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1 **TITLE**

2 **Understanding eating disorders in elite gymnastics: ethical and conceptual challenges**

3

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21

22 **KEY WORDS (MeSH terms)**

23 Gymnastics [I03.450.642.845.417]

24 Eating Disorders [F03.375]

25 Depressive Symptoms [F01.145.126.350]

26 Self Esteem [F01.752.747.792]

27 Female Athlete Triad Syndrome [F03.375.450]

28 Elite Performance

29

30 **ABSTRACT**

31 Eating disorders and disordered eating are more common in high performance sports than the  
32 general population, and particularly so in high performance aesthetic sports. This paper presents  
33 some of the conceptual difficulties in understanding and diagnosing eating disorders in high  
34 performance gymnasts. It presents qualitative and quantitative data from a study designed to  
35 ascertain the pattern of eating disorder symptoms, depressive symptoms and levels of self-esteem  
36 amongst national and international level gymnasts from the UK in the gymnastic disciplines of  
37 sport acrobatics, tumbling and rhythmic gymnastics.

38

39 **KEY POINTS**

- 40 • Symptoms of eating disorders are more prevalent in high performance gymnasts than the  
41 normal population
- 42 • The definition of eating disorders is problematic when applied to the high performance  
43 gymnastics environment
- 44 • The high levels of eating disordered attitudes and behaviours and depressive and anxiety  
45 symptoms should be of concern especially given the young age of this population

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49 acknowledge the assistance of British Gymnastics, and Steve Green in particular.

50

51 **Introduction**

52 Eating disorders are serious mental disorders characterised by an overvalued desire to lose weight  
53 and/or be thin or a fear of fatness, a distorted body image, and associated behaviours,<sup>1</sup> They tend  
54 to begin in adolescence and young adulthood, and can derail development and life courses.<sup>2,3</sup> The  
55 mortality of eating disorders is the highest of all mental disorders, with deaths occurring not only  
56 in the throes of severe disorder but even years afterwards, both due to suicide and the physical  
57 consequences of disordered eating and weight loss behaviours.<sup>4-6</sup>

58  
59 Of those who survive, much larger numbers suffer from psychiatric comorbidities and physical  
60 disabilities such as cardiac problems, gastrointestinal problems, osteoporosis, infertility and  
61 neurological deficits; some of these irreversible.<sup>7</sup> Treatments for eating disorders are often  
62 ineffective and a majority of sufferers either remain chronically unwell or suffer a relapsing and  
63 remitting course.<sup>2</sup> The best outcomes for eating disorders are seen when eating disorders are  
64 detected early in younger individuals and prompt treatment is provided to prevent them from  
65 becoming entrenched or chronic.<sup>8,9</sup> The cost of eating disorders to individuals, families and  
66 society in terms of suffering, loss of potential and treatment costs are immense.<sup>10</sup> The prevention,  
67 early identification and treatment of eating disorders are therefore of paramount importance.<sup>9-11</sup>

68  
69 It is well established that eating disorders have a higher prevalence in elite and high performance  
70 sport as compared to the normal population, with a particularly high prevalence in disciplines that  
71 emphasise leanness, low weight or (slim) aesthetics.<sup>12,13</sup> The term ‘Female Athlete Triad’ was  
72 coined to characterise a variant of eating disorders commonly found in female athletes, consisting  
73 of disordered eating, menstrual dysfunction and low bone mass.<sup>14,15</sup> Research has investigated the  
74 characteristics of eating disorders and the Female Athlete Triad among athletes, and also the  
75 effects of high levels of physical training on the growth and sexual development of girls and  
76 young women.<sup>14,16</sup>

77 Despite considerable scientific research, some conceptual issues in the context of eating disorders  
78 and elite sports remain largely unaddressed. Research studies largely assume that mental health  
79 criteria developed for the normal population can be applied to the high performance sports  
80 domain.<sup>12</sup> This assumption, however, that mental health criteria and concepts map well onto the  
81 particular and unusual context of high performance sports is problematic. In the process of  
82 conducting our empirical research it became clear that there are difficulties with operating the  
83 current definition of eating disorders in an elite sport environment, where some features common  
84 to eating disorders are normalised within that milieu.<sup>17</sup> Here we report upon a quantitative and  
85 qualitative study into disordered eating and eating disorders, in which a range of conceptual and  
86 ethical difficulties raised clear problems for research, diagnosis, and treatment.<sup>17</sup>

