

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

Author(s): Kaski, Satu; Arvinen-Barrow, Monna; Kinnunen, Ulla; Parkkari, Jari

Title: Profiles of Mental Well- and Ill-Being Among Elite Athletes : Associations With Sport-Related Demands and Resources

Year: 2022

Version: Accepted version (Final draft)

Copyright: © Human Kinetics, 2022

Rights: In Copyright

Rights url: <http://rightsstatements.org/page/InC/1.0/?language=en>

Please cite the original version:

Kaski, S., Arvinen-Barrow, M., Kinnunen, U., & Parkkari, J. (2022). Profiles of Mental Well- and Ill-Being Among Elite Athletes : Associations With Sport-Related Demands and Resources. *Journal of clinical sport psychology*, Early online. <https://doi.org/10.1123/jcsp.2021-0083>

1 **Profiles of Mental Well- and Ill-Being among Elite Athletes: Associations with Sport-**
2 **Related Demands and Resources**

3
4 Satu Kaski¹, Monna Arvinen-Barrow², Ulla Kinnunen³ and Jari Parkkari⁴

5
6 ¹ UTHA Ltd., Helsinki, Finland

7 ² University of Wisconsin-Milwaukee, Milwaukee, WI, USA

8 ³ Faculty of Social Sciences (Psychology), Tampere University, Tampere, Finland

9 ⁴ Faculty of Sport and Health Sciences, University of Jyväskylä, Jyväskylä, Finland

10

11

12

13

14

15

16

17

18

19

20

21

Author note

22 Correspondence concerning this article should be addressed to Satu Kaski. Email:

23 satu.kaski@clearmind.fi

24

25 **Profiles of Mental Well- and Ill-Being among Elite Athletes: Associations with Sport-**
26 **Related Demands and Resources**

27

28 **Abstract**

29 The aim of the present study was to identify profiles of elite athlete mental well- and ill-being
30 and study how the profiles (i.e., subgroups of athletes) differed in sport-related demands and
31 resources. A total of 259 Finnish elite athletes ($n = 170$ active; $n = 89$ retired) completed
32 quantitative self-report inventories. Through cluster analysis, four profiles of mental well-
33 and ill-being were identified. Profile 1 was overrepresented by retired, older, and male
34 athletes and characterized by good mental well-being. Profile 2 consisted mainly of active
35 athletes who reported mild risk for alcohol abuse. Profile 3 consisted mainly of women who
36 displayed possible presence of an eating disorder. Profile 4 was typical of young athletes with
37 mental ill-being. The balance between sport-related demands and resources appeared to be
38 the healthiest in Profile 1 and worst in Profile 4. The present findings are beneficial for those
39 who work with and/or provide psychological support to athletes.

40

41 **Keywords:** Elite athletes, mental well-being, mental health symptoms, mental ill-being,
42 sport-related demands, sport-related resources

43

44

45

46

47

48

49 **Profiles of Mental Well- and Ill-Being among Elite Athletes: Associations with Sport-**
50 **Related Demands and Resources**

51 Over the recent decade, elite athlete mental well- and ill-being has gained traction in
52 both popular media and academic literature (e.g., Doherty et al., 2016; Souter et al., 2018). In
53 addition to many high-profile athletes opening about their mental health struggles in the
54 media (Souter et al., 2018), existing reviews of empirical evidence have also demonstrated
55 that athletes, alike to general population, experience myriad of mental ill-being such as
56 depression, anxiety, eating disorders, and substance abuse (e.g., Gouttebauge et al., 2019;
57 Reardon et al., 2019; Rice et al., 2016).

58 A range of biopsychosocial stressors and demands have been found to have the
59 potential to negatively affect elite athlete mental well-being (Hughes & Leavey, 2012;
60 Nixdorf et al., 2016). Some stressors and demands include: extensive training load (Rice et
61 al., 2016), overtraining (Kuettel & Larsen, 2020), injury (Wolanin et al., 2015), pressure to
62 perform (Noblet et al., 2003), poor athletic performance (Prinz et al., 2016; Reardon, 2017),
63 poor coach-athlete and/or athlete-athlete relationships (Prinz et al., 2016), travel and
64 subsequent separation from family and friends (Rice et al., 2016), and unsuccessful transition
65 out of sport (Bruner et al., 2008; Esopenko et al., 2017). While the aim(s) and methodologies
66 of the above research vary, a commonality across the existing elite athlete mental well-being
67 research exists. Much of the research has predominantly focused on identifying and
68 understanding the presence and symptoms of mental ill-being or disorders, often referred to
69 as mental ill-being (Rice et al., 2016), rather than the presence of factors that comprise mental
70 well-being. Such approach, by default, defines mental well-being as the absence of mental
71 health symptoms (i.e., mental ill-being) rather than as a state of well-being.

72 Our research aims to address this gap. By aligning our research with World Health
73 Organization's definition of mental well-being, "a state of well-being in which every

74 individual realizes his or her own potential, can cope with the normal stresses of life, can
75 work productively and fruitfully, and is able to make a contribution to her or his community”
76 (World Health Organization, 2014, para. 1), our purpose is to explore mental well- and ill-
77 being profiles among elite athletes, and how these profiles may be associated with sport-
78 related demands and resources. Consistent with the WHO definition, our research defines
79 mental well-being as a malleable state, where an individual has an awareness of their existing
80 ill-being (i.e., presence of mental health symptoms), well-being (i.e., realization of personal
81 potential), sport-related demands (i.e., stressors), and resources (e.g., social support).

82 Our research also recognizes that mental well-being is typically approached from two
83 distinct perspectives. Hedonistic perspective emphasizes *subjective well-being*, which is
84 characterized by maximizing one's feeling of pleasure and satisfaction with life and
85 occasionally, equated with happiness (Diener, 1984). In contrast, eudaimonic perspective
86 focuses on *psychological well-being*, which refers to actualizing one's human potentials and
87 formulating positive human functioning, giving meaningfulness and purpose in life (Ryff,
88 1989; Ryff & Keyes, 1995). Thus far, research has found that satisfaction in sport, intrinsic
89 interest in sport, and self-worth (Lundqvist, 2011; Reinboth & Duda, 2006) are all related to
90 athlete mental well-being. While the psychological constructs associated with subjective and
91 psychological well-being correlate with each other, evidence also suggest that the two
92 approaches are empirically distinct (Keyes et al., 2002). To account for the differing
93 perspectives described above, our research measures mental well- and ill-being in three
94 distinct ways: subjective mental well-being (i.e., life satisfaction), psychological mental well-
95 being (i.e., positive functioning), and mental ill-being (i.e., depression, anxiety, potential
96 presence of an eating disorder, risk for alcohol abuse).

97 Lastly, and consistent with the WHO definition of mental well-being, our research
98 acknowledges range of resources as protective in elite athlete mental well-being. These

99 factors have been studied more seldom than risk factors, probably because ill-health and
100 related factors have been the main target of athlete mental health studies to date (Kuettel &
101 Larsen, 2020). In their review, based on nine reviews/meta-analyses and 43 empirical
102 primary research studies, Kuettel and Larsen (2020) identified several personal and sport-
103 environmental resources as protective factors for mental well-being. Some of the personal
104 resources included positive supportive relationships, appropriate recovery, feeling of
105 competence related to sport success, and career satisfaction. Identified sport-environmental
106 resources included having a trusting and mastery-oriented sport climate, confidential and
107 trusting relationship with the coach, social support from the sport environment, and
108 successful adjustment to sport retirement.

