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RUMBOLD, James <<http://orcid.org/0000-0002-1914-1036>>, MADIGAN, Daniel J., MURTAGH-COX, Alice and JONES, Leighton

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1 Examining Profiles of the Big Five and Sensation Seeking among Competitive Climbers

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3 James L. Rumbold¹, Daniel J. Madigan², Alice Murtagh-Cox¹, Leighton Jones¹

4 ¹Sheffield Hallam University, UK

5 ²York St John University, UK

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21 Correspondence concerning this article should be addressed to James L. Rumbold,
22 Sport and Human Performance Research Group, Sport and Physical Activity Research
23 Centre, College of Health, Wellbeing and Life Sciences, Sheffield Hallam University,
24 Collegiate Crescent, Sheffield, South Yorkshire, S10 2BP. United Kingdom. Email:
25 J.Rumbold@shu.ac.uk

26 Abstract

27 The present study sought to identify distinct personality profiles in competitive climbers ($N =$
28 331, *Mean age* = 29.85, *SD* = 10.92), and also sought to explore whether these climbers
29 differed in their sensation seeking tendencies based on these personality profiles. Employing
30 a cross-sectional design, participants completed measures of the big five personality
31 dimensions (agreeableness; conscientiousness; extraversion; neuroticism; openness to
32 experience) and sensation seeking (boredom susceptibility; experience seeking; disinhibition;
33 thrill and adventure seeking). Latent profile analysis identified four distinct big five
34 personality profiles (Curious and Impulsive; Emotionally Unstable; Healthy; and Measured
35 and Compliant). MANCOVA and follow-up ANCOVAs demonstrated significant differences
36 between the four personality profiles in relation to thrill and adventure seeking, experience
37 seeking, and disinhibition. The findings suggest that the identification of distinct personality
38 profiles using a person-centred approach is a useful way of distinguishing and optimizing
39 typical behaviors and preferences in adventure sports in the future.

40 *Keywords:* adventure sport, climbing, latent profile analysis, personality, risk taking.

66 display a lower sensitivity to experiencing adverse consequences in potentially dangerous but
67 rewarding activities (i.e., a hyperactive approach system). In contrast, low sensation seekers
68 may display an enhanced sensitivity to achieving their desired outcomes in the presence of
69 risk or potential loss (i.e., a hypoactive avoidance system).

70 Although sensation seeking is considered a distinct personality construct, there is
71 some evidence that it shares a large amount of variance with the big five personality factors
72 (Castanier et al., 2010b; de Vries et al., 2009; McEwan et al., 2019; Russo et al., 2012).
73 Specifically, psychology literature has concluded that sensation seeking shares a large
74 proportion of variance with extraversion, openness to experience, and, to a lesser degree,
75 conscientiousness and agreeableness (de Vries et al., 2009). Neuroticism on the other hand
76 has been shown to share very little variance with sensation seeking (Russo et al., 2012).
77 Conversely, in a recently published mapping review of personality studies in sport and
78 exercise psychology (Laborde et al., 2020), it was concluded that traits related to sensation
79 seeking were closely connected in definition to personality facets of: neuroticism (e.g.,
80 impulsiveness); extraversion (e.g., excitement seeking); and conscientiousness (e.g.,
81 deliberation). Furthermore, conscientiousness has been shown to have an inverse relationship
82 with total sensation seeking (Jones et al., 2018) and risk-taking behaviors (Woodman et al.,
83 2020).

84 Collectively, these findings highlight that shared variance may exist between the big
85 five personality factors and sensation seeking within and beyond sport and exercise
86 psychology domains. However, these findings could be a consequence of the nomothetic
87 methodological approach that is often adopted in assessing these relationships (de Vries et al.,
88 2009). Several studies have assessed the individual contribution of some or all FFM domains
89 in predicting outcomes independently of one another (e.g., Breivik et al., 1998; Russo et al.,
90 2012; for a review, see McEwan et al., 2019). This methodological approach is somewhat

91 unhelpful not least because the big five are highly correlated and therefore previous findings
92 may unintentionally be the result of issues with multicollinearity. Moreover, in an applied
93 context, people participating in sport and exercise may be more likely to exhibit a *profile* of
94 the big five rather than exhibiting high scores in one of the domains and not the others (cf.
95 Bleidorn et al., 2020; de Vries et al., 2009). Understanding whether personality profiles exist
96 in certain adventure sports, such as climbing, can provide coaches and practitioners with an
97 idiographic insight into why some climbers may approach or avoid challenging maneuvers,
98 and why some climbers may consistently be at greater risk of injury than others. Moreover,
99 identifying climbers' personality profiles may distinguish differences in their sensation
100 seeking tendencies. In turn, this could provide new understanding on how interventions could
101 be promoted in this specific adventure sport, to enhance safety education for some target
102 groups whilst optimizing perception of gain during risky maneuvers for others.