87

### 88 **Eating disorders; classification and diagnosis**

89 There are three main eating disorders – Anorexia Nervosa, Bulimia Nervosa and Binge Eating  
90 Disorder (BED).<sup>18</sup> BED is a recently recognised diagnosis in the newly released DSM-5 (the  
91 American Psychiatric Association’s Diagnostic Classification system and is mostly associated with  
92 obesity.<sup>18</sup> In addition to individuals who fulfil criteria for these specific eating disorders, there are  
93 larger numbers who are significantly eating disordered but do not fulfil criteria – these are  
94 variously classified as Eating Disorder Not Otherwise Specified (EDNOS) in the ICD-10 (which  
95 is the World Health Organisation’s Classification of Psychiatric Disorders),<sup>19,20</sup> or Other Specified  
96 Feeding or Eating Disorder (OSFED) and Unspecified Feeding or Eating Disorder (UFED) in the  
97 DSM-5.<sup>21</sup>

98

99 Eating disorders are generally characterised by disordered eating behaviours and distorted  
100 cognitions concerning food, weight and shape. In Anorexia Nervosa, there is a strong drive to be  
101 thin or lose weight with self-induced weight loss, which is associated with distorted body  
102 perception and self-image; in Bulimia Nervosa there are cycles of bingeing and purging which are  
103 associated with similar cognitive distortions. Text Boxes 1 and 2 provide the current ICD-10 and

104 DSM-5 Criteria for Anorexia Nervosa and Bulimia Nervosa respectively, and Text Box 3 provides  
105 a list of the other ICD-10 and DSM-5 eating disorders.

106 [Insert Text Boxes 1, 2 and 3 about here]

107

108 Eating disorders tend to emerge in adolescence and young adulthood – Anorexia Nervosa has a  
109 typical onset at 13-19 years, whilst Bulimia Nervosa has a slightly older typical age of onset.<sup>5</sup>

110 Females are at higher risk of developing eating disorders, although males can suffer from them as  
111 well.<sup>22</sup> Risk factors for eating disorders include a family history of eating disorders, parental

112 dieting or disordered eating behaviours, and personality traits of perfectionism and

113 obsessionality.<sup>23</sup> Some common triggers for the development of eating disorders are

114 dissatisfaction with body shape and weight for example as the body is changing in adolescence;

115 dieting behaviours; traumatic or illness experiences; and bullying.<sup>23</sup> It is well established that

116 context is important, and cultures and environments which place pressure on individuals to

117 conform to unrealistically thin body ideals place individuals at risk for eating disorders, with the

118 prevalence of eating disorders much higher amongst ballet dancers and models.<sup>24,25</sup>

119

120 There are physical and psychological developmental concerns associated with eating disorders in

121 children and adolescents. When individuals develop eating disorders during adolescence, many of

122 the developmental trajectories can be arrested or derailed as physical height, hormonal changes

123 and bone growth are affected by nutritional fluctuations and/or deficiencies; social isolation and a

124 narrowing of interests or growing co-morbid depression can affect academic and social

125 development at a time when exploration of the social environment, friendships and intellectual

126 capacities are usually increasing; and the young person's development of identity and self-image

127 can also be affected.<sup>10,26,27</sup>

128

129 It is important to note that there are continuing conceptual and definitional controversies in eating

130 disorders. The new DSM-5 classification published in 2014 loosened the criteria for both

