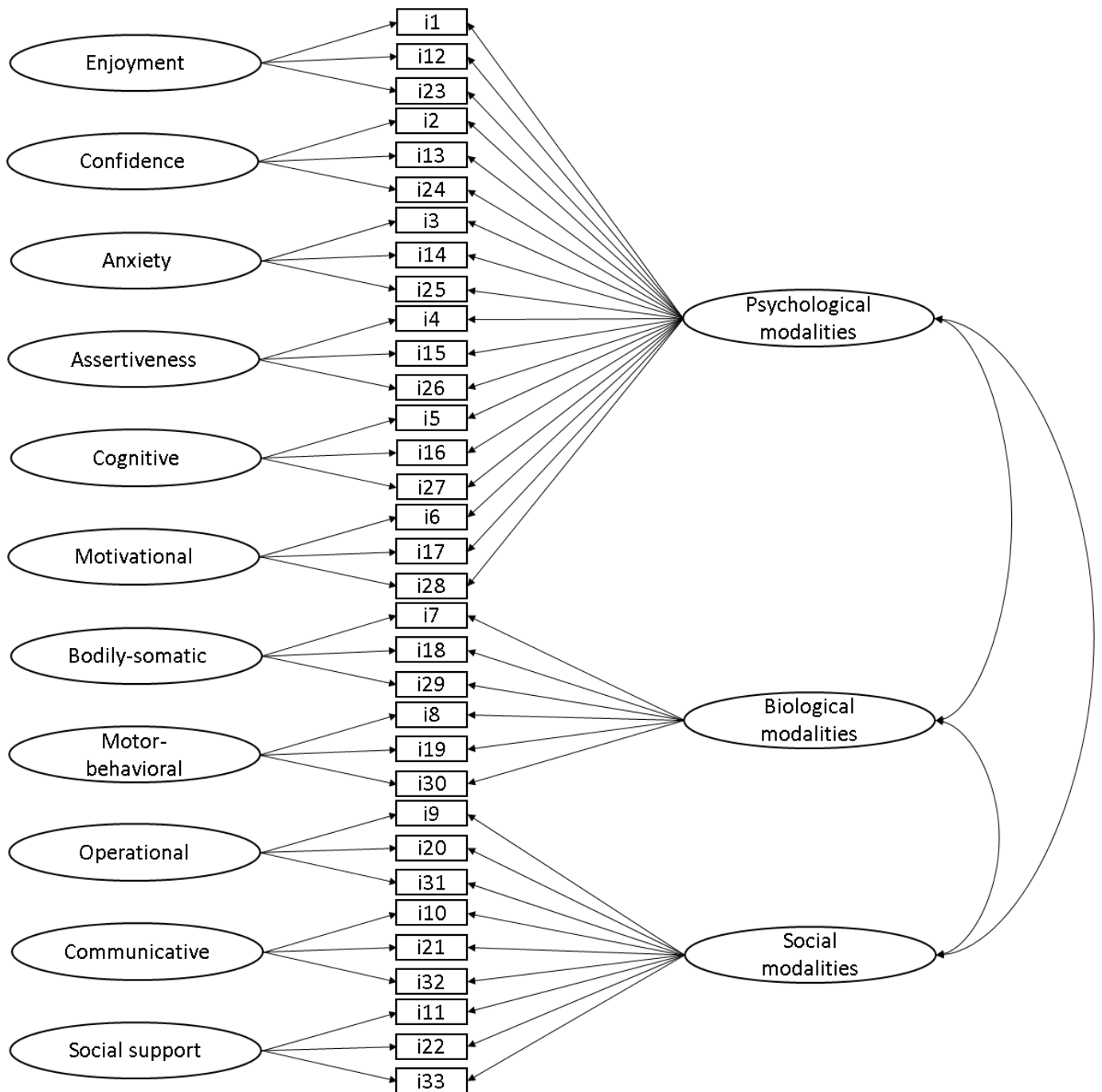
Supplemental Figure 4

Nested-factor Model



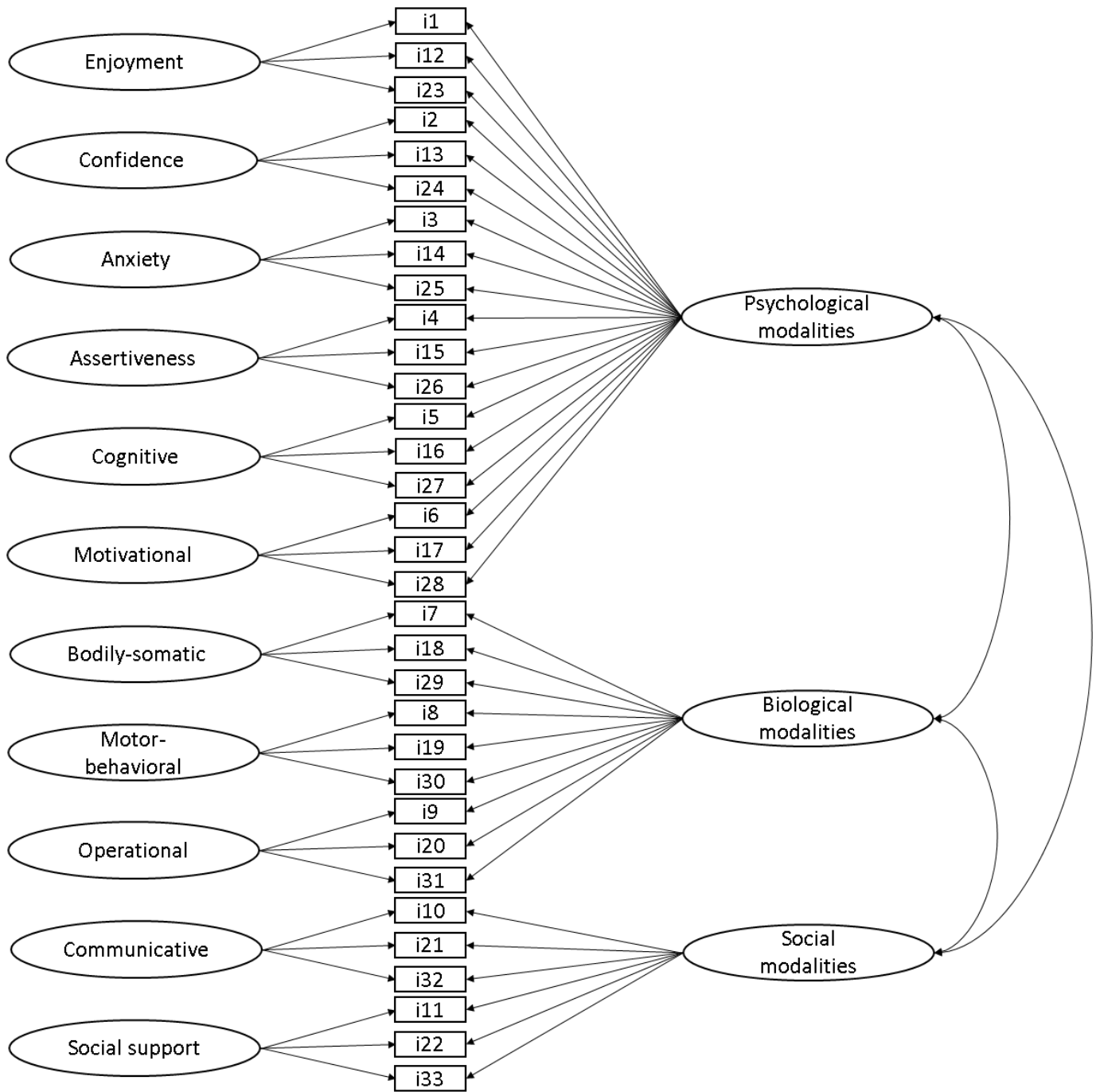
Supplemental Figure 5a

Nested Three-factor Model



Supplemental Figure 5b

Modified Nested Three-factor Model



Appendix 1

Psychobiosocial Experiences in Physical Education (PESD-PE)