109 In summary, existing elite athlete mental well-being research has been focused on
110 exploring the absence and/or presence of mental ill-being, as opposed to presence of mental
111 well-being. Consistent with the WHO definition of mental well-being, our research aims to
112 address this gap by profiling elite athlete subjective and psychological mental well-being in
113 conjunction with their self-reported absence and/or presence of mental ill-being. We also aim
114 to explore the relationships between the identified mental well- and ill-being profiles and
115 selected sport-related demands and resources as identified in the existing literature.

116 Method

117 Participants

118 A total of 259 self-identified Finnish elite athletes participated in the study. Of the
119 athletes, 64% ($n = 166$) identified as female and 36% ($n = 93$) as male. All participants were
120 18 years or older (age range 18–65 years). The largest age groups were: 19–24 (31%, $n = 81$),
121 25–34 (25%, $n = 65$) and 35–44 (14%, $n = 36$). Of the participants, 13% ($n = 34$) were under
122 19 years of age, 10% ($n = 25$) were 45–54, and 7% ($n = 18$) were aged 55 and over.
123 Participants represented a total of 31 individual and/or team sports (e.g., baseball, figure

124 skating, football, swimming). Sport representation varied from $n = 1$ participants (e.g.,
125 dressage and weightlifting) to $n = 47$ (ice hockey). Of the participating athletes, 65% ($n =$
126 168) had won a medal at the European Championships, World Championships, or in the
127 Olympic Games, and 79% ($n = 204$) had won a medal at the Finnish National
128 Championships.

129 Of the sample, 66% were actively competing in their sport (referred to as active
130 athletes; $n = 170$) and 34% had retired from competitive elite sport (referred to as retired
131 athletes; $n = 89$). Of the retired athletes, 49% ($n = 44$) had retired from sports over ten years
132 ago, and 15% ($n = 13$) had retired from their sport within a year of data collection. We
133 included retired athletes as their experiences are important (Poucher et al., 2019) in
134 understanding elite athlete mental well- and ill-being.

135 **Procedure**

136 Following the Ethics Committee approval, we approached the potential participants
137 through various Finnish sport federations and sport organizations. The organization
138 representatives were asked to send electronic invitations to their active and retired elite
139 athlete members to participate in the study. These invitations included a brief introduction, an
140 informed consent, and an URL link to the online survey that contained all the measures.
141 Follow-up contacts with the representatives were made two times. The data were collected
142 during Spring and Summer 2019 using Webropol-software.

143 **Measures: Mental Well- and Ill-Being**

144 We measured mental well-being with the presence of both subjective (life
145 satisfaction) and psychological (positive functioning) well-being. We measured mental ill-
146 being with measures identifying the presence of selected mental health symptoms and
147 maladaptive behaviors (depression, anxiety, possible presence of eating disorders, and risk
148 for alcohol abuse) associated with mental ill-being.

149 ***Subjective Well-Being: Life Satisfaction***

150 We used the questions from the Finnish Health 2011 survey (Terveys, 2011) to
151 measure subjective well-being (life satisfaction). These seven self-report questions (e.g., *how*
152 *satisfied are you with your relationships* and *how satisfied are you with your health?*) were
153 rated on a 6-point Likert scale (1 = *very dissatisfied* to 6 = *very satisfied*). We calculated a
154 mean score (1–6) for the seven items.

155 ***Psychological Well-Being: Positive Functioning***

156 We used the 18-item version of the Scales of Psychological Well-Being (Ryff, 1989)
157 to measure participants' psychological well-being. The Finnish language version of the
158 measure has demonstrated acceptable validity and reliability (Kokko & Feldt, 2018). The
159 scale is a self-report questionnaire that measures six components of psychological well-being:
160 self-acceptance, positive relationships with others, environmental mastery, autonomy,
161 purpose in life, and personal growth. Each item (e.g., *I tend to dominate the current life*
162 *situation; my life has been one of continuous learning, change and growth*) are rated on a 4-
163 point Likert scale (1 = *strongly disagree* to 4 = *strongly agree*). In this study, the original
164 structure of the construct could not be confirmed by Principal Component Analysis (PCA).
165 Therefore, a mean score (1–4) consisting of all items was calculated to describe
166 psychological well-being in a similar way as in the study by Kokko and Feldt (2018).

167 ***Depression***

168 We measured depression with Beck Depression Inventory (BDI; Beck, 1972), a valid
169 and reliable measure of depressive symptoms with Finnish general population (Aalto et al.,
170 2012). The BDI is a 4-point Likert-scale (0 = *no depression* to 3 = *major depression*) self-
171 report questionnaire with 21 statements about negative thoughts, feelings, and behavior (e.g.,
172 *sense of failure, feeling guilt, self-hate, loss of appetite, crying spells*). The BDI is scored by
173 adding all items to a total score (0 - 63).

174 **Anxiety**

175 We measured anxiety with Beck Anxiety Inventory (BAI), a measure with
176 demonstrated validity and reliability (Beck et al., 1988). The BAI is a 4-point Likert-scale (0
177 = *not at all anxious* to 3 = *severe anxiety*) self-report questionnaire with 21 questions about
178 cognitive and somatic signs and symptoms of anxiety (e.g., *numbness, tingling and fear of the*
179 *worst happening*). The BAI is scored by adding all items to a total score (0 – 63).

180 **Eating Disorder(s)**

181 We screened the possible presence of eating disorders with the Finnish version of the
182 Questionnaire to Screen for Eating Disorders (SCOFF; Morgan, Reid & Lacey, 2000), which
183 has demonstrated validity in Finnish (Hautala et al., 2005). The SCOFF is a five-question
184 (e.g., *are you worried about the idea that you can no longer control how much you eat?*) self-
185 report questionnaire that screens for potential eating disorders on a dichotomous (1 = *yes*, 0 =
186 *no*) scale. The SCOFF is scored by adding all items to a total score (0 - 5).

187 **Alcohol (Ab)use**

188 We used the Audit-10 (Saunders et al., 1993) to document the participants' alcohol
189 consumption, drinking related behaviors, and alcohol related problems. The Audit-10 has
190 been found to provide an accurate measure of risk across gender, age, and cultures (for more
191 details on demonstrated validity, see Babor et al., 2001). Audit-10 is a 10-item, self-report
192 questionnaire that aims to determine if a person is at risk for alcohol abuse problems and
193 measures both the amount of alcohol consumed (two questions) and the harm related to
194 alcohol use (eight questions) on a 5-point Likert Scale (1 = *never* to 5 = *daily or almost*
195 *daily*). Audit-10 is scored by adding all items to a total score (0 - 40).

196 **Measures: Sport-Related Demands and Resources**

197 We measured sport-related demands and resources with a measure developed
198 specifically for the purpose of this research. The items used were derived from earlier

199 research (i.e., Fletcher & Wagstaff, 2009; Kaski, 2013; Rice et al., 2016) and previous
200 clinical sport psychology practice. We used PCA with Promax Rotation to establish the sport-
201 related demands and resources components used in the present study. Thus, we had a pool of
202 items separately for demands and resources of which we searched with the help of PCA the
203 most reliable items measuring each demand and resource.

204 ***Sport-Related Demands***

205 Following PCA with Promax Rotation, three distinct sport-related demand
206 components emerged: sport success-related pressures (3 items, e.g., *not being successful in*
207 *sport would burden me*), overcommitment to sport (3 items, e.g., *sport is the only important*
208 *matter in my life*), and sport-related worries (3 items, e.g., *I am worried about being injured*
209 *or getting sick*). Each item was rated on a 5-point Likert scale (1 = *strongly disagree* to 5 =
210 *strongly agree*). A mean score (1-5) was computed for each demand.

