

Exercise behaviour, enjoyment and boredom

Deck, Sarah; Roberts, Ross; Hall, Craig; Kouali, Despina

International Journal of Sport and Exercise Psychology

DOI:

[10.1080/1612197X.2019.1581830](https://doi.org/10.1080/1612197X.2019.1581830)

Published: 01/11/2020

Peer reviewed version

[Cyswllt i'r cyhoeddiad / Link to publication](#)

Dyfyniad o'r fersiwn a gyhoeddwyd / Citation for published version (APA):

Deck, S., Roberts, R., Hall, C., & Kouali, D. (2020). Exercise behaviour, enjoyment and boredom. *International Journal of Sport and Exercise Psychology*, 18(6), 779-793. <https://doi.org/10.1080/1612197X.2019.1581830>

Hawliau Cyffredinol / General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

1

2

3

4

5

6

7

8 Exercise behaviour, enjoyment and boredom: A test of the 2x2 model of perfectionism

9

10

11 Abstract

12 Previous research investigating the role of perfectionism in exercise has been limited by both
13 the method of investigation (largely examining independent effects of perfectionism
14 dimensions), and the outcome variables that have been studied (mostly maladaptive outcomes).
15 The purpose of the current study was to investigate the role of perfectionism on exercise
16 behaviour, boredom, and enjoyment using the recently established 2×2 model of perfectionism.
17 This model proposes that different forms of perfectionism, such as self-oriented (SOP) and
18 socially prescribed perfectionism (SPP), will interact to influence different outcomes. One
19 hundred and ninety-four college students completed a multi-section inventory comprised of
20 demographics, the Multidimensional Perfectionism Scale (MPS; Hewitt & Flett, 1991b), the
21 Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991), and the Godin
22 Leisure Time Exercise Questionnaire (GLETQ; Godin & Sheppard, 1985). Somewhat contrary
23 to the predictions of the 2×2 model, we obtained significant interactions between SOP and SPP
24 for boredom in exercise only. More specifically, the highest levels of boredom were associated
25 with high levels of SOP and low levels of SPP (“pure personal standards perfectionism” in the
26 parlance of the 2×2 model). In addition, SOP was a significant negative predictor of weekly,
27 mild, moderate, and strenuous exercise minutes and a significant positive predictor of
28 enjoyment. SPP positively predicted mild and moderate exercise. These findings do not offer
29 full support for the use of the 2×2 model but we suggest that the model may be better suited for
30 more achievement related environments.

31 *Keywords:* perfectionism, exercise, 2×2 model

32

33 Exercise behaviour, enjoyment and boredom: A test of the 2x2 model of perfectionism

34 Perfectionism is a personality trait associated with the setting of excessively high
35 standards in conjunction with a tendency to make overly critical self-evaluations (Frost,
36 Marten, Lahart, & Rosenblate, 1990). An abundant literature has examined the effects of
37 perfectionism on divergent outcomes in various domains (see Bardone-Cone et al., 2007
38 Beheshtifar, Mazrae-Sefidi, & Nekoie Moghadam, 2011; Hill & Madigan, 2017; Nounopoulos,
39 Ashby & Gilman, 2006). Much of this literature uses the model developed by Hewitt and Flett
40 (1991b) as a guiding framework, as Hewitt and Flett's model distinguishes between
41 interpersonal and intrapersonal aspects of perfectionism. Specifically, Hewitt and Flett
42 distinguish between self-oriented perfectionism (SOP), characterized by holding high
43 perfectionistic standards for oneself, socially-prescribed perfectionism (SPP) characterized by
44 striving towards perfectionism mainly due to pressure exerted by others to be perfect and to
45 reach social standards of excellence or perfection, and other-oriented perfectionism (OOP)
46 characterized by the need for others to achieve perfection. The literature using Hewitt and
47 Flett's work converges to support the deleterious effects of SPP (Jahromi, Naziri, & Barzegar,
48 2012), although the effects of SOP seem less clear, as research has demonstrated positive,
49 negative and null effects of SOP (Gaudreau & Verner-Filion, 2012). Less work has examined
50 the role of OOP, especially within sport and exercise but research has shown that OOP is
51 associated with different personality disorders such as antisocial and narcissistic (Hewitt &
52 Flett, 1991a).

53 Historically, SPP and SOP have been studied in isolation. However, more recently
54 researchers have begun to explore interactions between these two components of perfectionism
55 to better understand the effects of different within-person combinations of perfectionism. The