Below you can find adjectives (descriptors) or sentences that people usually use to describe how they feel about their experience in physical education. For each row there are two opposing descriptors. Read them carefully and for each row choose one descriptor, **one only** (e.g., the descriptor on the left or the one on the right), which best reflects **how you usually feel during physical education classes**. Then mark the intensity of the descriptor on the scale ranging from 1 (**a little**) to 4 (**very much**). If none of the descriptors in a row reflect how you feel in your experience during physical education classes, check the middle box 0 (**neither... nor**). There are no right or wrong answers. Please, make sure to complete all rows.

Example:

“I feel quite satisfied with myself”. In this case you check box 2 on the right side.

Unsatisfied	4	3	2	1	0	1	2	3	4	Satisfied
-------------	---	---	---	---	---	---	--------------	---	---	-----------

On the other hand, if for you it is true: “I feel much dissatisfied with myself”, then you have to check box 3 on the left side.

Unsatisfied	4	3	2	1	0	1	2	3	4	Satisfied
-------------	---	--------------	---	---	---	---	---	---	---	-----------

		Very much	Much	Moderate	A little	neither... nor	A little	Moderate	Much	Very much	
1	Unhappy	4	3	2	1	0	1	2	3	4	Happy
2	Incapable	4	3	2	1	0	1	2	3	4	Capable
3	Worried in a harmful way	4	3	2	1	0	1	2	3	4	Worried in a helpful way
4	Submissive	4	3	2	1	0	1	2	3	4	Fighting spirit
5	Distracted	4	3	2	1	0	1	2	3	4	Alert
6	Unmotivated	4	3	2	1	0	1	2	3	4	Motivated
7	Physically weak	4	3	2	1	0	1	2	3	4	Physically vigorous
8	Uncoordinated in my movements	4	3	2	1	0	1	2	3	4	Coordinated in my movements
9	Ineffective in my performance	4	3	2	1	0	1	2	3	4	Effective in my performance
10	Being communicative is harmful	4	3	2	1	0	1	2	3	4	Being communicative is useful

MEASURING PSYCHOBIOSOCIAL EXPERIENCES IN PE

11	I feel ignored	4	3	2	1	0	1	2	3	4	I feel considered
12	Sad	4	3	2	1	0	1	2	3	4	Joyful
13	Insecure	4	3	2	1	0	1	2	3	4	Secure
14	Mentally tense in a harmful way	4	3	2	1	0	1	2	3	4	Mentally tense in a helpful way
15	Fragile	4	3	2	1	0	1	2	3	4	Gritty
16	Unfocused	4	3	2	1	0	1	2	3	4	Focused
17	Disengaged	4	3	2	1	0	1	2	3	4	Engaged
18	Physically fatigued	4	3	2	1	0	1	2	3	4	Full of energy
19	Lethargic in my movements	4	3	2	1	0	1	2	3	4	Dynamic in my movements
20	Unskillful in my performance	4	3	2	1	0	1	2	3	4	Skillful in my performance
21	Being expansive is harmful	4	3	2	1	0	1	2	3	4	Being expansive is useful
22	I feel neglected	4	3	2	1	0	1	2	3	4	I feel supported