131 Anorexia Nervosa and Bulimia Nervosa in order to enable more sufferers to be categorised as  
132 having these disorders.<sup>21</sup> The rationale behind this was that the majority of people suffering from  
133 disordered eating and eating disorders failed to meet criteria for these two disorders and were  
134 relegated to the ill-defined catch-all ‘atypical’ and ‘EDNOS’ categories, which is unhelpful as  
135 these ‘atypical’ categories are both poorly researched and undertreated.<sup>21</sup> A further difficulty is the  
136 shifting course of eating disorders within individuals – it has been shown that the majority of  
137 sufferers shift from one diagnosis to another in the course of their illness.<sup>28</sup> Proposals of a  
138 ‘transdiagnostic eating disorders’ categorisation have been made to reflect the fluctuating nature  
139 of many eating disorders.<sup>29</sup> In spite of this, distinct differences remain between Anorexia Nervosa  
140 and Bulimia Nervosa that are relevant to both conceptualisation, diagnosis and treatment.<sup>30,31</sup>

141  
142 Anorexia Nervosa is characterised by weight loss and is particularly distinctive because of its  
143 egosyntonic nature; that is, it is often experienced as part of the self or congruent with the person’s  
144 orientation and desires.<sup>32,33</sup> As a result, even when it is very severe and causing significant harm  
145 or debility, sufferers may deny they have an illness and claim their starvation is a matter of  
146 personal or lifestyle choice.<sup>34–36</sup> This is exemplified by the ‘Pro-Ana’ underground subculture  
147 which may glorify Anorexia Nervosa and individuals trade tips online about how to lose more  
148 weight and deceive health professionals, or the subversion of treatment efforts that can occur.<sup>36,37</sup>  
149 Even when in distress or suffering from diminishing function and increasing risk, sufferers can  
150 often be attached to their disorder or feel deep ambivalence to receiving treatment to the extent  
151 that compulsory treatment may be needed in order to save life.<sup>38,39</sup> Because of the opposing effects  
152 of bingeing and purging, Bulimia Nervosa sufferers may be low, normal or high in weight, and can  
153 more easily escape detection. The bingeing and purging behaviours adopted in Bulimia Nervosa  
154 can nevertheless lead to high risks of physical harm.<sup>7</sup>

155

156 **The high performance gymnastics environment**

157 Gymnasts aspiring to elite level typically enter and peak in the high performance arena at a young  
158 age. Specialisation and intensive training begins very early in life, and most competitive gymnasts  
159 retire before their mid-twenties.<sup>40</sup> The time window of peak performance often coincides with  
160 adolescence, and these adolescent athletes have to cope with both the demands of a high  
161 performance environment and the changes associated with physical and sexual growth and  
162 maturation.<sup>41</sup> It is important to understand how these changes are interpreted by gymnasts  
163 themselves. These normal developmental changes may be viewed in the gymnastics context as  
164 both undesirable and deleterious to performance, as illustrated by this female gymnast.

165  
166 *But I mean like when we get boobs and bums and hips and, it is, you kind of think “Well go away*  
167 *for a bit, come back when I’m older, I don’t need you now.”*

168  
169 Because of their relatively young age and the intensive nature of high performance training  
170 required, coaches have extensive contact with high performance gymnasts and become important  
171 in providing psychological support and structure to their athletic lives which spills over into  
172 everyday life. Most coaches are in effect acting in *loco parentis*. In the process of shaping their  
173 young protégés’ bodies and performance coaches develop strong bonds of trust and shape their  
174 attitudes and values, transmitting their own values and goals to the developing gymnasts.<sup>42</sup> The  
175 heteronomous nature of this relationship, and the high levels of external structure normal and  
176 necessary to the high performance environment are accentuated by the nature of the relationship,  
177 where the youth of many gymnasts means there is a dependence and clear asymmetry in power  
178 and experience, and the gymnast has to trust his or her coach implicitly to know the athlete’s  
179 limits and capabilities better than the gymnast himself or herself could.<sup>42</sup>

180  
181 There is a constant focus on optimising weight for performance in high performance gymnastics,  
182 consistent with any high performance sport; but in gymnastics (depending on discipline) there can  
183 be an additional element of the demands of aesthetic judging which idealises the slim physique