103 The current study positions the importance of a person-centred approach (Marsh et al.,
104 2009) to understanding the big five and its relationship to sensation seeking tendencies. A
105 person-centred approach is a technique for identifying and describing subgroups of
106 individuals (e.g., climbers) who are defined by similarities and differences in
107 multidimensional constructs (e.g., personality) (Gustafsson et al., 2016). This may provide an
108 advantage over traditional variable-centred techniques (e.g., regression) as it could enable the
109 identification of personality profiles to which individuals may belong. Furthermore, by
110 identifying such subgroups and how they relate to, for example, sensation seeking tendencies,
111 psychologists can use this information to transition away from cross-sectional designs to
112 assess idiographic changes over time, as well as shape the development and evaluation of
113 interventions for target groups.

114 In this study, we place greater emphasis on a person's interconnected personality
115 profile rather than the independent assessment of separate variables. In doing so, we treat the

116 construct of the FFM as a multidimensional interrelated construct (de Vries et al, 2009). The
117 first purpose of this study was to explore whether distinct profiles can be identified among
118 competitive climbers on the FFM domains using latent profile analysis (LPA). In comparison
119 to cluster analysis, LPA has the advantage of calculating probability estimates of group
120 membership and fit indices to more reliably differentiate between multiple profile solutions
121 (Marsh et al., 2009). A second purpose was to explore whether distinct personality profiles
122 amongst the climbers differed in relation to their sensation seeking tendencies. Informed by
123 extant literature examining person-centred approaches to understanding the FFM model (e.g.,
124 Bleidorn et al., 2020; de Vries et al, 2009), we expected that personality profiles would
125 emerge, and may differentiate climbers in relation to their specific sensation seeking
126 tendencies.

127 **Method**

128 **Participants and Procedure**

129 Following institutional ethics approval, a sample of 331 climbers (51% male, 49%
130 female; 89% British nationality) was recruited through national climbing clubs and
131 organizations¹. These organizations were initially contacted by email, informed of the
132 purpose of the study, and asked to share an online questionnaire with their members via their
133 official club webpages and social media. Prior to completing the online questionnaire,
134 participants were provided with an online information sheet and consent form, which
135 explained the study, clarified the anonymity and confidentiality of the data to be collected,
136 and reminded participants of their right to withdraw from the study at any time. A priori

¹ Climbing involves using one's body to ascend a steep landscape (natural or man-made) object. The activity is carried out for recreational and competitive purposes and can be completed indoors and outdoors. There are a vast range of climbing activities that individuals participate in. A selection of these types of climbing activity include: Bouldering; buildering; free climbing; ice climbing; mountaineering; rope climbing; scrambling; sport climbing; and traditional climbing. Each climbing activity can typically be distinguished by the chosen climbing area and environment, and the degree to which safety equipment is used for safety purposes only, or to also assist in climbing progress (Cinnamon, 2000).

137 power analysis using G*Power 3.01 indicated that a minimum sample size of 305 would be
138 appropriate to detect a small effect size ($f^2 = 0.02$) based on a power value of .90 and an alpha
139 of 0.05. This power analysis was also determined on the basis of hypothesizing five distinct
140 big five personality classes from the latent class profile analysis to be conducted. A minimum
141 sample size of 305 is approximately in line with previous psychology literature examining the
142 same construct relationships (personality and sensation seeking) with undergraduate student
143 populations (de Vries et al., 2009). We therefore originally targeted a sample size of over 340
144 to account for a 10% dropout and / or data missing at random. Climbers' mean age was 29.85
145 years ($SD = 10.92$) with an average of 9.42 years of experience ($SD = 8.80$) and they
146 identified bouldering (48%), sport climbing (27.5%), or traditional climbing (23.3%) as their
147 main form of competitive participation. Fifty-three percent chose outdoor climbing as their
148 main form of climbing environment.