56 2×2 model of perfectionism (Gaudreau & Thomson, 2010) proposes four different within-
57 person combinations of perfectionism; (1) non-perfectionism characterized by low levels of
58 SPP and SOP, (2) high evaluative concerns characterized by high levels of SPP and low levels
59 of SOP, (3) high pure personal standards characterized by high levels of SOP and low levels of
60 SPP, and (4) mixed perfectionism characterized by high levels of both SOP and SPP. This
61 model of perfectionism was designed to compare outcomes associated with the four within-
62 person combinations of perfectionism. Originally, the model was developed using the broader
63 dimensions of perfectionism; evaluative concerns perfectionism (ECP) and personal standards
64 perfectionism (PSP), but it has (and can) be applied to the more specific dimensions of
65 perfectionism (Gaudreau & Verner-Filion, 2012). The model testing the broader dimensions of
66 perfectionism has mainly been used in sport and has been shown to predict outcomes such as
67 burnout (Hill, 2013; Nordin-Bates, Raedeke, & Madigan, 2017). The model posits that SOP
68 and SPP co-exist in all individuals to a certain degree, and understanding the nature of the
69 within-person organization of perfectionism can more likely determine the type of
70 perfectionism associated with more or less positive outcomes (Gaudreau & Verner-Filion,
71 2012; Flett & Hewitt, 2006). In sport, this model has shown pure SPP to be the most
72 detrimental within-person combination of perfectionism when comparing athlete's perfectionist
73 traits to well-being (affect, satisfaction with life, and vitality; Gaudreau & Verner-Filion, 2012)
74 and burnout (Hill, 2013). In addition, pure PSP has been associated with better outcomes, such
75 as threat appraisal and athlete goal progress, compared to all other within-person combinations,
76 (Crocker, Gaudreau, Mosewich, & Kljalic, 2014).

77 In the exercise domain, perfectionism has mostly been studied in relation to less
78 desirable outcomes such as excessive exercise and exercise dependence (see Hagan &

79 Hausenblas, 2003; Hill, Robinson, & Stamp, 2015). These studies have utilized a combination
80 of variable and group based approaches. For example, in relation to exercise dependence,
81 evidence suggests that both SOP and SPP may have a direct and positive effect on exercise
82 dependence, or may be mediated by an additional variable such as self-acceptance or self-
83 presentation (Hall, Hill, Appleton, & Kozub, 2009). Although not as extensive, there has also
84 been research that posits how aspects of perfectionism may play a positive role in the exercise
85 domain. Anshel and Seipel (2006) found that the maintenance of an exercise regimen in
86 college students was positively and significantly related to dimensions of perfectionism such as
87 organization. Longbottom, Grove, and Dimmick (2010) found a similar relationship between
88 dimensions of perfectionism and aerobic exercise, mediated by both autonomy and self-
89 presentation. Self-oriented perfectionism had a positive indirect effect on exercise behaviour
90 via autonomy and self-presentation (although both individual paths involving self-presentation
91 were negative), highlighting the importance of the dimensions of perfectionism that may have
92 beneficial consequences relative to exercise behaviour.

93 In college students, both perfectionism and exercise have been studied separately, each
94 with a number of different variables. Perfectionism has been link to self-efficacy, disordered
95 eating or dietary restraint, and motivation (Locicero & Ashby, 2000; Neumeister, 2004;
96 Paulson & Rutledge, 2014). Similarly, exercise has also been looked at in college students with
97 motivation, diet, and a number of psychological health variables (Kilpatrick, M., Herbert, E., &
98 Bartholomew, J. 2005; Thome & Espelage, 2004). Studied together, researchers have found
99 that for college women, those who experience less distress when their exercise performance do
100 not meet their standards (discrepancy) are at less risk for disordered eating (Paulson &
101 Rutledge, 2014). For both college men and women, organization, which is positively linked to

102 personal standards of perfectionism is significantly linked to the maintenance of a exercise
103 regimen (Anshel & Siepel, 2006).

104 Although these studies provide evidence of a relationship between dimensions of
105 perfectionism and exercise behaviour in both athletes and college students, more work is
106 needed. Indeed, understanding different variables that may impact exercise (positively or
107 negatively) is important for behaviour change, intervention development, and recognizing more
108 or less helpful patterns of behaviour (i.e., exercise addiction). Previous work has shown how
109 both enjoyment and boredom can influence or predict exercise behaviour (Hagber, Lindahl,
110 Nyberg, Hellenuis, 2009; Salmon, Owen, Crawford, Bauman, Sallis, 2003), where enjoyment
111 of exercise is associated with an increase in exercise duration and boredom is associated with
112 shorter exercise duration. With these variables having a strong relationship with exercise, they
113 are worth exploring when examining perfectionism and its own potential influence on exercise
114 behaviour. Given the complexity of perfectionism, and its relationship with exercise, the 2×2
115 model could help to further distinguish how perfectionism can influence different behaviours,
116 yet the 2×2 model has yet to be tested in the exercise domain.

117 With these issues in mind, the purpose of the following study was to use the model to
118 examine the relationship between perfectionism and exercise behaviour and exercise related
119 cognitions (i.e., enjoyment and boredom). The model proposes four theoretically driven
120 hypotheses (or outcomes; Gaudreau & Thompson, 2012). For pure SOP, or pure personal
121 standards perfectionism, based on the healthy nature of SOP and the unhealthy nature of SPP,
122 pure SOP is associated with better psychological adjustment compared to non-perfectionism.
123 In contrast, pure SPP (i.e., high evaluative concerns) is associated with poorer adjustments
124 when compared to non-perfectionism, and should be related to the most negative outcomes

125 when compared to the three other forms of perfectionism (Gaudreau & Thompson, 2012).
126 Finally, for mixed perfectionism there are two hypotheses; (1) mixed perfectionism should be
127 associated with better psychological adjustment and higher levels of internalization compared
128 to SPP, and (2) mixed perfectionism should be associated with lower levels of internalization
129 and worst psychological adjustment compared to pure SOP. With these proposed effects in
130 mind, we hypothesized that pure SPP would be the most detrimental within-person
131 combination of perfectionism (correlated with low enjoyment, and increased boredom); that
132 mixed perfectionism would be associated with better outcomes compared to pure SPP, but
133 poorer outcomes when compared with pure SOP (those with SOP would have the highest levels
134 of enjoyment and the lowest levels of boredom). We also hypothesized that pure SPP would be
135 correlated with decreased exercise behaviour, and pure SOP would be correlated with the
136 highest levels of exercise behaviour.