184 and the constant drive to optimise maximal power and performance for minimal weight.<sup>13,43</sup> There  
185 are clear differences between different gymnastics disciplines, in performance and aesthetics  
186 demands.<sup>44</sup> Tumbling requires small yet very powerful physiques, with less emphasis on slimness.  
187 Rhythmic gymnasts, are typically tall and slim with a uniformity of shape and size across the  
188 team. In sport acrobatic gymnasts work in teams, with specific roles. Bases have to be strong and  
189 powerful and are usually older while the ‘tops’ have to be small and light and are usually  
190 younger.<sup>44</sup> Some disciplines or competition formats require conformity and teamwork so  
191 relationships with and responsibilities to teammates become important.<sup>44</sup>

192

### 193 **The research study**

194 The aim of the overall study was to study the ethical issues involved in eating disorders, and the  
195 aim of the quantitative sub-study was to ascertain the pattern of eating disorder symptoms,  
196 symptoms of depression and levels of self-esteem amongst high performance British gymnasts  
197 aged 10 to 25 years. Our particular focus here will be upon the conceptual and ethical issues in  
198 diagnosing eating disorders that became apparent as the study progressed, that the physician  
199 should be aware of in order to support, diagnose and/or treat adolescent athletes in high level  
200 sports environments.

201

### 202 **METHOD**

203 In collaboration with British Gymnastics, coaches of selected high performance gymnastics clubs  
204 were invited to facilitate recruitment of the sample. This study was reviewed and approved by the  
205 Swansea University Research Ethics Committee. All participants (and their parents if under 18)  
206 were given invitation letters, information sheets and consent forms via their coaches, who also  
207 provided access for data collection at their regular training venue in confidential settings. All  
208 participants signed consent forms, with additional consent provided by parents of participants  
209 aged below 16 years. Each participant was given a set of four self-administered questionnaires and  
210 then interviewed individually. Participation in research was followed by a psycho-education

211 session for gymnasts (and separately with parents) about eating disorders. All high performance  
212 gymnasts aged 10 to 25 years old training were eligible to take part in this study. Fieldwork took  
213 place between November 2011 and March 2012 at four high performance clubs across Britain.

214  
215 Four questionnaires were used: the Eating Attitudes Test (EAT-26);<sup>45</sup> the Eating Disorder  
216 Examination Questionnaire Version (EDE-Q6);<sup>46</sup> the Beck Depression Inventory (BDI-II);<sup>47</sup> and  
217 the Rosenberg Self Esteem Scale.<sup>48</sup> The Eating Disorder Examination Questionnaire is a detailed  
218 questionnaire which provides detailed scores on four subscales (restraint, eating concern, weight  
219 concern and shape concern);<sup>46</sup> it has been shown to be an accurate screening tool for identifying  
220 likely cases of eating disorders in the community.<sup>49</sup> The Eating Attitudes Test is a briefer  
221 screening instrument that has been found to be useful in identifying athletes at risk of eating  
222 disorders.<sup>50</sup> The Rosenberg Self-Esteem Scale indicates whether there is significant low self-  
223 esteem.<sup>48</sup> The Beck Depression Inventory differentiates between symptoms of mild, moderate and  
224 severe depression.<sup>47</sup> The EDE-Q6, EAT-26, BDI, and Rosenberg Self-Esteem Scale are all  
225 validated for ages 12 and above.<sup>47,48,50-55</sup> The participants' self-reported dates of birth, height, and  
226 weight were also collected at the same time.

227

## 228 **RESULTS**

229 A total of 51 male (n=16) and female (n=35) high performance gymnasts from four clubs  
230 completed the questionnaire, from the disciplines of Tumbling (n=7), Acrobatics (n=28) and  
231 Rhythmic Gymnastics (n=16). 38 gymnasts were competing at international level and 13 at  
232 national level. Table 1 characterises the sample and questionnaire scores. Four of these  
233 participants were aged below 12 years and have been excluded from the analyses that follow as  
234 there are no norms for individuals below 12 years in the instruments used. The project also  
235 involved semi-structured interviews with gymnasts and support staff (n=42). These are only  
236 briefly reported upon here, a more detailed analysis of these findings is published elsewhere  
237 (Bloodworth, *et al.*, submitted). [Table 1 here]

238  
239 On the Rosenberg Self-Esteem Scale, five athletes (11%) had low self-esteem (<15 indicates low  
240 self-esteem). Nine athletes (18%) had scores above 25. On the Beck Depression Inventory, 26  
241 (55%) had scores indicating minimal or no depression (range 0-9); 19 (40%) had scores indicative  
242 of mild depression (range 10-18); 3 (6%) had scores suggestive of moderate levels of depression.  
243 On the EAT 26, 9 athletes (19%) had scores indicating a significant eating problem ( $\geq 20$ ). The  
244 EDE-Q6 showed far higher proportions above population norms: 67% of females 16+ years, 61%  
245 of females <16 years and 31% of males had mean EDE-Q6 global scores above population norms.