211 ***Sport-Related Resources***

212 PCA with Promax Rotation produced two distinct sport-related resource components:
213 personal development (3 items, e.g., *I enjoy that sport challenges me as a person*) and
214 satisfaction with coaching (3 items, e.g., *I am satisfied with my coach's way of coaching*).
215 Each item was rated on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). A
216 mean score (1-5) was computed for each resource.

217 The reliabilities (Cronbach alphas) for the measures are shown in Table 1. Overall, all
218 measures demonstrated acceptable ($\alpha > .60$ -.70) reliability, with the exception of the
219 measure for possible prevalence of an eating disorder demonstrated low reliability (.52).

220 **Data Analysis**

221 Descriptive statistics (frequencies, percentages, means, and standard deviations) were
222 calculated for each of the study variables. Pearson correlation coefficients were computed to
223 examine the relationships between the study variables. The first research aim, i.e., to explore

224 multidimensional mental well- and ill-being with a goal to capture distinct profiles (i.e.,
225 subgroups) of elite athletes, was examined by cluster analysis. We adopted a person-oriented
226 perspective to our analysis with a goal to distinguish distinctly different, yet internally
227 homogeneous psychosocial profiles among the elite athletes. For our analysis, we used two-
228 step cluster analysis, a hybrid approach that first uses a distance measure to separate groups,
229 followed by a probabilistic approach to choose the optimal subgroup model (Gelbard et al.,
230 2007; Kent et al., 2014). The analysis automatically determines the optimal solution based on
231 the chosen criterion. We used Bayesian Information Criterion (BIC); lower BIC values reflect
232 better fit for a given cluster solution. In addition to the statistical criterion, it is also important
233 to consider the content and interpretability of the cluster solution (e.g., Benassi, et al., 2020).
234 Comparative studies have regarded two-step cluster analysis as one of the most reliable in
235 terms of the number of subgroups detected, classification probability of individuals to
236 subgroups, and reproducibility of findings in various types of data (Gelbard et al., 2007; Kent
237 et al., 2014). The variables of mental well- and ill-being were standardized before entered to
238 the cluster analysis because they were scored differently. The second research aim, i.e., to
239 examine sport-related demands and resources and background factors that distinguish
240 differences between the different mental well- and ill-being clusters (i.e., profiles) was
241 examined in one of two ways: using robust variance analysis (Welch's *F*-test, continuous
242 variables) or cross-tabulation and chi-square test (categorical variables). In the variance
243 analysis, pairwise comparisons between the groups were examined with Games-Howell post
244 hoc-test.

245 **Results**

246 **Descriptive Results**

247 Descriptive statistics, internal consistency scale reliabilities (Cronbach alphas) and
248 Pearson correlation coefficients are reported in Table 1. The Pearson correlation coefficients

249 showed that mental ill-being measures (i.e., mental health symptoms) correlated positively
250 with each other, except for possible presence of an eating disorder and risk for alcohol abuse.
251 The strongest correlation ($r = .71$) was found for symptoms of depression and symptoms of
252 anxiety. Mental ill-being measures also correlated negatively with life satisfaction and
253 positive functioning, symptoms of depression showing the strongest correlation with life
254 satisfaction ($r = -.66$) and positive functioning ($r = -.68$). In addition, all sport-related
255 demands were statistically significantly associated with all mental well- and ill-being
256 measures except for risk for alcohol abuse. The strongest correlations were found for sport-
257 related worries and symptoms of depression ($r = .37$) and positive functioning ($r = -.43$). Of
258 the sport-related resources, satisfaction with coaching was also found to have statistically
259 significant relationship with mental well- and ill-being measures, except for risk for alcohol
260 abuse. Satisfaction with coaching showed strongest correlations with depression ($r = -.23$)
261 and positive functioning ($r = .30$).

262 **Identifying Distinct Mental Well- and Ill-Being Profiles**

263 A two-step cluster analysis proposed three clusters, with the lowest information
264 criterion (BIC) being 892.995. These clusters differed from each other in mental well- and ill-
265 being: one cluster presented with good mental well-being, one with mental ill-being, and one
266 with an average mental well- and ill-being. When we compared BIC-values between three
267 and four clusters, the change was small; the four-cluster solution had a BIC-value of 894.348.
268 Examining the content of the four clusters, we found that one of the original clusters (average
269 mental well- and ill-being) was divided into two distinct clusters: one cluster with mild risk
270 for alcohol abuse, and another with a higher possible presence of eating disorders. As the
271 four-cluster solution revealed interesting content differences and provided further information
272 on elite athlete mental well- and ill-being when compared to the three-cluster solution, we
273 considered it justified to select the four-cluster solution.

274 The four clusters (i.e., profiles) are displayed in Figure 1. The most frequent profile,
275 Profile 1 (41.3%; $n = 107$) is characterized by good mental well-being, with notable absence
276 of mental ill-being, and the highest levels of both subjective (life satisfaction) and
277 psychological (positive functioning) well-being. Profile 2 (35.5%; $n = 92$) is characterized by
278 average mental well- and ill-being with mild risk for alcohol abuse. Profile 3 (12.0%; $n = 31$)
279 is characterized by average mental well- and ill-being, with possible presence of an eating
280 disorder. The least frequent profile, Profile 4 (11.2%; $n = 27$) is characterized by mental ill-
281 being, with the highest level of both symptoms of depression and anxiety, and the lowest
282 level of both subjective and psychological well-being.

283 **Distinguishing Differences Between the Mental Well- and Ill-Being Profiles**

284 The four mental well- and ill-being profiles differed statistically significantly in terms
285 of gender, age, and sport participation status (active, retired; Table 2). Profile 1 was
286 overrepresented by males, individuals aged 45-54 years, and retired athletes. Profile 1 was
287 also underrepresented by females, young (19-24) athletes, and active athletes. Profile 2 was
288 overrepresented by active athletes (both male and female). Profile 3 had a significant
289 overrepresentation of women, particularly those under 19 years of age. Only one male fit
290 Profile 3. Profile 4 was overrepresented by young (19-24) athletes. In summary, the profiles
291 indicate that women and young athletes were most likely to present mental ill-being.

292 The mental well- and ill-being profiles also differed significantly in sport-related
293 demands and resources (see Table 3). Profile 1 exhibited significantly less sport-related
294 demands. Athletes in Profile 1 reported less overcommitment to sport, fewer sport success-
295 related pressures, and fewer sport-related worries than athletes in Profiles 2, 3, and 4. They
296 also differed from other profiles by being most satisfied with coaching. In short, the balance
297 between sport-related demands and resources appeared to be the healthiest. Profile 2
298 exhibited less sport-related demands than Profile 3 and 4. Athletes in Profile 2 appeared to

299 report less overcommitment to sport than athletes in Profile 3, and fewer sport success-related
300 pressures, and fewer sport-related worries than athletes in Profile 4. Profile 3 reported less
301 sport-related worries than athletes in Profile 4. Profile 4 exhibited the most sport-related
302 demands, and least sport-related resources. Athletes in Profile 4 scored highest on sport
303 success-related pressures and sport-related worries, of which the latter was significantly
304 higher than in other profiles. With regards to sport-related resources, the only significant
305 pairwise profile differences were found for satisfaction with coaching.