137 **Method**

138 **Participants & Procedure**

139 Following ethics approval, we recruited participants from an undergraduate university class.
140 Participants received a link to the online survey, and had one month to complete the assessment
141 at one time. The online questionnaire took participants ~25 minutes to complete. All
142 participants received a letter of invitation and gave informed consent before proceeding to data
143 collection. One hundred and eighty-two participants (66% female) took part in the study. The
144 age of the participants ranged from 18-25 ($M = 20$, $SD = 1.1$). The majority of the participants
145 were Caucasian (77%), while the remaining participants reported being, Aboriginal (1%),
146 Asian (12%) and other (10%). All participants were currently enrolled in an undergraduate
147 degree program.

148 **Instrumentation**

149 **The Godin Leisure Time Exercise Questionnaire** (GLETQ; Godin & Sheppard, 1985).

150 The GLETQ is a self-report measure of leisure-time exercise habits based on a typical 7-day
151 week. Participants indicated the number of times per week they engaged in strenuous (i.e.,
152 running, hockey), moderate (i.e., fast walking, tennis), and mild exercise (i.e., yoga, bowling) at
153 15 minute intervals. Exercise scores were calculated by multiplying the number of times
154 participants indicated participating in an activity by 15. Weekly exercise minutes were
155 calculated by adding the number of minutes for mild, moderate and strenuous activity. The
156 GLETQ has shown to be valid and reliable when for classifying individuals by their exercise
157 behaviour (i.e., active or not; see Amireault & Godin, 2015).

158 **The Multidimensional Perfectionism Scale** (MPS; Hewitt & Flett, 1989). The subscales
159 used in the current study were self-oriented perfectionism (SOP), and socially prescribed
160 perfectionism (SPP). Participants rated 30 items (15 per scale) on a 7-point Likert scale, from 1
161 (*agree*) to 7 (*disagree*). Each item from each subscale were added to create a total score for
162 each type of perfectionism. For a review of validity, reliability and psychometric properties,
163 see Hewitt, Flett, Turnbull-Donovan, and Mikail (1991).

164 **Positive and Negative Affect Scale** (PANAS; Watson, Clark, & Tellegen, 1988).

165 Individuals were asked to indicate how they feel at the present moment. Items are measured on
166 a 5-point Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*); sample items include
167 “Interested”, “Upset”, and “Attentive”. Items for each subscale (positive affect and negative
168 affect) are added to create two overall scores. There is evidence to show internal consistency
169 of the scales, as well as convergent and divergent validity (see Watson et al., 1988). We
170 entered scores from the PANAS as covariates in all analyses to account for mood state of

171 participants. Current mood state can influence the responses given on self-report scales, and
172 thus can contribute to common method variance (Podsakoff, MacKenzie, & Lee, 2003).
173 Therefore, controlling for mood state is recommended in correlational designs to reduce the
174 influence of common method variance.

175 **Physical Activity Enjoyment Scale** (PACES; Kendzierski & DeCarlo, 1991). Participants
176 are asked to rate how they feel about exercise; each item is measured on a dichotomous 5-point
177 Likert scale. Examples of anchors/items include, “I enjoy it; I hate it”, and “I find it
178 energizing; I find it tiring”. An overall enjoyment score was calculated by first reversing 11
179 items, and then adding up all items for the scale. Higher scores on the PACES indicate more
180 enjoyment, where lower scores indicated more boredom. Research exists supporting both
181 reliability and validity of the scale (see Crocker, Bouffard & Gessaroli, 2005; Kendzierski &
182 DeCarlo, 1991).

183 **Data Analysis**

184 We screened data for missing values and four cases were deleted due to incomplete data
185 (i.e., missing an entire subscale). Coefficient alphas for all scales of each instrument were
186 appropriate; all subscales were $>.70$ (see Table 1 for reliability of each subscale).

187 Based on previous work and recommendations (Gaudreau, 2012) we tested the
188 predictions of the 2×2 model using moderated hierarchical regression (Cohen, Cohen, West, &
189 Aiken, 2003). This type of analysis takes into account the continuous nature of SOP and SPP,
190 as opposed to using cut-off points or creating sub-groups (Bissonnette, Ickes, Berstein, &
191 Knowles, 1990). We entered scores from the PANAS first as covariates to account for mood
192 state of participants. Other covariates were explored (i.e., age and gender) and found to be
193 insignificant, so were not included in the following analyses.

194 In the second step of the model we entered the centered variables for SOP and SPP,
195 followed by the interaction term. Where significant interactions were evident, we used simple
196 slopes to estimate the relationship between SOP and SPP and the outcome variables (exercise
197 behaviour, boredom, and enjoyment).