246  
247 Table 2 shows the bivariate correlations between all study variables for all gymnasts. Sex was  
248 associated with self-esteem and disordered eating behaviours and attitudes, with males reporting  
249 higher levels of self-esteem than females, and females indicating greater propensity for eating  
250 disorder symptoms, particularly in the EDE-Q6 Restraint, Weight Concern and Shape Concern  
251 subscales. International gymnasts generally reported greater restraint over eating than national  
252 gymnasts. Self-esteem was marginally negatively associated with shape concern. Higher levels of  
253 self-esteem were linked with fewer concerns about body shape. Depressive symptoms were  
254 positively associated with eating disorder symptoms. As expected, all of the eating disorder  
255 measures (EAT26 & EDE-Q6, along with all the subcomponents of the EDE-Q6) were highly  
256 correlated. [Table 2 here]

257  
258 The EDE-Q6 asks 3 questions concerning menstrual status, requiring free responses. The  
259 responses were converted into a variable ('Menstrual Status') that was subject to bivariate  
260 correlation analysis. Table 3 shows bivariate analysis for females only. Table 4 shows male  
261 gymnasts' data. In females, menstrual status is highly correlated with the EDE-Q6 Global,  
262 Restraint Subscale and Eating Concern Subscale scores, and significantly correlated with Shape  
263 Concern Subscale, Weight Concern Subscale and EAT-26 scores. Body Mass Index (BMI)  
264 centiles were not significantly correlated with either eating disorder symptom scores either for sex

265 or menstrual status. Additionally, a series of sequential multiple regression models were run to  
266 assess the unique effects of each of the key variables on the different eating disorder measures  
267 (Table 5). Specifically, the analyses examined whether sex, level of competition, age, self-esteem,  
268 and depressive symptoms independently predicted eating disorders. A separate analysis was  
269 performed for EAT-26, EDE-Q6 Global and each Sub-scale scores, and the proportion of variance  
270 is also reported. [Tables 3,4 and 5 here]

271  
272 The patterns of relationships were similar between male and female gymnasts. Self-esteem was  
273 independently associated with eating disorder symptoms (Restraint and Eating Concerns sub-  
274 scales) and marginally associated with EAT-26 and EDE-Q6 Global measures of eating disorders.  
275 An increase in self-esteem was linked to an increase in eating disorder symptoms. However, most  
276 of the participants had ‘good’ self-esteem and this effect may have been being driven by the  
277 minority who scored lowly for self-esteem. Depressive symptoms were independently associated  
278 with eating disorders, with greater levels of depressive symptoms as scored by the BDI linked  
279 with greater severity of symptoms of eating disorders. Each model explained a ‘good’ proportion  
280 of the variance in eating disorders.

281

## 282 **DISCUSSION**

283 The results of this study reflect a high prevalence of eating disordered behaviours and attitudes  
284 that are found amongst high performance gymnasts, when defined using standard mental health  
285 criteria.<sup>12</sup> Importantly, 31% male gymnasts also scored highly on the eating disorder scales, which  
286 suggests that male gymnasts must not be overlooked as potentially having disordered eating  
287 attitudes and behaviours. There were no reports of purging and Bulimia Nervosa did not appear to  
288 be a likely diagnosis in this particular group of gymnasts, which is consistent with the young age  
289 of the sample.