149 **Measures**

150 An online questionnaire (Qualtrics) was administered to collect demographic
151 information and responses to the big five personality domains, and sensation seeking
152 tendencies. This questionnaire took approximately 10 minutes to complete. All subscales
153 demonstrated acceptable internal consistency (i.e., Cronbach's alpha > .70; Nunnally, 1978).

154 **Big five personality domains.** The International Personality Item Pool (IPIP:
155 Goldberg et al., 2006) version of the revised NEO personality inventory (NEO-PI-R: Costa &
156 McCrae, 1992) provided 10 items each for extraversion ($\alpha = 0.87$; "I feel comfortable around
157 people"); neuroticism ($\alpha = 0.87$; "I often feel blue"); conscientiousness ($\alpha = 0.79$; "I carry out
158 my plans"); agreeableness ($\alpha = 0.72$; "I believe that others have good intentions"); and
159 openness to experience ($\alpha = 0.75$; "I have a vivid imagination"). Previous research supports
160 the reliability and validity of the five subscales (Jones et al., 2018; Rumbold et al., 2020).
161 Participants rated the extent to which each item described them accurately on a 5-point scale

162 (1 = “strongly disagree”, 5= “strongly agree”).

163 **Sensation seeking.** The Sensation Seeking Scale - Form V (SSS V; Zuckerman,
164 Eysenck, & Eysenck, 1978) measures a person’s general preferences for thrill and adventure
165 seeking (10 items; $\alpha = 0.97$; “I sometimes like to do things that are a little frightening”);
166 experience seeking (10 items; $\alpha = 0.71$; “I like to explore a strange city or section of town by
167 myself even if it means getting lost”); disinhibition (8 items; $\alpha = 0.96$; “I like to have new and
168 exciting experiences and sensations even if they are a little frightening / unconventional”);
169 and boredom susceptibility (10 items; $\alpha = 0.71$; “I get bored seeing the same old faces”).
170 Each of the 38 items contained two statement choices. Participants were asked to select the
171 statement that best described their likes or the way they feel. Two items were omitted due to a
172 pilot test indicating high participant non-completion due to the perceived homophobic nature
173 of these items. The four subscales have demonstrated satisfactory to good internal
174 consistency in previous studies (e.g., Frenkel et al., 2019; Roberti et al., 2003).

175 **Data Analysis**

176 Initial data screening, descriptive statistics, alpha coefficients, bivariate, and biserial
177 correlations (see Table 1) were calculated using IBM SPSS Statistics version 24. Latent
178 profile analysis (LPA) was then conducted with *Mplus* version 7.3 (Muthén & Muthén, 1998-
179 2012) to identify consistent profiles within the sample based on their big five personality
180 domain scores (Marsh et al., 2009). The benefit of this approach is that class membership to
181 specific big five domain interactions can be inferred from the relationship between a person’s
182 agreeableness; conscientiousness; extraversion; neuroticism; and openness to experience.
183 Moreover, these classes can be used to examine individual differences in competitive
184 climbers’ sensation seeking preferences. We followed the recommendations of previous
185 studies that have employed LPA and used the following criteria to assess best model fit:
186 Bootstrap Likelihood Ratio Test (BLRT); Bayesian Information Criteria (BIC); Sample Size-

187 Adjusted BIC (SSABIC); entropy values; and, the average latent class probabilities for each
188 profile solution (e.g., for a more detailed explanation, see Gustafsson et al., 2016; Marsh et
189 al., 2009). We used 500 random start values for each model, with the 50 best retained for the
190 final solution. We then applied 1500 random start values to avoid local maxima (cf.
191 Gustafsson et al 2016).

192 Multivariate analysis of covariance (MANCOVA) was used to examine differences
193 between big five personality profiles in terms of sensation seeking, whilst including sex as a
194 covariate. Sex was included as a covariate since previous research has underlined that
195 sensation seeking tendencies may differ between males and females (Cross et al., 2013;
196 Zuckerman, 1979; Zuckerman et al. 1978). Our biserial correlations also showed that sex was
197 related to all sensation seeking subscales (see Table 1).