198 Although the 2x2 rests on the premise of interactions, support for the model can be
199 obtained in the absence of interactive effects (cf. Gaudreau, 2012). Thus, where we failed to
200 find interactions we utilized Gaudreau's (2012) approach and ran multiple regression analyses
201 using non-standardized values, and with the interaction term removed, to estimate the main
202 effects of SPP and SOP on exercise behaviour and enjoyment. For significant interactions, a
203 first set of simple slopes were calculated to estimate the relationship between SOP and the
204 outcome variable at low SPP and at high SPP. The first simple slope can be used as a contrast
205 to compare the predicted values of non-perfectionism and pure SPP. The second simple slope
206 compares the predicted values of pure SOP and mixed perfectionism. A second set of simple
207 slopes were calculated to estimate the relationship between SPP and the outcome variable at
208 low SOP and at high SOP. The third simple slope contrasts the predicted values of non-
209 perfectionism and pure SOP. The final simple slope compares the predicted values of pure SPP
210 and mixed perfectionism. The following equations were used to obtain the predicted values:

211 (1) \hat{Y} of Non-perfectionism = Intercept + (B_{SOP} * low SOP) + (B_{SPP} * low SPP).

212 (2) \hat{Y} of pure SOP = Intercept + (B_{SOP} * High SOP) + (B_{SPP} * low SPP).

213 (3) \hat{Y} of pure SPP = Intercept + (B_{SOP} * Low SOP) + (B_{SPP} * High SPP).

214 (4) \hat{Y} of mixed perfectionism = Intercept + (B_{SOP} * High SOP) + (B_{SPP} * High SPP).

215 **Results**

216 **Descriptive Analysis**

217 The participants, on average, indicated that they exercised 1.40 days a week ($SD = .53$);
218 and engaged in mild exercise for 6.49 hours ($SD = 11.65$), moderate exercise for 5.09 hours
219 ($SD = 8.96$), and vigorous exercise for 3.95 hours ($SD = 3.57$). Participants indicated taking
220 part in a number of different exercise activities, at various levels, including but not limited to,
221 running, walking, yoga, intramural sports, dance, soccer, rugby, and group fitness classes.

222 **Main Analysis**

223 Moderated hierarchical regressions indicated that the interaction between SOP and SPP
224 was non-significant for both exercise behaviour (weekly, mild, moderate, and strenuous
225 activity) and enjoyment (see Table 2 and Table 3, respectively). Although it was hypothesized
226 that pure SPP would be the most detrimental within-person combination of perfectionism
227 (correlated with low enjoyment or boredom and therefore, decreased exercise behaviour), our
228 results did not align with this hypothesis. Table 1 includes means, standards deviations, and
229 correlations between each variable analyzed.

230 **Exercise enjoyment. Boredom.** The interaction was statistically significant when
231 predicting boredom ($B = -.0005$, $\beta = .0002$, $t = -2.74$, $p = .01$; see Table 2). This interaction
232 effect explained 3.5% of variance in boredom in exercise over and above the effects of SOP
233 and SPP. The simple slope of SOP on boredom approached significance at low levels of SPP
234 ($B = -9.26$, $\beta = .0048$, $t = 1.91$, $p = .057$) but was not significant at high levels of SPP were not
235 significant ($B = 8.55$, $\beta = -.004$, $t = -1.41$, $p = .16$). The simple slope of SPP on boredom was
236 significant at high levels of SOP ($B = 9.29$, $\beta = -.012$, $t = -4.46$, $p = .000$), but not at low levels
237 of SOP ($B = -10.23$, $\beta = -.002$, $t = -.69$, $p = .49$). Figure 1 displays the nature of the interaction
238 for SOP and SPP, and indicates that participants were the most bored when SOP was high and
239 SPP was low, and that they had decreased boredom when both SPP and SOP were high. This

240 significant interaction supports the underlying premise of the 2×2 model, but contradicts the
241 four main hypotheses. This interaction indicated that pure SOP was associated with the highest
242 levels of boredom compared to non-perfectionism and mixed perfectionism was associated
243 with decreased boredom compared to SPP. Further SOP was associated with the highest levels
244 of boredom compared to a within-person combination of mixed perfectionism; and pure SPP
245 was associated with the lowest rates of boredom compared to non-perfectionism. Therefore,
246 SOP (not SPP) was associated with the most detrimental outcome for exercise cognition
247 (increased boredom).

248 **Enjoyment.** Multiple regression revealed that SOP was a significant positive predictor
249 of enjoyment ($B = .007$, $\beta = .003$, $t = 2.49$, $p < .05$; see Table 2). As one increased in beliefs
250 that attaining perfectionism is important; their enjoyment of exercise also increased. SPP was
251 not a significant predictor of enjoyment ($B = -.0004$, $\beta = 0$, $t = 0.12$, $p = 0.91$). The predicted
252 values for enjoyment based on the 2 ×2 framework are shown in Figure 2. This result aligns
253 with our hypothesis that pure SOP would have the highest levels of enjoyment, and would be
254 associated with better psychological adjustments, whereas, pure SPP is associated with poorer
255 adjustments. Also, consistent with the model, mixed perfectionism was associated with higher
256 levels of enjoyment than pure SPP and lower levels of enjoyment of pure SOP.