		Very much	Much	Moderate	A little	neither... nor	A little	Moderate	Much	Very much	
23	Dejected	4	3	2	1	0	1	2	3	4	Cheerful
24	Uncertain	4	3	2	1	0	1	2	3	4	Certain
25	Nervous in a harmful way	4	3	2	1	0	1	2	3	4	Nervous in a helpful way
26	Surrendered	4	3	2	1	0	1	2	3	4	Combative
27	Inattentive	4	3	2	1	0	1	2	3	4	Attentive
28	Uninterested	4	3	2	1	0	1	2	3	4	Interested
29	Physically drowsy	4	3	2	1	0	1	2	3	4	Physically charged
30	Clumsy in my movements	4	3	2	1	0	1	2	3	4	Smooth in my movements
31	Inconsistent in my performance	4	3	2	1	0	1	2	3	4	Consistent in my performance
32	Being sociable is harmful	4	3	2	1	0	1	2	3	4	Being sociable is useful
33	I feel rejected	4	3	2	1	0	1	2	3	4	I feel accepted

Scoring

Scores on the dysfunctional side (i.e., left side) are transformed into negative scores. Thus, the score of an item could range from -4 to 4, and the total score of each modality could range from -12 to 12. It is also possible to calculate a total score by adding the scores of the individual items. The total score could range from -132 to 132.

Mean scores of each modality:

$$\text{Enjoyment} = (1 + 12 + 23)/3$$

$$\text{Confidence} = (2 + 13 + 24)/3$$

$$\text{Anxiety} = (3 + 14 + 25)/3$$

$$\text{Assertiveness} = (4 + 15 + 26)/3$$

$$\text{Cognitive} = (5 + 16 + 27)/3$$

$$\text{Motivation} = (6 + 17 + 28)/3$$

$$\text{Bodily-somatic} = (7 + 18 + 29)/3$$

$$\text{Motor-behavioral} = (8 + 19 + 30)/3$$

$$\text{Operational} = (9 + 20 + 31)/3$$

$$\text{Communicative} = (10 + 21 + 32)/3$$

$$\text{Social support} = (11 + 22 + 33)/3$$

Note: The English version here presented is a translation of the Italian version (see last page) and has not been validated.

Complete Psychobiosocial Profile of two Students

		Very much	Much	Moderate	A little	neither... nor	A little	Moderate	Much	Very much		
Maladaptive experiences											Adaptive experiences	
1	Unhappy			X						X		Happy
12	Sad				X				X			Joyful
23	Dejected			X						X		Cheerful
2	Incapable			X						X		Capable
13	Insecure		X					X				Secure
24	Uncertain	X							X			Certain
3	Worried in a harmful way		X				X					Worried in a helpful way
14	Mentally tense in a harmful way			X					X			Mentally tense in a helpful way
25	Nervous in a harmful way		X						X			Nervous in a helpful way
4	Submissive				X						X	Fighting spirit
15	Fragile			X					X			Gritty
26	Surrendered			X							X	Combative
5	Distracted		X						X			Alert
16	Unfocused		X								X	Focused
27	Inattentive			X					X			Attentive
6	Unmotivated		X								X	Motivated
17	Disengaged			X					X			Engaged
28	Uninterested				X						X	Interested
7	Physically weak			X							X	Physically vigorous
18	Physically fatigued				X						X	Full of energy
29	Physically drowsy			X					X			Physically charged
8	Uncoordinated in my movements		X								X	Coordinated in my movements