198 Results

199 Latent Profile Analysis of the Big Five

200 Table 2 shows the model fit statistics and profile membership distribution of
201 participants for the big five personality domains. Average posterior probabilities for the final
202 four-profile model chosen were as follows: class 1 = 0.83; class 2 = 0.82; class 3 = 0.75; and
203 class 4 = 0.78. Figure 1 illustrates the plot of four distinct big five personality profiles in the
204 competitive climbers sampled ($N = 331$). Class 1 climbers ($n = 62$) were characterized by
205 relatively high scores on extraversion, conscientiousness, agreeableness and openness to
206 experience, whilst displaying relatively low scores on neuroticism. In so far that this profile
207 shared strong similarities to a *healthy personality index* (Bleidorn et al., 2020), we labelled
208 this class the Healthy climber. In contrast, class 2 ($n = 56$) displayed the highest scores on
209 neuroticism and the lowest scores on the remaining big five domains. For these reasons, we
210 labelled class 2 the Emotionally Unstable climber. Class 3 ($n = 106$) were characterized by
211 displaying low-moderate scores on extraversion, neuroticism and openness to experience,

212 whilst displaying moderate-high scores on conscientiousness and agreeableness. We therefore
213 labelled class 3 the Measured and Compliant climber, in line with consistently recognized
214 facet descriptions of conscientiousness and agreeableness (Costa & McCrae, 1992; Goldberg
215 et al., 2006). Conversely, class 4 climbers ($n = 107$) had relatively high scores on openness to
216 experience, and moderate levels of extraversion and neuroticism, whilst displaying lower
217 scores for conscientiousness and agreeableness in comparison to other profiles. We labelled
218 class 4 the Curious and Impulsive climber on the basis that most models of openness to
219 experience include curiosity-related facets (Silvia & Christensen, 2020), and impulsiveness
220 seems to contain facets of both neuroticism and extraversion (Laborde et al., 2020) (for
221 means and standard errors, please see Table 3).

222 **Big Five Profile Differences in Sensation Seeking**

223 MANCOVA showed significant differences between the four different profiles on
224 sensation seeking, Pillai's Trace (12, 966) = 5.48, $p < .001$. Follow-up univariate tests
225 confirmed differences between profiles for the following sensation seeking variables: thrill
226 and adventure seeking, $F(3, 323) = 2.74$, $p < .05$, $\eta^2 = 0.02$; experience seeking, $F(3, 323) =$
227 19.86 , $p < .001$, $\eta^2 = 0.15$; and, disinhibition, $F(3, 323) = 5.38$, $p < .001$, $\eta^2 = 0.05$. No
228 significant differences between personality profiles and boredom susceptibility were found, F
229 $(3, 323) = 2.12$, $p = .10$, $\eta^2 = 0.02$.

230 Post-hoc comparisons (with Hochberg adjustment) for personality profiles on
231 sensation seeking subscales showed that for thrill and adventure seeking, Healthy climbers
232 reported significantly higher scores than Emotionally Unstable climbers ($p = .05$). For
233 experience seeking, five of the six post-hoc comparisons showed statistically significant
234 differences (see Table 4). Healthy climbers had higher ratings for experience seeking than
235 Emotionally Unstable ($p = .000$) and Measured and Compliant climbers ($p = .001$),
236 respectively. Emotionally Unstable climbers showed lower scores for this variable than

237 Measured and Compliant ($p = .04$) and Curious and Impulsive climbers ($p = .000$),
238 respectively. In addition, Measured and Compliant climbers reported lower experience
239 seeking tendencies than Curious and Impulsive climbers ($p = .000$). For disinhibition,
240 Curious and Impulsive climbers had significantly higher scores than Emotionally Unstable
241 climbers ($p = .01$) and Measured and Compliant ($p = .02$) respectively. Finally, significant
242 differences in sensation seeking were also found for sex as a covariate, Pillai's Trace (4, 320)
243 $= 7.28, p < .001$. Follow-up univariate tests showed that males rated themselves higher than
244 females for boredom susceptibility, $F(1, 323) = 16.40, p < .001, \eta^2 = 0.05$; experience
245 seeking, $F(1, 323) = 7.99, p < .01, \eta^2 = 0.02$; disinhibition, $F(1, 323) = 7.35, p < .01, \eta^2 =$
246 0.02 ; and, thrill and adventure seeking, $F(1, 323) = 10.18, p < .01, \eta^2 = 0.03$.