306 **Discussion**

307 The emergent four profiles are consistent with previous research on mental well-being
308 profiles conducted with non-athlete populations (e.g., Keyes, 2005; Kokko & Feldt, 2018).
309 Much like general population, most of the athletes in this research presented with average
310 mental well- and ill-being, followed by athletes with good mental well-being (Profile 1). In
311 our research, having an average mental well-being with presence of ill-being was
312 characterized by either a mild risk of alcohol abuse (Profile 2) or a potential presence of an
313 eating disorder (Profile 3). The mental ill-being profile (Profile 4) was the least frequent,
314 finding that is also consistent research conducted with general populations (Keyes, 2005;
315 Kokko & Feldt, 2018).

316 As expected, our results also found sport-related demands and resources as
317 contributing to athlete mental well- and ill-being. Presence of sport-related demands was
318 found to be more important in distinguishing the emergent mental well- and ill-being profiles
319 than sport-related resources. The most balanced ratio of sport-related demands and resources
320 were found in Profile 1, and least balanced ratio in Profile 4. Our results support existing
321 literature (e.g., Bakker & Demerouti, 2017) and the notion that sport-related demands can
322 deplete individuals' resources, and if left unmitigated, can lead to mental ~~ill-being~~ (i.e.,
323 mental health symptoms. Equally, sport-related resources can operate as an energizing and

324 replenishing process to enhance mental well-being and offset demands (see Kuettel & Larsen,
325 2020). For example, our research found that satisfaction with coaching (a resource) was a
326 significant contributor to good mental well-being, supporting the notion that having a
327 trusting, open, and supportive relationship(s) with coach(es) can protect athlete mental well-
328 being (Bissett et al., 2020; Kuettel & Larsen, 2020).

329 In addition to the above expected differences, the sport-related demands and resources
330 were more balanced for Profiles 2 and 3, both characterized by average mental well- and ill-
331 being. Athletes in Profile 3 reported the highest level of overcommitment to sport while
332 simultaneously enjoying personal development as an athlete at the highest level. This
333 suggests that working hard with a goal to achieve high levels of performance and success was
334 very important to athletes in Profile 3. Such thought and behavioral patterns can amplify risk
335 of eating disorders, as it is known that commitment to excellence is among predisposing
336 factors for eating disorders (Bratland-Sanda & Sundgot-Borgen, 2013).

337 Our results also suggest that athlete mental well- and ill-being is associated with
338 gender, age, and sport participation status (active vs. retired). Good mental well-being profile
339 (Profile 1) was more common for men than women, and the Profile 3 consisted mostly of
340 young (< 19) women (with one man as an exception). This is consistent with previous
341 research, in that female athletes have been found to score higher in mental ill-being than male
342 athletes (e.g., Junge & Feddermann-Demont, 2016; Schaal et al., 2011). It is also known that
343 young female athletes present with more eating problems than young male athletes (Bratland-
344 Sanda & Sundgot-Borgen, 2013; Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004). It is
345 important to note that those working with elite female athletes should be aware of how
346 several factors can contribute to the development of an eating disorder. Some of these factors
347 include involvement in sports where leanness and meeting a specific weight is important

348 (Sundgot-Borgen, 1993), early sport specialization, dieting, and perceived early puberty onset
349 in relation to optimal performance (Sundgot-Borgen, 1994).

350 Although the relationship between age and mental well- and ill-being has not been
351 frequently studied (Poucher et al., 2021), Schaal et al. (2011) found that prevalence of mental
352 ill-being among older (>21) athletes was lower than among younger (< 17) athletes. This may
353 suggest that as athletes age, they also gain more experience, which may help in the
354 development of effective ways of coping with sport-related demands, thus resulting better
355 stress management and stress recovery. This is further supported by our research, as Profile 1
356 included a greater share of older athletes, whereas Profile 4 included a greater share of
357 younger athletes.

358 Our results also demonstrated a relationship between sport participation status (active
359 vs. retired) and athlete mental well- and ill-being. Given the prevalence of retired athletes in
360 Profile 1, it is possible that these athletes have had a healthy transition out of elite sport,
361 resulting in good mental well-being. If so, these findings are promising, as it is known that
362 transitioning out of elite sport can be challenging for athlete mental well-being (Bruner et al.,
363 2008; Esopenko et al., 2017), particularly due to loss of social support networks (Park et al.,
364 2013), and loss of athletic identity (Martin et al., 2014; Menke & Germany, 2019).
365 Nevertheless, it is also possible that the retired athletes in our sample did not have a healthy
366 transition out of sport, but during post-retirement they have had time to process their
367 retirement experience and therefore feel mentally well. Our results also support the findings
368 from a recent meta-analysis (Gouttebauge et al., 2019) in that the prevalence of mental ill-
369 being (e.g., anxiety, depression) is higher among active than retired athletes. This was
370 supported in our research, as Profile 1 (with higher number of retired athletes) with good
371 mental well-being also reported less mental ill-being than athletes in the other three profiles,
372 with a higher percentage of active athletes. More specifically, active athletes were

373 particularly overrepresented in Profile 2. While alcohol use can negatively impact
374 performance and recovery, these results may be a reflection of active elite athletes being
375 exposed to both generic demands and stressors (e.g., adverse life events) and sport-specific
376 demands and stressors (Arnold & Fletcher, 2012). To cope with such demands and stressors,
377 elite athletes may result in using alcohol as a means of relieving stress, or to cope with pain,
378 and/or negative emotions (Reardon et al, 2019).

379 The current findings can be of benefit to athletes and those working in elite sport in
380 multiple ways. First, identifying baseline mental well-and ill-being, as well as presence of
381 sport-related demands and resources is paramount, to which regular subsequent re-
382 assessments can be equated. Such process can identify individual athletes at risk of mental ill-
383 being, by identifying symptoms of mental health problems, highlighting the absence of signs
384 of mental well-being, and possible imbalances between existing sport-related demands and
385 resources. Based on our findings, in addition to symptoms of depression and anxiety, early
386 screening for and identifying signs of possible eating disorders among young female athletes,
387 and the potential risk of alcohol abuse (even mild) among active athletes deserves attention.
388 Second, our results also highlight the importance of ensuring active athletes have access to a
389 team of professionals specialized in mental health, alcohol abuse, and eating disorders.
390 Having such services regularly available to athletes, along with regular mental well- and ill-
391 being assessment will enable early detection of signs of impaired mental well-being, as well
392 as early referral to appropriate evidence-based intervention with a qualified professional.

393 Our results also highlight the significant role unidimensional athletic identity (i.e., the
394 extent to which a person identifies with the athlete role), plays in elite athlete mental well-
395 and ill-being. This was particularly prominent with athletes in Profile 3 and was apparent
396 factor contributing to the ways in which athletes perceived their sport-related demands and
397 resources. Athletes, coaches, and healthcare professionals working with athletes should be

398 aware of how athletic identity is reinforced within an elite sporting environment. Existing
399 research has highlighted that strong unidimensional athletic identity can have a negative
400 effect on active athletes' mental well-being (Doherty et al., 2016) as well as expose athletes
401 to adjustment difficulties both during and post athletic retirement (Kuettel & Larsen, 2020).
402 Ensuring a sporting environment that fosters the development of a multidimensional identity
403 and commitment to several roles (e.g., athlete, student, child, or a spouse) is paramount and
404 responsibility of both the athlete, their immediate sporting environment, and its social agents.