257 **Exercise behaviour. Weekly exercise minutes.** SOP was a significant negative
258 predictor of weekly exercise minutes ($B = -8.30$, $\beta = 3.35$, $t = -2.47$, $p < .05$; see Table 3).
259 SPP approached significance in relation to being a positive predictor of weekly exercise
260 minutes ($B = 6.36$, $\beta = 3.59$, $t = 1.77$, $p = .07$). Therefore, as individuals became more
261 concerned with perfection to maintain their value to others, their weekly exercise minutes'
262 increased, while those who had increased self-directed tendencies to obtain perfection because

263 it is important to them, had decreased weekly exercise minutes. This finding contradicts the
264 hypothesis that pure SOP is associated with better psychological adjustment, and pure SPP is
265 associated with poorer adjustments. For mixed perfectionism, the predicted values did not
266 support the model hypotheses by showing that mixed perfectionism had both lower levels of
267 weekly exercise minutes than pure SPP and higher weekly exercise minutes than pure SOP).
268 The predicted values of weekly exercise minutes based on the 2×2 framework are shown in
269 Figure 3.

270 **Mild exercise minutes.** Both SOP and SPP were significant negative and positive
271 predictors, respectively, of mild exercise minutes ($B = -4.25$, $\beta = -1.68$, $t = -2.53$, $p < .05$; $B =$
272 3.50 , $\beta = .180$, $t = 1.94$, $p < .05$; see Table 3). As with weekly exercise minutes, those who
273 were more concerned with perfection to maintain their value to others, report greater levels of
274 mild exercise, while those who have increased self-directed tendencies to obtain perfection
275 because it is important to them, have decreased mild exercise minutes. This finding again
276 contradicts the idea of the better psychological adjustments of pure SOP and the poorer
277 psychological adjustment of SPP, but does support the difference in these two combinations of
278 perfectionism. For mixed perfectionism, the model was contradicted with lower mild exercise
279 minutes for mixed perfectionism compared to pure SPP and higher levels of mild exercise
280 minutes compared to pure SOP. The predicted values of mild exercise minutes across the
281 within-person combinations of perfectionism based on the 2x2 framework are shown in Figure
282 4.

283 **Moderate exercise minutes.** Both SOP and SPP were significant negative and positive
284 predictors, respectively, of moderate exercise minutes ($B = -2.79$, $\beta = 1.30$, $t = -2.15$, $p < .05$;
285 $B = 2.32$, $\beta = 1.39$, $t = 1.67$, $p < .05$; see Table 3). Similar to weekly and mild exercise

286 minutes, the same pattern occurred, where as one became more concerned with perfection to
287 maintain his/her value to others, weekly exercise minutes' increased, while those who have
288 increased self-directed tendencies to obtain perfection because it is important to them, had a
289 decrease in weekly exercise minutes. These findings contradict the hypotheses of the healthy
290 nature of SOP and the unhealthy nature of SPP, but are showing significant differences
291 between the two that support the hypothesis proposed by Gaudreau and Thompson (2012) that
292 pure SPP and pure SOP do significantly differ in terms of psychological adjustment. As with
293 mild exercise, the model is not supported by the predicted values of mixed perfectionism; with
294 lower levels of moderate exercise minutes for mixed perfectionism than pure SPP and higher
295 levels of moderate exercise minutes with pure SOP. The predicted values of moderate exercise
296 minutes across the within-person combinations of perfectionism are shown in Figure 5.

297 *Strenuous exercise minutes.* For strenuous exercise, SPP had no effect, while SOP had
298 a negative effect similar to mild and moderate exercise ($B = -1.25$, $\beta = .513$, $t = -2.46$, $p = .02$;
299 see Table 3). The predicted values of strenuous exercise minutes across the within-person
300 combinations of perfectionism are shown in Figure 6. Those who had increased self-directed
301 tendencies to obtain perfection because it was important to them, had their exercise minutes
302 (weekly, mild, moderate, and strenuous) decrease. As with mild, moderate, and weekly
303 exercise, strenuous exercise did not support the healthier nature or better psychological
304 adjustments of pure SOP. Strenuous exercise did not show support of the model's hypotheses,
305 that pure SOP and SPP were significantly different in terms of psychological adjustments, as
306 the non-effect of pure SPP, was more similar to the positive effect seen in other variables. For
307 mixed perfectionism, the predicted values did not support the hypotheses of the model,

308 showing higher levels of strenuous activity for mixed perfectionism than pure SOP and lower
309 levels of strenuous exercise for mixed perfectionism than pure SPP.

310 **Discussion**

311 The purpose of this study was to use the 2×2 model of perfectionism to examine the
312 relationship between perfectionism, exercise behaviour, and enjoyment of exercise. The 2×2
313 model identifies four within-person combinations of dispositional perfectionism, and using this
314 theoretical model allows researchers to identify unique interactive effects of SOP and SPP. Our
315 findings provide support for our hypothesis of the unhealthy nature of SPP, the healthy nature
316 of SOP and that mixed perfectionism would have a more positive nature than SPP but less than
317 SOP for only the variable of Enjoyment. Boredom and all three aspects of exercise behaviour
318 (mild, moderate, and strenuous minutes) did not provide support for our hypotheses made
319 based on the 2×2 model.