247 Discussion

248 To our knowledge, this is the first study that has taken a person-centred approach to
249 exploring whether distinct big five personality profiles could be identified among competitive
250 climbers. Our findings identified four separate personality profiles: Healthy; Emotionally
251 Unstable; Measured and Compliant; and Curious and Impulsive climbers. A second
252 exploratory aim sought to examine whether these personality profiles would differ on
253 sensation seeking tendencies. The findings showed significant differences between the
254 personality profiles on three of the four sensation seeking subscales. The Healthy climbers
255 displayed higher ratings on the thrill and adventure seeking, and experience seeking subscales
256 in comparison to the Emotionally Unstable climbers, respectively. This represents an
257 important finding since the Healthy profile shares a strong resemblance to a recently
258 developed *healthy personality index*. This *healthy personality index* has been found to be
259 positively correlated with psychological adjustment, self-esteem, self-regulation, immunity to
260 stress, and an optimistic outlook (Bleidorn et al., 2020). This contrasts previously held views
261 on sensation seeking whereby many of the subscales were considered to be indicative of

262 pathological functioning (Zuckerman, 1979).

263 In identifying different personality profiles, these findings help to suggest that higher
264 scores on some sensation seeking subscales may be experienced by competitive climbers who
265 display a healthy, normative personality profile in comparison to those who may not (i.e.,
266 Emotionally Unstable climbers). These profiles go some way to supporting theoretical
267 assertions that sensation seeking may be driven by a hyperactive approach (Joseph et al.,
268 2009) or hypoactive avoidance brain system (Zheng et al., 2019). In the presence of potential
269 rewards and risks whilst climbing, approach systems may be expressed in the forms of
270 greater openness to experience, extraversion, and conscientiousness, whilst avoidance
271 systems may manifest themselves through greater expression of neuroticism than other
272 personality domains. This could have important applied implications for providing new
273 understanding on how coaches and practitioners could support climbing profile groups who
274 may be more likely to avoid difficult maneuvers, or ‘freeze’ during climbing events.

275 In challenging the view that high-risk sport participants can be considered a
276 homogenous sensation-seeking group regardless of adventure sport (Barlow et al., 2013), our
277 findings extend current knowledge by illustrating how heterogenous personality profiles can
278 exist within a single high-risk sport, and how these groups may report similar or different
279 levels of sensation seeking. For example, the Healthy, and Curious and Impulsive groups
280 showed no statistically significant differences in any of the sensation seeking subscales,
281 whilst both reporting high scores for thrill and adventure seeking, and experience seeking.

282 When exploring the big five composition differences between the Healthy and
283 Curious and Impulsive groups, it was observed that both profiles displayed similarly high
284 levels of openness to experience, and moderate or high levels of extraversion. This would
285 suggest that openness to experience is the most salient big five factor that determines high
286 levels of sensation seeking in climbers, but the degree to which this is the case might also

287 depend on possessing a moderate or high level of extraversion, conscientiousness, and
288 agreeableness (most likely in that order of importance). This is justified by psychology
289 studies that have used relative weight analysis to demonstrate that openness to experience,
290 extraversion, and conscientiousness contribute the most variance in sensation seeking, in
291 comparison to agreeableness and neuroticism (de Vries et al., 2009). Moreover, in the current
292 study, a comparison of the Healthy and Curious and Impulsive groups highlights that
293 possessing moderate levels of neuroticism may not prevent climbers from enacting high
294 sensation seeking. Rather, it is the amalgamation of neuroticism with moderate-to-high levels
295 of extraversion and openness to experience that seems to be associated with higher sensation
296 seeking tendencies. From an applied perspective, these nuanced profile differences between
297 the Healthy and Curious and Impulsive groups could be highly visible for coaches to identify
298 during training, or referees and spectators at competitive events. This is because the moderate
299 neuroticism that the Curious and Impulsive group display could manifest itself by way of
300 poorly timed decision making in dangerous climbing circumstances, or fear and panic
301 following a spontaneous decision. From a theoretical perspective, the Curious and Impulsive
302 group and their subsequent behaviors could sit somewhere in between a hyperactive and
303 hypoactive avoidance system of sensation seeking during competitive events.