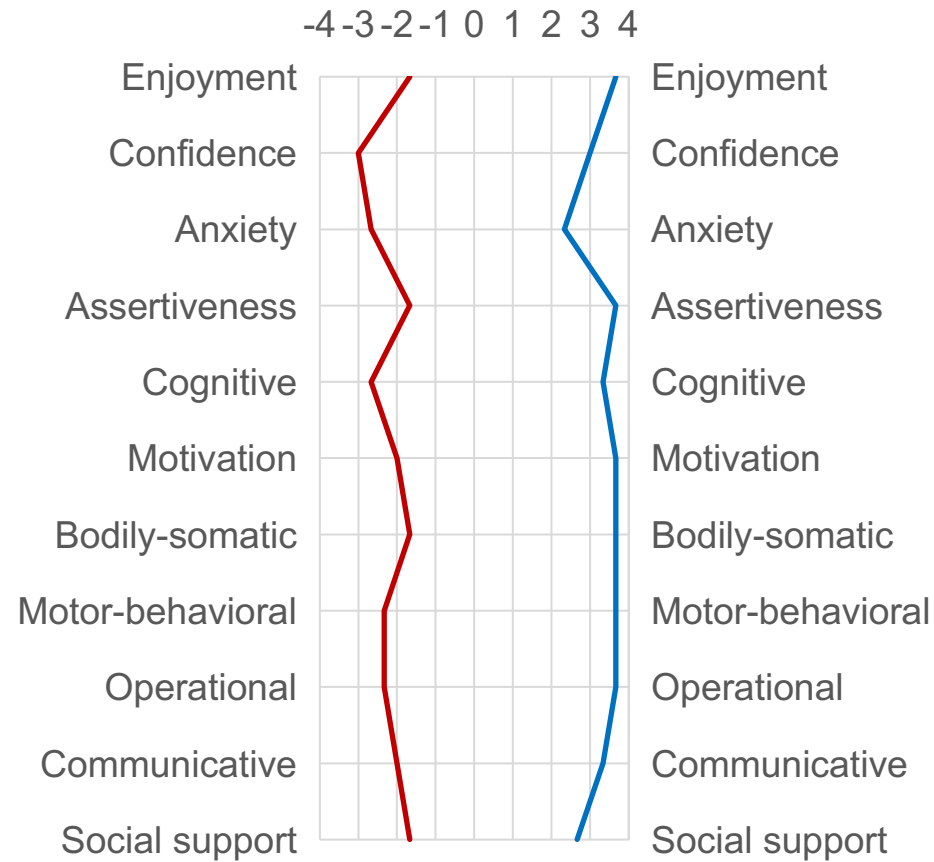
19	Lethargic in my movements			X						X	Dynamic in my movements
30	Clumsy in my movements			X						X	Smooth in my movements
9	Ineffective in my performance		X							X	Effective in my performance
20	Unskillful in my performance			X						X	Skillful in my performance
31	Inconsistent in my performance			X						X	Consistent in my performance
10	Being communicative is harmful			X						X	Being communicative is useful
21	Being expansive is harmful		X							X	Being expansive is useful
32	Being sociable is harmful				X					X	Being sociable is useful
11	I feel ignored			X						X	I feel considered
22	I feel neglected			X					X		I feel supported
33	I feel rejected				X					X	I feel accepted

Note. A Maladaptive Profile of a Student is Displayed on the Left Side (in red) and an Adaptive Profile of Another Student is Displayed on the Right Side (in blue).

Aggregated Psychobiosocial Profile of two Students

Maladaptive experiences

Adaptive experiences



Note. A Maladaptive Profile of a Student is Displayed on the Left Side (in red) and an Adaptive Profile of Another Student is Displayed on the Right Side (in blue).

Esperienze Psicobiosociali in Educazione fisica (PESD-PE)

Di seguito sono riportati aggettivi o frasi che le persone di solito usano per descrivere come si sentono in relazione alle attività motorie. Per ogni riga vi sono due descrittori opposti. Leggili attentamente e per ciascuna riga scegli uno dei due, **uno solo** (quello nella parte sinistra oppure quello nella parte destra), che riflette **come ti senti di solito durante le lezioni di scienze motorie**; indicane poi l'**intensità** con una X sulla scala che va da 1 (**poco**) a 4 (**moltissimo**). Se in una riga nessuno dei due descrittori è presente nella tua esperienza durante le lezioni di scienze motorie, segna la casella centrale 0 (**né...né**). Non ci sono risposte giuste o sbagliate. Per favore, accertati di rispondere a tutte le descrizioni.

Esempio:

“Mi sento abbastanza soddisfatto di me stesso”. In tal caso devi contrassegnare la casella 2 nella parte destra.