320 We hypothesized that pure SPP would be the most detrimental within-person
321 combination of perfectionism, and that pure SOP and mixed perfectionism would be positively
322 associated with exercise behaviour. Contradictory to these hypotheses, our results indicated
323 that those with higher SOP had lower exercise behaviour with respect to mild, moderate,
324 strenuous, and weekly exercise minutes. Those higher in SPP were also higher in weekly,
325 mild, and moderate minutes, but not strenuous minutes of exercise. This finding suggests that
326 those who are striving for perfection because it is important to them rather than achieving
327 perfection for the views of others, exercise less. In addition, individuals higher in SPP also
328 found exercise more enjoyable and were less bored than their SOP counterparts. Therefore, it
329 is possible that in the exercise domain, when a person is striving for perfection because it is

330 important to them, they tend to enjoy it less and consequently exercise less (decrease the
331 number of exercise minutes).

332 Despite not supporting our hypotheses our results are interesting and warrant further
333 investigation. An increase in SOP and a lack of SPP revealed an increase in participant
334 boredom. Individuals who have higher standards and may not be able to achieve them may
335 become less interested, and therefore more bored with their current exercise regimen. They
336 may well prefer a more achievement-oriented environment than that provided by exercise or
337 benefit from particular types of exercise where achievement is more readily measurable.
338 Understanding individual levels of perfectionism and the behaviours or tendencies that are
339 associated with the levels of this trait are important. For example, these tendencies could be
340 potentially important for health reasons, as those who are bored may be less motivated and
341 more likely to quit or not follow through with an exercise or exercise program. In addition, our
342 results do highlight that increased SPP predicts an increase in exercise behaviour. In other
343 words, an increase in evaluative concerns, may lead to increases in exercise behaviour (number
344 of exercise minutes per week), which supports previous work (Hall, Kerr, Kozub, & Finnie,
345 2007), but more work is need with longitudinal designs to make more conclusive statements.

346 As Pure SPP emerged as the strongest predictor of exercise behaviour, this may have
347 implications for exercise dependence. Previous research has shown that perfectionism may be
348 an important precursor of dependence (Hagan & Hausenblas, 2003). Costa and colleagues
349 recently found that ‘maladaptive’ perfectionism or perfectionistic concerns were indirectly
350 related to exercise dependence through needs thwarting and needs satisfaction (Costa,
351 Coppolino & Oliva, 2016). Future research should consider looking at exercise dependence in

352 conjunction with the within person combinations of perfectionism and exercise behaviour to
353 help further our understanding of the impact of perfectionism in exercise.

354 Previous research in areas such as academia and sport, although limited, has found
355 consistent results using the 2×2 model for studying perfectionism (Gaudreau, 2016). In
356 contrast, our results did not fully support the hypotheses of the 2×2 model. This finding may
357 be due in part to the setting of exercise, as the model has been used mostly in achievement
358 settings (i.e., the classroom and sport). In school and sport there may be more pressure or
359 expectation to perform and therefore the relationship with perfectionism and performance may
360 be more relevant or distinct. The model may be better suited for areas in exercise such as
361 dependency that has shown to be highly correlated with perfectionism (Hagan & Hausenblas,
362 2003), or goal achievement in exercise. For these types of variables that are associated with
363 perfectionism; the model may be able to show, more specifically, which type of perfectionism
364 can predict these different behaviours. Future research should consider these aspects of
365 exercise behaviour in relation to the 2×2 model to more fully understand if, and how, the
366 different types of perfectionism within the model explain exercise related behaviours and
367 cognitions.

368 Although this study was one of the first to use the 2×2 model in conjunction with
369 exercise behaviour, used both adaptive and maladaptive measures, and accounted for mood
370 state, there are still some limitations that need to be recognized. First, our sample was mostly
371 second year university students enrolled in a kinesiology degree program. A larger, more
372 diverse sample would allow for a deeper understanding on the impact of perfectionism on
373 exercise behaviour and enjoyment. Second, our study is limited by the use of subjective
374 measures only. Objective measures of exercise would strengthen the results and conclusions of

375 the study. Future researchers are encouraged to use objective methods (i.e., ActivePAL
376 devices) to document exercise behaviours more precisely, as well as using longitudinal designs
377 that are able to look at behaviour across time.

378 Overall, our study is one of the first to use the 2×2 model of perfectionism in an exercise
379 setting. Although our results do not support the model completely, we are unable to draw firm
380 conclusions and, therefore further research of the model is warranted in exercise settings. This
381 will help determine whether the model is best suited for use in achievement settings, as it has
382 been used for in the past, or whether the model may not be suited for use in the exercise
383 domain. Future research should continue to use the 2×2 model of perfectionism in different
384 areas of exercise, as well as in a larger, more diverse sample, over a longer period of time that
385 could offer more insight into the role of mixed perfectionism and non-perfectionism in exercise
386 behaviour.