304 Our findings also extend current knowledge on person-centred approaches to
305 understanding personality differences in sensation seeking-related behaviors. In a study by
306 Castanier et al. (2010b), the authors examined personality differences in risk-taking behaviors
307 across various high-risk sports. Their cluster analysis findings showed that risk-taking
308 behaviors, such as experiencing frequent accidents due to irresponsible behavior, and taking
309 too many risks when practicing high-risk sports, were the highest in groups displaying low
310 conscientiousness, and high or low combinations of extraversion and neuroticism. These risk-
311 taking behaviors share some similarities to items from the thrill and adventure seeking

312 subscale of sensation seeking (e.g., “I can’t understand people who risk their necks climbing
313 mountains”). From an applied perspective, this person-centred approach provides an
314 advantage over variable-centred techniques (e.g., regression) in identifying subgroup profiles
315 from a sampled population that could lead to tailored subgroup interventions. The Castanier
316 et al. (2010b) study, however, did not examine group membership of all five personality
317 domains, nor was it clear how participants were reliably assigned to group memberships for
318 high / low profiles of conscientiousness, extraversion, and neuroticism in specific sports.
319 Using a latent profile analysis, we extend these findings by reliably demonstrating the
320 importance of identifying different big five profiles containing high levels of openness to
321 experience in predicting high sensation seeking. We also highlight that high levels of
322 sensation seeking can be seen in groups displaying moderate to high levels of
323 conscientiousness and agreeableness as well, particularly when accompanied by high levels
324 of extraversion.

325 **Applied Recommendations**

326 The findings of the present study have important applied implications for coaches and
327 sport psychologists working with competitive climbers, because they suggest that different
328 personality profiles may be able to distinguish between higher and lower degrees of sensation
329 seeking. From a theoretical standpoint, this may suggest that some climbers could have a
330 greater tolerance to how they approach or avoid potential risks and rewards from
331 participating in this adventure sport (Joseph et al., 2009; Zheng et al., 2019). Identifying how
332 an individual’s personality profile is linked to one’s sensation seeking tendencies in climbing
333 could provide greater understanding of how training interventions could be promoted to
334 improve safety education. For example, training could look to reinforce one’s perception of
335 negative consequences. This approach could be suitable for specific groups (e.g., a Curious
336 and Impulsive profile) who may lack inhibition from completing risky maneuvers, or lack an

337 ability to sensibly comply with regulating their activation of dangerous activities.

338 Furthermore, knowledge of subgroup personality profile differences could lead to
339 developing cognitive-behavioral programs designed to improve one's perception of
340 reward/gain. Such an approach could be appropriately shaped for specific groups (e.g., an
341 Emotionally Unstable profile) who may be more hesitant and 'freeze' on a climbing wall
342 when completing potentially threatening maneuvers. Taken together, coaches and
343 psychologists could seek to establish the profiles of novice sportspersons and then seek to
344 tailor their training experiences accordingly. In the context of the present findings, coaches
345 could look to offer Curious and Impulsive climbers a more expansive range of experiences
346 (aligned to greater disinhibition) than Measured and Compliant climbers. The longer-term
347 effects of such an approach could then be examined in relation to climbers' enjoyment and
348 engagement over time.

349 **Limitations and Future Research**

350 First, latent profile analysis was conducted on the big five personality *domains*.
351 Although sport and exercise psychology researchers often examine the FFM domains in
352 relation to various well-being and performance outcomes (Allen et al., 2020; Rumbold et al.,
353 2020), an examination at the *facet* level may provide a more nuanced explanation of how
354 personality profiles are linked to sensation seeking tendencies or other outcome variables in
355 the future (Laborde et al., 2020). Second, we acknowledge the limitation of sampling one
356 sport, which prevents generalizability to other adventure sports. Future research could seek to
357 apply a latent profile analysis to other adventure sports to determine whether similar
358 personality profiles emerge. This is particularly important in light of evidence that
359 comprehensively challenges the view that high-risk sport participants can be considered a
360 homogenous sensation-seeking group (Barlow et al., 2013). Third, we agree that research on
361 personality in sport and physical activity needs to transition away from cross-sectional

362 designs (Allen et al., 2020; Laborde et al., 2020). For example, researchers could
363 longitudinally examine how participation in sport and exercise might contribute to stability or
364 change in personality. In addition, prospective designs could be used to assess how
365 personality traits may explain changes in people's enjoyment of sport and physical activities
366 (Jackman et al., 2020). Our findings would also suggest that it may be worthwhile to continue
367 to examine gender differences in future work when examining sensation seeking-related
368 experiences over time. Although our findings support previous research that has identified
369 sex differences in sensation seeking tendencies (e.g., Cross et al., 2013; Zuckerman et al.
370 1978), other research suggests that this may not always be the case (e.g., McEwan et al.,
371 2019). Finally, we acknowledge that the sensation seeking scale (SSS V; Zuckerman,
372 Eysenck, & Eysenck, 1978) adopted in this study does not imply that sensation seeking is a
373 motive for participation in high-risk sports (Woodman et al., 2020). It was not our intention
374 in this study to assess sensation seeking as a proxy for motives for participation in
375 competitive climbing, however, future research could look to adopt a person-centred
376 approach in identifying variance in participation motives within and between high-risk sports.