Insoddisfatto	4	3	2	1	0	1	2	3	4	Soddisfatto
---------------	---	---	---	---	---	---	--------------	---	---	-------------

Se invece per te è vero: “Mi sento molto insoddisfatto di me stesso”, in tal caso devi contrassegnare la casella 3 nella parte sinistra.

Insoddisfatto	4	3	2	1	0	1	2	3	4	Soddisfatto
---------------	---	---	---	---	---	---	---	---	---	-------------

		Moltissimo	Molto	Abbastanza	Poco	Né...né	Poco	Abbastanza	Molto	Moltissimo	
1	Infelice	4	3	2	1	0	1	2	3	4	Felice
2	Incapace	4	3	2	1	0	1	2	3	4	Capace
3	Preoccupato in modo dannoso	4	3	2	1	0	1	2	3	4	Preoccupato in modo utile
4	Remissivo	4	3	2	1	0	1	2	3	4	Combattivo
5	Distratto	4	3	2	1	0	1	2	3	4	Vigile
6	Demotivato	4	3	2	1	0	1	2	3	4	Motivato
7	Fisicamente affaticato	4	3	2	1	0	1	2	3	4	Pieno di energia
8	Fiacco nei movimenti	4	3	2	1	0	1	2	3	4	Attivo nei movimenti
9	Inefficace nella mia prestazione	4	3	2	1	0	1	2	3	4	Efficace nella mia prestazione
10	Essere comunicativo mi danneggia	4	3	2	1	0	1	2	3	4	Essere comunicativo mi è utile

MEASURING PSYCHOBIOSOCIAL EXPERIENCES IN PE

11	Mi sento ignorato	4	3	2	1	0	1	2	3	4	Mi sento considerato
12	Triste	4	3	2	1	0	1	2	3	4	Gioioso
13	Insicuro	4	3	2	1	0	1	2	3	4	Sicuro
14	Mentalmente teso in modo dannoso	4	3	2	1	0	1	2	3	4	Mentalmente teso in modo utile
15	Fragile	4	3	2	1	0	1	2	3	4	Grintoso
16	Deconcentrato	4	3	2	1	0	1	2	3	4	Concentrato
17	Disimpegnato	4	3	2	1	0	1	2	3	4	Coinvolto
18	Fisicamente scarico	4	3	2	1	0	1	2	3	4	Fisicamente carico
19	Inerte nei movimenti	4	3	2	1	0	1	2	3	4	Dinamico nei movimenti
20	Scadente nella mia prestazione	4	3	2	1	0	1	2	3	4	Abile nella mia prestazione
21	Essere espansivo mi danneggia	4	3	2	1	0	1	2	3	4	Essere espansivo mi è utile
22	Mi sento trascurato	4	3	2	1	0	1	2	3	4	Mi sento supportato

		Moltissimo	Molto	Abbastanza	Poco	Né...né	Poco	Abbastanza	Molto	Moltissimo	
23	Avvilito	4	3	2	1	0	1	2	3	4	Allegro
24	Incerto	4	3	2	1	0	1	2	3	4	Certo
25	Nervoso in modo dannoso	4	3	2	1	0	1	2	3	4	Nervoso in modo utile
26	Arrendevole	4	3	2	1	0	1	2	3	4	Agguerrito
27	Disattento	4	3	2	1	0	1	2	3	4	Attento
28	Disinteressato	4	3	2	1	0	1	2	3	4	Interessato
29	Fisicamente non reattivo	4	3	2	1	0	1	2	3	4	Fisicamente reattivo
30	Goffo nei movimenti	4	3	2	1	0	1	2	3	4	Fluidi nei movimenti
31	Instabile nella mia prestazione	4	3	2	1	0	1	2	3	4	Stabile nella mia prestazione
32	Essere socievole mi danneggia	4	3	2	1	0	1	2	3	4	Essere socievole mi è utile
33	Mi sento rifiutato	4	3	2	1	0	1	2	3	4	Mi sento accettato