405 Our results are also of specific benefit to athletic coaches. According to Bissett et al.
406 (2020), athletic coaches are in a key position to foster positive psychosocial development and
407 mental well-being among athletes in three main ways: (a) by cultivating team environment
408 that supports athlete mental health, (b) by normalizing mental health related care-seeking
409 behaviors, and (c) by supporting athletes receiving mental health services. Moreover, athletic
410 coaches can help athletes to shift focus from uncontrollable performance outcomes to more
411 controllable process and performance improvement-related effort and standards, as such an
412 approach has been found to mitigate performance related stressors and optimize sport
413 participation (Reardon et al., 2019). This is particularly important for young elite athletes,
414 who tend to focus on performance outcomes, are vulnerable to internalize problematic
415 athletic identity from early sport experiences, and whose identity development is still in
416 progress (Carless & Douglas, 2013).

417 In addition to athletic coaches, our findings also have implications to sport healthcare
418 professionals such as physiotherapists, sport and performance psychologists, and sport
419 administrators, to name a few. Each play a role in enhancing athlete performance, including
420 the creation and implementation of strategies (and policies) aimed to help athletes balance
421 sport-related demands and resources. Given our results, it is imperative that sport healthcare
422 professionals, and sport administrators understand the role sport-related demands and

423 resources play in athlete mental well- and ill-being, particularly as it relates to their role in
424 creating a sporting environment that helps minimize sport-related demands and provide
425 access to appropriate resources. Such environment should also include considerations for pre-
426 retirement planning and post-retirement support, as it has been found that athletes who have a
427 pre-retirement plan in place prior to transitioning out of sport, are more likely to experience a
428 healthy career transition, and thus exhibit better mental well-being post-retirement (e.g.,
429 Arvinen-Barrow et al., 2015; Arvinen-Barrow et al., 2019).

430 Despite the significant contributions our study is not without limitations. Due to our
431 cross-sectional design, we are unable to draw conclusions implying causality. Our theoretical
432 framework was grounded on the assumption that both risk (demands) and protective
433 (resources) factors have a unidirectional relationship with athlete mental well- and ill-being,
434 which, then, in turn interact in a bidirectional manner. It is, however, possible that mental ill-
435 being, due to depleted personal resources, play a role in how an athlete perceives their sport-
436 related demands and resources, thus suggesting that the reverse relationships are possible.

437 As our data was collected with the help of representatives from several Finnish sport
438 organizations, we are unable to calculate response rate, or to know which athletes decided not
439 to participate in the study. Thus, we do not know how representative the sample was, for
440 example, in terms of mental well- and ill-being. As our sample included elite athletes from
441 multiple sports, this can be considered an advantage in terms of generalizability of the
442 findings. However, due to likely producing heterogeneity in the results, our sample can also
443 be considered a limitation for generalizability of the results. In addition, since we focused
444 only on elite athletes, our sample size limits our ability to identify potential sport-type
445 differences in athlete mental well- and ill-being.

446 Future research should consider conducting more person-oriented research on athlete
447 mental well- and ill-being. The main emphasis in person-oriented research is on the search

448 for robust emerging typical profiles (in our study athlete mental well- and ill-being profiles)
449 and their meaningful connections, such as sport-related demands and resources (Bergman &
450 Lundh, 2015). Future research could either replicate our research or extend it to focus on
451 creating athlete mental well- and ill-being profiles over time, thus allowing the identification
452 of possible changes/similarities in mental well- and ill-being indicators and sport-related
453 demands and resources. Creating longitudinal research designs by including multiple time
454 points for profile creation would provide a deeper understanding of how mental well- and ill-
455 being develops over time at an intra-individual level.

456 Our research also included only selected sport-related demands and resources. We
457 focused on sport-specific demands and resources, leaving out, for example, personal risk
458 factors and resources (e.g., coping skills and perceptions of competence). To gain a more
459 comprehensive understanding of athlete mental well- and ill-being, future research should
460 consider examining a wider range of demands and resources. Future research should also
461 focus on the development of comprehensive, valid, and reliable screening instruments that are
462 both user-friendly (i.e., not too long) and specific to elite athlete population (see Gouttebauge
463 et al., 2020). Such screening instruments should also include valid and reliable measures of
464 clinical mental health symptoms and disorders, rather than rely solely on self-reported
465 symptoms, like we did, which is a limitation of the present study. In addition, data gained
466 from the screening instruments could be triangulated with an interview conducted by a
467 clinical mental health professional appropriately trained to work with athletes.

468 Despite the above limitations, our study adds to the existing literature in number of
469 ways. By aligning our research with WHO's definition of mental well-being and adopting a
470 person-oriented approach in understanding athlete mental well- and ill-being, our research
471 has highlighted four distinct profiles of mental well- and ill-being among elite athletes. The
472 emergent mental well- and ill-being intricacies would have been missed had we used a

473 variable-oriented approach, which by default explores different mental well- and ill-being
474 indicators in isolation. Our study adds to existing elite athlete mental health literature, with its
475 ability to gain greater insight into the complexity of athlete mental well-being. More
476 specifically, our research demonstrates how different mental well- and ill-being indicators
477 form identifiable mental well- and ill-being profiles, and how selected sport-related demands
478 and resources differentiate these emergent profiles.

479 **References**

- 480 Aalto, A-M., Elovainio, M. Kivimäki, M., Uutela, A., & Pirkola S. (2012). The Beck
481 Depression Inventory and General Health Questionnaire as measures of depression in
482 the general population: A validation study with the Composite International
483 Diagnostic Interview as the gold standard. *Psychiatry Research*, 97(1-2), 163-171.
484 <https://doi.org/10.1016/j.psychres.2011.09.008>
- 485 Arvinen-Barrow, M., DeGrave, K., Pack, S., & Hemmings, B. (2019). Transitioning out of
486 professional sport: The psychosocial impact of career-ending non-musculoskeletal
487 injuries among male cricketers from England and Wales. *Journal of Clinical Sport*
488 *Psychology*, 13(4), 629-644. <https://doi.org/10.1123/jcsp.2017-0040>
- 489 Arvinen-Barrow, M., Nässi, A., & Ruiz, M. C. (2015). Kun vamma päättää, milloin ura
490 loppuu. [When injury determines when the career ends]. *Liikunta & Tiede*, 52(6), 45-
491 49.
- 492 Arnold, R., & Fletcher, D. (2012). A research synthesis and taxonomic classification of the
493 organizational stressors encountered by sport performers. *Journal of Sport Exercise*
494 *Psychology*, 34(3), 397-429. <https://doi.org/10.1123/jsep.34.3.397>
- 495 Bakker, A. B., & Demerouti, E. (2017). Job Demands–Resources Theory: Taking stock and
496 looking forward. *Journal of Occupational Health Psychology*, 22(3), 273-285.
497 <http://dx.doi.org/10.1037/ocp0000056>