377 **Conclusion**

378 In summary, the findings of this study contribute to an in-depth understanding of
379 individual differences in relation to sensation seeking tendencies in the specific high-risk
380 sport of competitive climbing. The latent profile analysis approach provided a reliable way of
381 differentiating between big five personality profile memberships, and enabled us to
382 demonstrate that various combinations of the big five seem to provide greater examples of
383 high sensation seeking tendencies in this climbing sample than others. Continuing with a
384 person-centred approach towards personality research in the future may be useful in
385 developing individually tailored interventions to engage people in particular sport activities
386 safely, and, to optimize their experience in a healthy and personally meaningful way.

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Table 1. Descriptive statistics, coefficient alphas, bivariate and biserial correlations of the study variables ($N = 331$)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Extraversion	3.24	0.72	(.87)										
2. Neuroticism	2.65	0.81	-.34	(.87)									
3. Conscientiousness	3.47	0.64	.25	-.35	(.79)								
4. Agreeableness	3.74	0.50	.14	-.21	.29	(.72)							
5. Openness to new experience	3.82	0.60	.40	<u>-.10</u>	<u>.07</u>	.13	(.75)						
6. Thrill and adventure seeking	7.48	1.89	.20	-.15	<u>-.03</u>	<u>-.03</u>	.11	(.97)					
7. Experience seeking	5.58	1.71	.30	-.14	<u>-.10</u>	<u>.01</u>	.39	.18	(.71)				
8. Disinhibition	4.53	1.66	.21	<u>.02</u>	-.12	.12	<u>.08</u>	.19	.33	(.96)			
9. Boredom susceptibility	2.96	1.75	.20	<u>-.03</u>	-.20	-.37	<u>-.02</u>	.16	.16	.29	(.71)		
10. Total sensation seeking	20.55	4.50	.35	-.12	-.17	-.19	.22	.62	.64	.69	.62	-	
11. Sex	1.49	0.50	<u>.03</u>	.19	<u>.05</u>	.18	<u>.09</u>	-.14	-.12	-.14	-.19	-.27	-

Note. Sex was coded as '1' for males and '2' for females. Cronbach's alpha coefficients for each subscale are presented in parentheses. Coefficient values $>.11 = p < .05$; Coefficient values $>.14 = p < .01$. Underlined coefficients indicate a non-significant relationship.

Table 2. Table of model fit statistics and profile membership distribution for the big five personality domains

Model	Fit statistics				Profile Membership Distribution				
	BIC	SSABIC	BLRT	Entropy	1	2	3	4	5
One-profile	3306.898	3275.177	N/A	N/A					
Two-profile	3209.666	3158.913	-1624.438***	0.582	145	186			
Three-profile	3216.443	3146.658	-1558.416***	0.572	108	59	164		
Four-profile	3219.219	3130.402	-1544.398***	0.616	62	56	106	107	
Five-profile	3238.219	3130.370	-1528.380 ^{ns}	0.659	114	55	91	64	7

Note. $N = 331$. *** = $p < .001$; ^{ns} = non-significant, $p > .10$.

Table 3. Means and standard errors of the four big five personality latent profiles ($N = 331$)

	Class 1 Healthy ($n = 62$)		Class 2 Emotionally Unstable ($n = 56$)		Class 3 Measured and Compliant ($n = 106$)		Class 4 Curious and Impulsive ($n = 107$)	
	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE
EXT	3.910	0.150	2.452	0.089	3.080	0.145	3.357	0.132
NEU	1.951	0.163	3.498	0.177	2.261	0.126	3.052	0.140
CON	3.892	0.116	3.043	0.118	3.678	0.101	3.210	0.132
AGR	3.968	0.083	3.476	0.072	3.815	0.091	3.659	0.099
OPE	4.253	0.128	3.260	0.126	3.479	0.124	4.160	0.058

Note. EXT = Extraversion; NEU = Neuroticism; CON = Conscientiousness; AGR = Agreeableness; OPE = Openness to experience.