387

388 References

- 389 Amireault, S., & Godin, G. (2015). The Godin-Shephard leisure-time physical activity
390 questionnaire: Validity evidence supporting its use for classifying healthy adults into
391 active and insufficiently active categories. *Perceptual and Motor Skills, 120*(20), 604-
392 622. doi: 10.2466/03.27.PMS.10v19x7
- 393 Anshel, M. H., & Seipel, S. J. (2006). Relationships between dimensions of perfectionism and
394 exercise behaviour among college students. *International Journal of Sport and Exercise*
395 *Psychology, 4*, 25-42. doi:10.1080/1612197x.2006.9671782
- 396 Bardone-Cone, A. M., Wonderlich, S. A., Frost, R. O., Bulik, C. M., Mitchell, J. E., Uppala, S.,
397 & Simonich, H. (2007). Perfectionism and eating disorders: Current status and future
398 directions. *Clinical Psychology Review, 27*, 384-405. doi:10.1016/j.cpr.2006.12.005
- 399 Beheshtifar, M., Mazrae-Sefidi, F., & Nekoie Moghadam, M. (2011). Role of perfectionism at
400 workplace. *European Journal of Economics, Finance and Administrative Sciences, 38*,
401 167-173. ISSN 14502275
- 402 Bissonnette, V., Ickes, W., Bernstein, I., & Knowles, E. (1990). Personality moderating
403 variables: A warning about statistical artifact and a comparison of analytic techniques.
404 *Journal of Personality, 58*(3), 567–587.
- 405 Costa, S., Coppolino, P., & Oliva, P. (2016). Exercise dependence and maladaptive
406 perfectionism: The mediating role of basic psychological needs. *International Journal*
407 *of Mental Health and Addiction, 14*(3), 241-256. doi:10.1007/s11469-015-9586-6
- 408 Crocker, P. R., Bouffard, M., & Gessaroli, M. E. (1995). Measuring enjoyment in youth sport
409 settings: A confirmatory factor analysis of the physical activity enjoyment scale.
410 *Journal of Sport and Exercise Psychology, 17*(2), 200-205. doi: 10.1123/jsep.13.1.50

- 411 Crocker, P. R., Gaudreau, P., Mosewich, A. D., & Kljajic, K. (2014). Perfectionism and the
412 stress process in intercollegiate athletes: examining the 2x2 model of perfectionism in
413 sport competition. *International Journal of Sport Psychology*, *45*, 325-348. doi:
414 10.7352/IJSP 2014
- 415 Flett, G. L., Pole-Langdon, L., & Hewitt, P. L. (2003) *Tri perfectionism and perfectionist self*
416 *presentation in compulsive exercise*. Unpublished manuscript, York University,
417 Toronto, Ontario, Canada.
- 418 Frost, R. O., Marten, P., Laharat, C., & Rosenblate, R. (1990). The dimensions of
419 perfectionism. *Cognitive Therapy and Research*, *14*, 449-468. doi: 10.1007/BF01172967
- 420 Gaudreau, P. (2016). The 2x2 model of perfectionism in sport, dance, and exercise. In A. P.
421 Hill (Ed.), *The Psychology of Perfectionism in Sport, Dance and Exercise* (pp. 174-
422 200). London: Routledge.
- 423 Gaudreau, P. (2012) A methodological note on the interactive and main effects of dualistic
424 personality dimensions: An example using the 2x2 model of perfection. *Personality and*
425 *Individual Differences*, *52*, 26-31. doi: 10.1016/j.paid.2012.04.029
- 426 Gaudreau, P., & Verner-Filion, J. (2012). Dispositional perfectionism and well-being: A test
427 of the 2 x 2 model of perfectionism in the sport domain. *Sport, Exercise, and*
428 *Performance Psychology*, *1*, 29-43. doi:10.1037/a0025747
- 429 Gaudreau, P., & Thompson, A. (2010). Testing a 2x2 model of dispositional perfectionism.
430 *Personality and Individual Differences*, *48*(5), 532-537.
- 431 Godin, G., & Shephard, R.J. (1985). A simple method to assess exercise behaviour in the
432 community. *Canadian Journal of Applied Sport Sciences*, *10*, 141-146.
433 doi:10.1037/t31334-000

- 434 Hagan, A. L., & Hausenblas, H. A. (2003). The relationship between exercise dependence
435 symptoms and perfectionism. *American Journal of Health Studies, 18*, 133. ISSN:
436 1090-0500
- 437 Hagberg, L. A., Lindahl, B., Nyberg, L., & Hellenius, M. L. (2009). Importance of enjoyment
438 when promoting physical exercise. *Scandinavian Journal of Medicine & Science in*
439 *Sports, 19*, 740-747. doi: 10.1111/j.1600-0838.2008.008844.x
- 440 Hall, H. K., Hill, A. P., Appleton, P. R., Kozub, S. A. (2009). The mediating influence of
441 unconditional self-acceptance and labile self-esteem on the relationship between
442 multidimensional perfectionism and exercise dependence. *Psychology of Sport and*
443 *Exercise, 10*, 35-44. doi: 10.1016/j.psychsport.2008.05.003
- 444 Hall, H. K., Kerr, A. W., Kozub, S. A., & Finnie, S. B. (2007). Motivational antecedents of
445 obligatory exercise: The influence of achievement goals and multidimensional
446 perfectionism. *Psychology of Sport and Exercise, 8*(3), 297-316.
447 doi: 10.1016/j.psychsport.2006.04.007
- 448 Hewitt, P. L., & Flett, G. L. (1991a). Perfectionism in the self and social contexts:
449 conceptualization, assessment, and association with psychopathology. *Journal of*
450 *personality and social psychology, 60*(3), 456. doi: 10.1037/022-3514.60.3.456
- 451 Hewitt, P. L., Flett, G. L., Turnbull-Donovan, W., & Mikail, S. F. (1991b). The
452 Multidimensional Perfectionism Scale: Reliability, validity, and psychometric
453 properties in psychiatric samples. *Psychological Assessment: A Journal of Consulting*
454 *and Clinical Psychology, 3*(3), 464. doi: 10.1037/1040.3.3.464
- 455 Hewitt, P.L., & Flett, G. L. (1989). The Multidimensional Perfectionism Scale: Development
456 and validation. *Canadian Psychology, 30*, 339. doi: 10.4236/psych.2015.65051