- 498 Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *Audit. The*
499 *Alcohol Use Disorders Identification Test*. (2nd. Ed.). The World Health
500 Organization. https://WHO_MSD_MSB_01.6a.pdf
- 501 Beck, A. (1972). *Depression: Causes and treatment*. University of Pennsylvania Press.
- 502 Beck, A., T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory of measuring
503 clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical*
504 *Psychology, 56*(6), 893-897. <https://psycnet.apa.org/doi/10.1037/0022-006X.56.6.893>
- 505 Benassi, M., Garofalo, S., Ambrosini, F., Sant'Angelo, R. P., Raggini, R., De Paoli, G.,
506 Ravani, C., Giovagnoli, S., Orsoni, M., & Piraccini, G. (2020). Using two-step cluster
507 analysis and latent class cluster analysis to classify the cognitive heterogeneity of
508 cross-diagnostic psychiatric in-patients. *Frontiers in Psychology, 11*, Article 1085.
509 <https://doi.org/10.3389/fpsyg.2020.01085>
- 510 Bergman, L. R., & Lundh, L-G. (2015). Introduction: The person-oriented approach: Roots
511 and roads to the future. *Journal for Person-Oriented Research, 1*(1-2), 1–6.
512 <https://doi.org/10.17505/jpor.2015.01>
- 513 Bissett, J. E., Kroshus, E., & Hebard, S. (2020). Determining the role of sport coaches in
514 promoting athlete mental health: A narrative review and Delphi approach. *BMJ Open*
515 *Sport & Exercise Medicine, 6*, Article e000676.
516 <http://dx.doi.org/10.1136/bmjsem-2019-000676>
- 517 Bratland-Sanda, S., & Sundgot-Borgen, J. (2013). Eating disorders in athletes: Overview of
518 prevalence, risk factors and recommendations for prevention and treatment. *European*
519 *Journal of Sport Science, 13*(5), 499-508.
520 <http://dx.doi.org/10.1080/17461391.2012.740504>
- 521 Bruner, M. W., Munroe-Chandler, K. J., & Spink, K. S. (2008). Entry into elite sport: a
522 preliminary investigation into the transition experiences of rookie athletes. *Journal of*

- 523 *Applied Sport Psychology*, 20(2), 236-252.
524 <https://doi.org/10.1080/10413200701867745>
- 525 Carless, D., & Douglas, K. (2013). "In the boat" but "selling myself short": Stories,
526 narratives, and identity development in sport. *Sport Psychologist*, 27(1), 27-39.
527 <https://doi.org/101123/tsp.27.1.27>
- 528 Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, 95(3), 542-575.
529 <https://psycnet.apa.org/doi/10.1037/0033-2909.95.3.542>
- 530 Doherty, S., Hannigan, B., & Campbell, M. J. (2016). The experience of depression during
531 the careers of elite male athletes. *Frontiers in Psychology*, 7, Article 1069.
532 <https://doi.org/10.3389/fpsyg.2016.01069>
- 533 Esopenko, C., Chow, T. W., Tartaglia, M. C., Bacopulos, A., Kumar, P., Binns, M. A.,
534 Kennedy, J. L., Muller, D. J., & Levine, B. (2017). Cognitive and psychosocial
535 function in retired professional hockey players. *Journal of Neurology, Neurosurgery*
536 *and Psychiatry*, 88(6), 512-528. <https://doi.org/10.1136/jnnp-2016-315260>
- 537 Fletcher, D., & Wagstaff, C. R. (2009). Organizational psychology in elite sport: Its
538 emergence, application and future. *Psychology of Sport and Exercise*, 10(4), 427-434.
539 <https://doi.org/10.1016/j.psychsport.2009.03.009>
- 540 Gelbard, R., Goldman, O., & Spiegler, I. (2007). Investigating diversity of clustering
541 methods: An empirical comparison. *Data and Knowledge Engineering*, 63(1), 155-
542 166. <https://doi.org/10.1016/j.datak.2007.01.002>
- 543 Gouttebauge, V., Bindra, A., Blauwet, C., Campriani, N., Currie, A., Engebretzen, L.,
544 Hainline, B., Kroshus, E., McDuff, D., Mountjoy, M., Purcell, R., Putukian, M.,
545 Reardon, C. L., Rice, S. M., & Budgett, S. (2020). International Olympic Committee
546 (IOC) Sport Mental Health Recognition Tool 1 (SMHAT-1) and Sport Mental Health
547 Recognition Tool 1 (SMHRT-1): towards better support of athletes' mental health.

- 548 *British Journal of Sports Medicine*, 55(1), 30-37. <http://dx.doi.org/10.1136/bjsports->
549 2020-102411
- 550 Gouttebauge, V., Castaldelli-Maia, J. M., Gorczynski, P., Hainline, B., Hitchcock, M. E.,
551 Kerkhoffs, G. M., Rice, S. M., & Reardon, C. L. (2019). Occurrence of mental health
552 symptoms and disorders in current and former elite athletes: A systematic review and
553 meta-analysis. *British Journal of Sports Medicine*, 53(11), 700-707.
554 <https://doi.org/10.1136/bjsports-2019-100671>
- 555 Hautala, L., Liuksila, P. R., Räihä, H., Väänänen, A. M., Jalava, A., Väinälä, A., & Saarijärvi,
556 S. (2005). Häiriintynyt syömiskäyttäytyminen ja sen varhainen toteaminen
557 kouluterveydenhuollossa. [Disrupted eating behaviors and early detection in school
558 healthcare]. *Suomen Lääkärilehti*, 60(45), 4599-4605.
- 559 Hughes, L., & Leavey, G. (2012). Setting the bar: Athletes and vulnerability to mental illness.
560 *The British Journal of Psychiatry*, 200(2), 95-96.
561 <http://dx.doi.org/10.1192/bjp.bp.111.095976>
- 562 Junge, A., & Feddermann-Demont, N. (2016). Prevalence of depression and anxiety in top-
563 level male and female football players. *BMJ Open Sport and Exercise Medicine*, 2,
564 Article e000087. <http://dx.doi.org/10.1136/bmjsem-2015-000087>
- 565 Kaski, S. (2013). *Urheiluvalmentajien työhyvinvointi Suomessa*. [Occupational well-being of
566 sport coaches in Finland]. Acta Universitatis Tamperensis 1888. [Doctoral
567 dissertation, University of Tampere], University Press. <http://urn.fi/URN:ISBN:978->
568 951-44-9309-6
- 569 Kent, P., Jensen, R. K., & Kongsted, A. (2014). A comparison of three clustering methods for
570 finding subgroups in MRI, SMS or clinical data: SPSS Two Step Cluster analysis,
571 Latent Gold and SNOB. *BMC Medical Research Methodology*, 14, Article 113.
572 <https://doi.org/10.1186/1471-2288-14-113>

- 573 Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the
574 complete state model of health. *Journal of Consulting and Clinical Psychology, 73*(3),
575 539-548. <https://doi.org/10.1037/0022-006X.73.3.539>
- 576 Keyes, C. L. M., Shmotkin, D., & Ryff, C. D. (2002). Optimizing well-being: The empirical
577 encounter of two traditions. *Journal of Personality and Social Psychology, 82*(6),
578 1007-1022. <https://doi.org/10.1037/0022-3514.82.6.1007>
- 579 Kokko, K., & Feldt, T. (2018). Longitudinal profiles of mental well-being as correlates of
580 successful aging in middle age. *International Journal of Behavioral Development,*
581 *42*(5), 485-495. <https://doi.org/10.1177/0165025417739177>
- 582 Kuettel, A., & Larsen, C. H. (2020). Risk and protective factors for mental health in elite
583 athletes: A scoping review. *International Review of Sport and Exercise Psychology,*
584 *13*(1), 231-265. <https://doi.org/10.1080/1750984X.2019.1689574>
- 585 Lundqvist, C. (2011). Well-being in competitive sports - the feel-good factor? A review of
586 conceptual considerations of well-being. *International Review of Sport and Exercise*
587 *Psychology, 4*(2), 109-127. <http://dx.doi.org/10.1080/1750984X.2011.584067>
- 588 Martin, L. A., Fogarty, G. J., & Albion, M. J. (2014). Changes in athletic identity and life
589 satisfaction of elite athletes as a function of retirement status. *Journal of Applied*
590 *Sport Psychology, 26*(1), 96-110. <https://doi.org/10.1080/10413200.2013.798371>
- 591 Menke, D. J., & Germany, M. L. (2019). Reconstructing athletic identity: College athletes
592 and sport retirement. *Journal of Loss and Trauma, 24*(1), 17-30.
593 <https://doi.org/10.1080/15325024.2018.1522475>
- 594 Morgan, J. F., Reid, F., & Lacey, J. H. (2000). The SCOFF questionnaire: A new screening
595 tool for eating disorders. *Western Journal of Medicine, 172*(3), 164-165.
596 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1070794>