Table 4. Description of the four latent class ($N = 331$) differences in sensation seeking subscales

	Class 1 Healthy ($n = 62$)		Class 2 Emotionally Unstable ($n = 56$)		Class 3 Measured and Compliant ($n = 106$)		Class 4 Curious and Impulsive ($n = 107$)		Post-hoc comparisons
	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE	<i>M</i>	SE	
Thrill and adventure seeking	7.920	0.236	6.972	0.248	7.399	0.185	7.589	0.180	a
Experience seeking	6.181	0.201	4.512	0.210	5.144	0.157	6.211	0.153	abdef
Disinhibition	4.589	0.206	4.111	0.216	4.215	0.161	4.988	0.157	ef
Boredom susceptibility	3.076	0.218	2.903	0.228	2.621	0.170	3.200	0.166	

Note. a = class 1 differs from class 2; b = class 1 differs from class 3; c = class 1 differs from class 4; d = class 2 differs from class 3; e = class 2 differs from class 4; f = class 3 differs from class 4. Standard errors and post-hoc comparisons are based on 95% bias-corrected bootstrapped estimates.

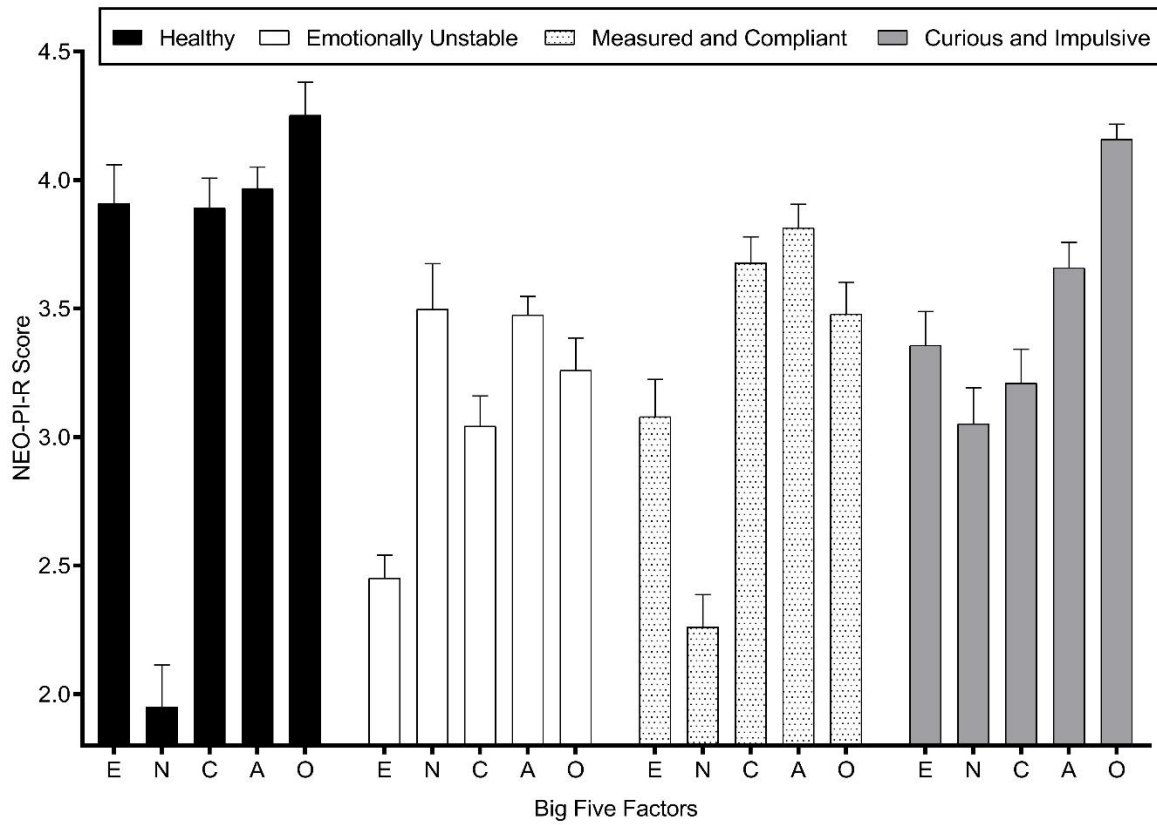


Figure 1. The four personality profiles by Big Five factors. Note. E = Extraversion, N = Neuroticism, C = Conscientiousness, A = Agreeableness, O = Openness to experience.