- 457 Hill, A. P. (2013). Perfectionism and burnout in junior soccer players: A test of the 2× 2 model
458 of dispositional perfectionism. *Journal of Sport and Exercise Psychology*, 35(1), 18-29.
459 doi: 10.1123/jsep.35.1.18
- 460 Hill, A. P., Robson, S. J., & Stamp, G. M. (2015). The predictive ability of perfectionistic traits
461 and self-presentational styles in relation to exercise dependence. *Personality and*
462 *Individual Differences*, 86, 176-183. doi: 10.1016/j.paid.2015.06.015
- 463 Hill, A. P., & Madigan, D. J. (2017). A short review of perfectionism in sport, dance and
464 exercise: out with the old, in with the 2 x 2. *Current Opinion in Psychology*, 16, 72-77.
465 doi: 10.1016/j.copsyc.2017.04.021
- 466 Jahromi, F. G., Naziri, G., & Barzegar, M. (2012). The relationship between socially prescribed
467 perfectionism and depression: The mediating role of maladaptive cognitive
468 schemas. *Procedia-Social and Behavioural Sciences*, 32, 141-147.
469 [doi: 10.1016/j.sbspro.2012.01.023](https://doi.org/10.1016/j.sbspro.2012.01.023)
- 470 Kendzierski, D., & DeCarlo, K. J. (1991). Physical activity enjoyment scale: Two validation
471 studies. *Journal of sport and exercise psychology*, 13, 50-64.
472 doi: 10.1123/jsep.13.1.50
- 473 Kilpatrick, M., Herbet, E., & Bartholomew, J. (2005). College students' motivation for physical
474 activity: differentiating men's and women's motives for sport participation and
475 exercise. *Journal of American college health*, 54(2), 87-94.
- 476 LoCicero, K. A., & Ashby, J. S. (2000). Multidimensional perfectionism in middle school age
477 gifted students: A comparison to peers from the general cohort. *Roeper Review*, 22(3),
478 182–185.
- 479 Longbottom, J. L., Grove, J. R., & Dimmock, J. A. (2012). Trait perfectionism, self

- 480 determination, and self-presentation processes in relation to exercise
481 behaviour. *Psychology of Sport and Exercise*, 13, 224-235.
482 doi: 10.1016/j.psychsport.2011.11.003
- 483 Nordin-Bates, S. M., Raedeke, T. D., & Madigan, D. J. (2017). Perfectionism, burnout, and
484 motivation in dance: A replication and test of the 2×2 model of perfectionism. *Journal*
485 *of Dance Medicine & Science*, 21(3), 115-122. doi: 10.12678/1089-313X.21.3.115
- 486 Nounopoulos, A., Ashby, J. S., & Gilman, R. (2006). Coping resources, perfectionism, and
487 academic performance among adolescents. *Psychology in the Schools*, 43, 613-622.
488 doi: 10.1002/pits.20167
- 489 Paulson, L. R., & Rutledge, P. C. (2014). Effects of perfectionism and exercise on disordered
490 eating in college students. *Eating Behaviours*, 15(1), 116-119.
- 491 Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method
492 biases in behavioural research: A critical review of the literature and recommended
493 remedies. *Journal of Applied Psychology*, 88, 879-903. doi: 10.1037/0021-
494 9010.88.5.879
- 495 Salmon, J., Owen, N., Crawford, D., Bauman, A., & Sallis, J. F. (2003). Physical Activity and
496 sedentary behaviour: a population-based study of barriers, enjoyment, and preference.
497 *Health Psych*, 22, 178-188. doi: 10.1037/0278-6133.22.2.178
- 498 Stoeber, J., Otto, K., Pescheck, E., Becker, C., & Stoll, O. (2007). Perfectionism and
499 competitive anxiety in athletes: Differentiating striving for perfection and negative
500 reactions to imperfection. *Personality and Individual Differences*, 42, 959-969.
501 doi: 10.1016/j.paid.2006.09.006
- 502 Thome, J., & Espelage, D. L. (2004) Relations among exercise, coping, disorderd eating, and

- 503 psychological health among college students. *Eating Behaviours*, 5(4), 337-351.
- 504 Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures
- 505 of positive and negative affect: The PANAS scales. *Journal of Personality and Social*
- 506 Psychology, 54(6), 1063–1070.