- 597 Nixdorf, I., Frank, R., & Beckmann, J. (2016). Comparison of athletes' proneness to
598 depressive symptoms in individual and team sports: Research on psychological
599 mediators in junior elite athletes. *Frontiers in Psychology, 7*, Article 893.
600 <https://doi.org/10.3389/fpsyg.2016.00893>
- 601 Noblet, A., Rodwell, J., & McWilliams, J. (2003). Predictors of the strain experienced by
602 professional Australian footballers. *Journal of Applied Sport Psychology, 15*(2), 184-
603 193. <https://doi.org/10.1080/10413200305394>
- 604 Park, S., Lavallee, D., & Tod, D. (2013). Athletes' career transition out of sport: A systematic
605 review. *International Review of Sport and Exercise Psychology, 6*(1), 22-53.
606 <https://doi.org/10.1080/1750984X.2012.687053>
- 607 Poucher, Z. A., Tamminen, K. A., Kerr, G., & Cairney, J. (2021). A commentary on mental
608 health research in elite sport. *Journal of Applied Sport Psychology, 33*(1), 60-82.
609 <https://doi.org/10.1080/10413200.2019.1668496>
- 610 Prinz B., Dvořák, J., & Junge, A. (2016). Symptoms and risk factors of depression during and
611 after the football career of elite female players. *BMJ Open Sport and Exercise*
612 *Medicine, 2*, Article e000124. <https://dx.doi.org/10.1136%2Fbmjsem-2016-000124>
- 613 Reardon, C. L., Hainline, B., Aron, C. M., Baron, D., Baum, A. L., Bindra, A., Budgett, R.,
614 Campriani, N., Castaldelli-Maia, J. M., Currie, A., Derevensky, J. L., Glick, I. D.,
615 Gorczynski, P., Gouttebauge, V., Grandner, M. A., Han, D. H., McDuff, D.,
616 Mountjoy, M., Polat, A., ... Engebretsen, L. (2019). Mental health in elite athletes:
617 International Olympic Committee consensus statement (2019). *British Journal of*
618 *Sports Medicine, 53*(11), 667-699. <https://doi.org/10.1136/bjsports-2019-100715>
- 619 Reardon, C. L. (2017). Psychiatric comorbidities in sports. *Neurologic Clinics, 35*(11), 537-
620 46. <https://doi.org/10.1016/j.ncl.2017.03.007>

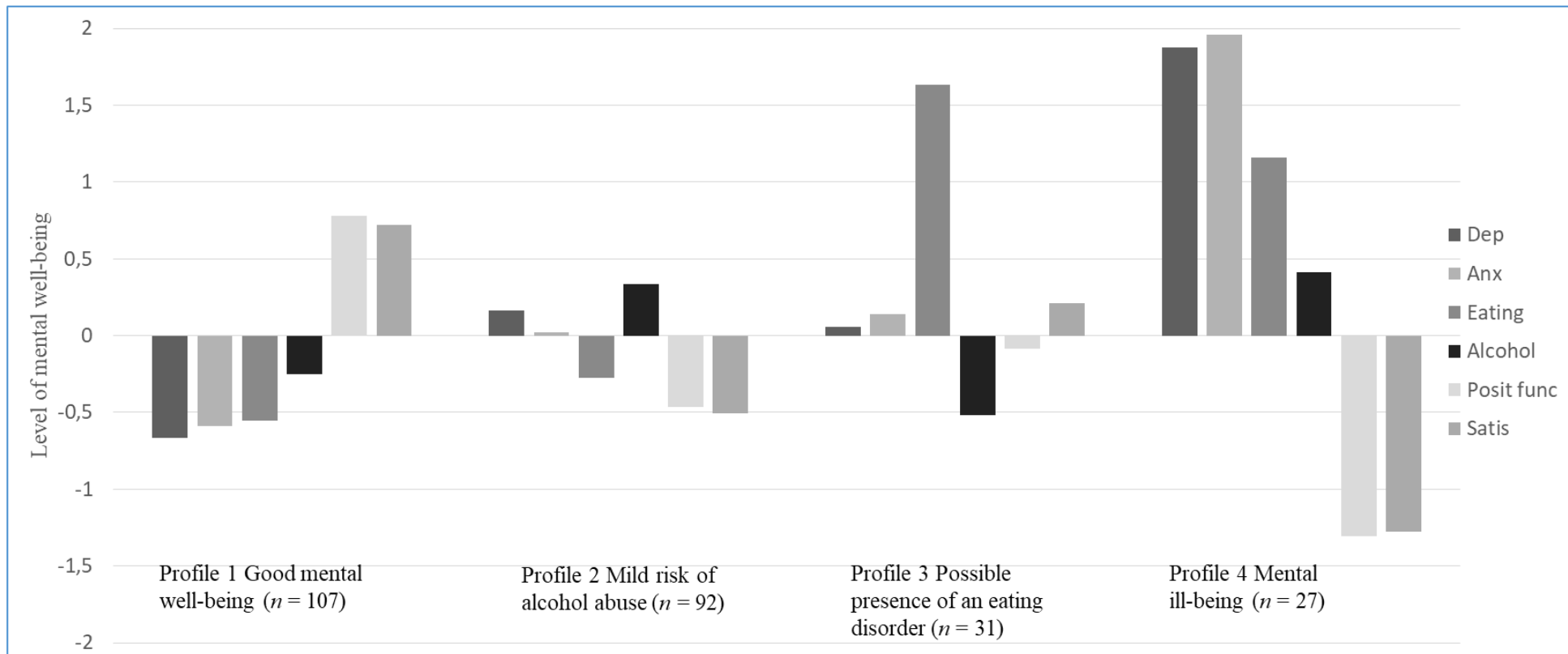
- 621 Reinboth, M., & Duda, J. L. (2006). Perceived motivational climate, need satisfaction and
622 indices of well-being in team sports: A longitudinal perspective. *Psychology of Sport
623 and Exercise*, 7(3), 269-286. <http://dx.doi.org/10.1016/j.psychsport.2005.06.002>
- 624 Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016).
625 The mental health of elite athletes: A narrative systematic review. *Sports Medicine*,
626 46(9), 1333-1353. <https://doi.org/10.1007/s40279-016-0492-2>
- 627 Ryff, C. D. (1989). Happiness is everything or is it? Explorations on the meaning of
628 psychological well-being. *Journal of Personality and Social Psychology*, 57(6), 1069-
629 1081. <https://psycnet.apa.org/doi/10.1037/0022-3514.57.6.1069>
- 630 Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited.
631 *Journal of Personality and Social Psychology*, 69(4), 719-727.
632 <https://psycnet.apa.org/doi/10.1037/0022-3514.69.4.719>
- 633 Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993).
634 Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO
635 collaborative project on early detection of persons with harmful alcohol consumption.
636 II. *Addiction*, 88(6), 791-804. <https://doi.org/10.1111/j.1360-0443.1993.tb02093.x>
- 637 Schaal, K., Tafflet, M., Nassif, H., Thibault, V., Pichard, C., Alcotte, M., Guillet, T., El
638 Helou, N., Berthelot, G., Simon, S., & Toussaint, J-F. (2011). Psychological balance
639 in high level athletes: Gender-based differences and sport-specific patterns. *PLoS
640 One*, 6(5), Article e19007. <https://doi.org/10.1371/journal.pone.0019007>
- 641 Souter, G., Lewis, R., & Serrant, L. (2018). Men, mental health and elite sport: A narrative
642 review. *Sports Medicine – Open*, 4, Article 57. [https://doi.org/10.1186/s40798-018-
643 0175-7](https://doi.org/10.1186/s40798-018-0175-7)

