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

2   **Related Demands and Resources**

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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.

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41   **Keywords**: Elite athletes, mental well-being, mental health symptoms, mental ill-being,

42   sport-related demands, sport-related resources

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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., Gouttebarge 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; Readon, 2017),

63   poor coach-athlete and/or athlete-athlete relationships (Prinz et al., 2016), travel and

64   subsequent separation from family and friends (Rice at 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.

Method

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 at 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.

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.

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).

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.

Results

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.

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 (Gouttebarge 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 Gouttebarge

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.

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Figure 1

Profiles of Mental Well- and Ill-being among Finnish Elite Athletes
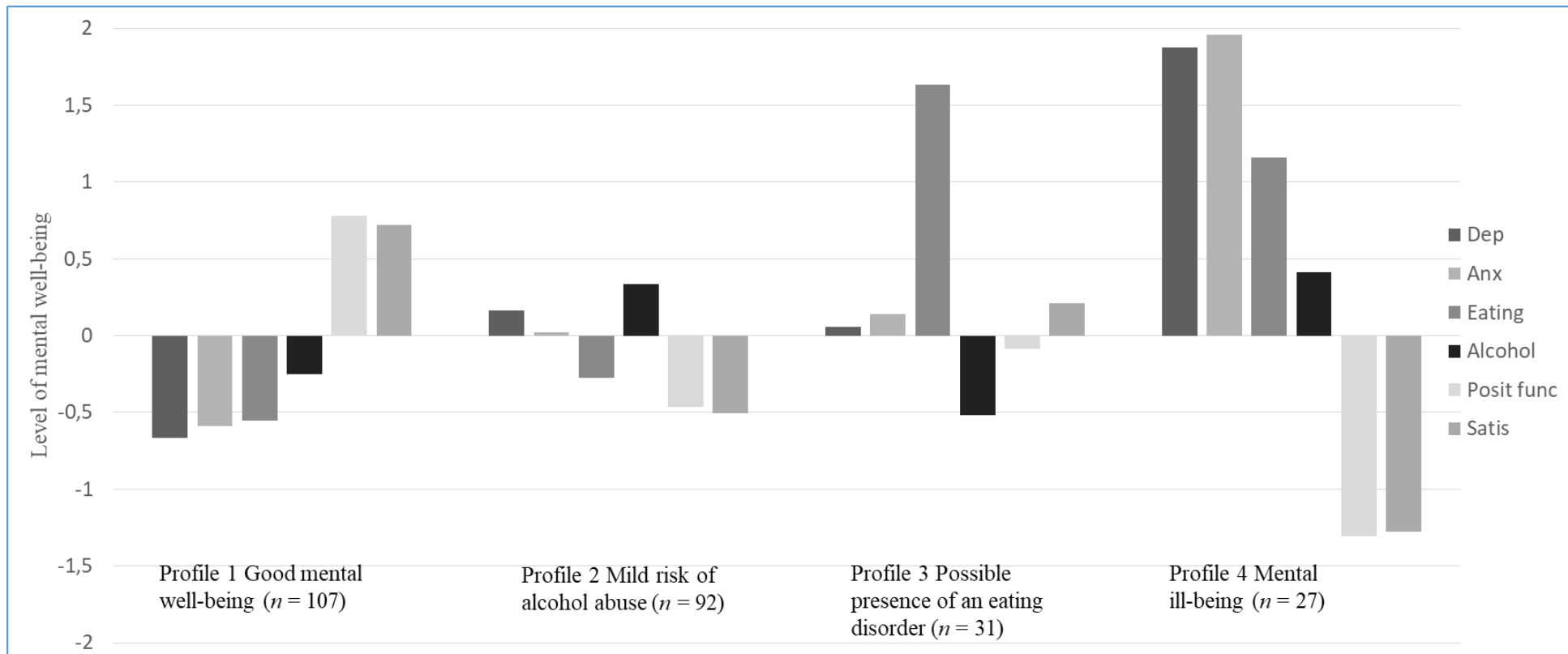
Note. Dep = Depression symptoms, Anx = Anxiety symptoms, Eating = Possible presence of an eating disorder, Alcohol = Risk for alcohol abuse, Posit func = Positive functioning, Satis = Life satisfaction

Table 1

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

Variable	*M*	*SD*	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

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).

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 (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)		F^1 (df)	p	Pairwise comparisons[2] p < .05
Demands	M	SD	M	SD	M	SD	M	SD			
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