- 644 Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes.
645 *International Journal of Sport Nutrition*, 3(1), 29-40.
646 <https://doi.org/10.1123/ijns.3.1.29>
- 647 Sundgot-Borgen, J. (1994). Risk and trigger factors for the development of eating disorders in
648 female elite athletes. *Medicine and Science in Sport and Exercise*, 26(4), 414-419.
649 <https://psycnet.apa.org/doi/10.1249/00005768-199404000-00003>
- 650 Sundgot-Borgen, J., & Torstveit, M. (2004). Prevalence of eating disorders in elite athletes is
651 higher than in the general population. *Clinical Journal of Sport Medicine*, 14(1), 25-
652 32. <http://dx.doi.org/10.1097/00042752-200401000-00005>
- 653 Terveys [Health]. (2011). *Tutkimus suomalaisten terveydestä ja toimintakyvystä. Kysely*. [A
654 study on health and functional capacity among Finnish people. Questionnaire.]
655 Retrieved from
656 https://thl.fi/documents/10531/2797097/T4002_kysely1_aikuiset.pdf/3f03c39e-74bb-47e6-b334-b676b0e259d9
- 658 Wang, M., Sinclair, R., Zhou, L., & Sears, L. (2013). Person-centered analysis. Methods,
659 applications, and implications for occupational health psychology. In L. Tetric, M.
660 Wang, & R. Sinclair (Eds.), *Research methods in occupational health psychology: Measurement, design, and data analysis* (pp. 249-373). Routledge.
661 <https://doi.org/10.4324/9780203095249-30>
- 663 Wolanin, A., Gross, M., & Hong, E. (2015). Depression in athletes. Prevalence and risk
664 factors. *Current Sports Medicine Reports*, 14(1), 56-60.
665 <https://doi.org/10.1249/JSR.0000000000000123>
- 666 World Health Organization (2014). *Mental health: A state of well-being*. Retrieved from
667 http://www.who.int/features/factfiles/mental_health/en/

PROFILES OF MENTAL WELL- AND ILL-BEING

Figure 1

Profiles of Mental Well- and Ill-being among Finnish Elite Athletes



Note. Dep = Depression symptoms, Anx = Anxiety symptoms, Eating = Possible presence of an eating disorder, Alcohol = Risk for alcohol abuse, Posit func = Positive functioning, Satis = Life satisfaction

Table 1

Means, Standard Deviations, Reliabilities (on the Diagonal) and Person Correlations of the Study Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1 Depression	6.58	6.52	.88										
2 Anxiety	7.29	7.86	.71**	.89									
3 Possible prevalence of an eating disorder	0.61	0.93	.50**	.41**	.52								
4 Risk of alcohol abuse	4.66	3.52	.17*	.18**	-.05	.68							
5 Life satisfaction	5.03	0.57	-.66**	-.46**	-.33**	-.18**	.72						
6 Positive functioning	3.20	0.37	-.68**	-.47**	-.38**	-.18**	.65**	.74					
7 Sport success-related pressures	3.73	0.92	.35**	.26**	.28**	.13*	-.26**	-.33**	.79				
8 Overcommitment to sport	3.06	0.92	.25**	.23**	.31**	-.00	-.18**	-.33**	.39**	.76			
9 Sport-related worries	3.01	1.00	.37**	.28**	.28**	.09	-.35**	-.43**	.38**	.20**	.63		
10 Personal development	4.55	0.49	-.09	-.05	.04	-.10	.14*	.17**	.22**	.32**	.05	.67	
11 Satisfaction with coaching	4.00	0.72	-.23**	-.17**	-.15*	-.10	.24**	.30**	-.12	-.01	-.19**	.28**	.67

** $p < .01$, * $p < .05$

PROFILES OF MENTAL WELL- AND ILL-BEING

Table 2

Differences in Background Factors between Identified Four Profiles of Mental Well- and Ill-Being

Variable	(1) Good mental well- being (n = 107)	(2) Mild risk of alcohol abuse (n = 92)	(3) Possible presence of an eating disorder (n = 31)	(4) Mental ill-being (n = 27)	χ^2 (df)
% of women	56.1 ^b	58.7	96.8 ^a	81.5	20.29 (3)***
% of active athletes	55.1 ^b	73.9 ^a	74.2	68.9	9.17 (3)*
Age (years)					36.32 (15)**
< 19	9.3	12.0	32.3 ^a	10.3	
19–24	20.6 ^b	34.8	35.5	55.2 ^a	
25–34	9.6	23.9	19.4	17.2	
35–44	15.9	14.1	3.2 ^b	17.2	
45–54	14.0 ^a	7.6	9.7	-	
> 55	10.3	6.5	-	-	

Note. ^a Typical (adjusted residual > 1.96), ^b Atypical (adjusted residual < -1.96).

PROFILES OF MENTAL WELL- AND ILL-BEING

Table 3

Differences in Sport-Related Demands and Resources between Identified Four Profiles of Mental Well- and Ill-Being

Variable	(1) Good mental well-being (<i>n</i> = 107)		(2) Mild risk of alcohol abuse (<i>n</i> = 92)		(3) Possible presence of an eating disorder (<i>n</i> = 31)		(4) Mental ill-being (<i>n</i> = 27)				Pairwise comparisons ²
Demands	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> ¹ (<i>df</i>)	<i>p</i>	<i>p</i> < .05
Sport success-related pressures	3.34	0.98	3.89	0.78	4.13	0.79	4.28	0.63	15.11 (3, 86.76)	< .001	1 < 2, 3, 4; 2 < 4
Overcommitment to sport	2.71	0.85	3.10	0.89	3.74	0.77	3.48	0.82	16.57 (3, 82.93)	< .001	1 < 2, 3, 4; 2 < 3
Sport-related worries	2.55	0.89	3.22	0.93	3.09	0.89	3.92	0.84	21.98 (3, 81.94)	< .001	1 < 2, 3, 4; 2, 3 < 4
Resources											
Personal development	4.58	0.47	4.49	0.56	4.74	0.39	4.47	0.39	3.20 (3, 87.04)	< .05	

Satisfaction with coaching	4.26	0.64	3.80	0.76	3.96	0.62	3.71	0.67	9.74 (3, 81.98)	< .001	1 > 2, 3, 4
----------------------------	------	------	------	------	------	------	------	------	-----------------	--------	-------------

*Note.*¹ Welch's *F*-test, ² Games-Howell post hoc-test