290

291 There are difficulties, however, in applying standard eating disorder criteria to this group of  
292 individuals. Traits such as perfectionism and obsessionality associated with success in an elite  
293 sport context have similarities with those found in eating disordered individuals.<sup>56-58</sup> In this  
294 context, the high performance gymnastics ‘job requirements’ are the demand for constant  
295 surveillance of dietary intake, frequent self monitoring of weight and shape (amplifying  
296 monitoring of weight and shape by coaches), high levels of concern about any weight gain and in  
297 particular concern about gaining fat, all of which would be considered ‘eating disordered’ in the  
298 mental health context. Here a female participant reflects upon a stringent and perhaps even  
299 disordered attitude toward food, but cites an ability to switch this off.

300  
301 • *‘I mean I didn’t eat a lot at all and what I did eat I constantly knew what I was eating for*  
302 *the right reasons. But I always felt like I was hungry, like if I felt like I wanted to eat, I knew I*  
303 *could just eat. Like the minute I finished I just went back into a regular eating plan straightaway.*  
304 *So it never kind of held me back’*

305  
306 The challenge here is discriminating between extreme attitudes and behaviours, that while  
307 seemingly disordered, are rationalised in the sporting context, and are reflected upon and endorsed  
308 by the athlete. (Bloodworth et al, submitted) As noted above, where individuals with Anorexia  
309 Nervosa experience the condition as a central aspect of their identity, and positively endorse this  
310 aspect, it becomes difficult to dissociate the apparently autonomously choosing person from the  
311 apparent disorder.<sup>59</sup> Furthermore, it will be not in the interests of the athlete to reveal their eating  
312 related concerns and issues to the coach for fear of de-selection, since health-related concerns may  
313 dictate removal from the squad on grounds of their duty of care to the athlete.<sup>60-62</sup>

314  
315 These concerns may be compounded in sports acrobatics where the gymnasts perform in teams, as  
316 interdependent units. Indeed, the attitudes of the gymnasts, particularly amongst females and the  
317 ‘tops’ (i.e. the performer at the apex of complex moves where they may be executing complex

318 skills on top of the shoulders of two or three other gymnasts) of both sexes of the acrobatics  
319 teams, were that the pre-pubertal slim figure was highly prized by the athlete and the team, and  
320 where otherwise “normal” growth in height and female sexual development in particular was  
321 viewed as problematic and challenging. A difficulty in the opposite direction presented itself when  
322 assessing the gymnasts’ (self-reported) weights and body mass indices. Because of the relatively  
323 high body mass indices of all the gymnasts, none of them satisfied the low weight criterion of  
324 Anorexia Nervosa. This data must be understood against a background of research which shows  
325 that bone density and lean body mass are higher in elite gymnasts than normal adolescents.<sup>63,64</sup>  
326 Our observational data was that some individuals were very clearly thin and pale, whom the  
327 coaches were clearly concerned about, and for whom the clinician researchers among the research  
328 team suspected that they were suffering from an eating disorder; yet none of these individuals had  
329 a Body Mass Index below 17.5, nor were they willing to disclose any disordered eating behaviours  
330 in their interviews. Indeed, these individuals were less forthcoming about disordered eating  
331 behaviours and attitudes than their peers.

332  
333 These difficulties in matching the standard criteria of eating disorders to this special population  
334 raises the possibility that the Female Athlete Triad may be a better means of defining athletes as  
335 having eating disorders, as it does not rely on any weight criterion or cognitions. Even so, there  
336 are difficulties with this for the specific young population under study. Research suggests that the  
337 triad does not identify many of the athletes at risk.<sup>65</sup> Menstrual abnormalities are common as a  
338 consequence of the negative energy balance, yet this is difficult to assess in this age group who  
339 mostly not have reached or established menarche as they begin high levels of training, and who  
340 may suffer delayed menarche rather than a more measurable disruption of already established  
341 menstrual cycles. Low bone mineralisation is also likely to be a particularly late sign of negative  
342 energy balance and severe nutritional problems in this group, because gymnastics is a high impact  
343 sport and tends to increase bone density as compared to normal populations.<sup>63,64,66</sup> Some  
344 researchers believe that small stature, late menarche and late physical maturation are selected for

345 by sports such as gymnastics, rather than being the consequence of intensive training.<sup>41</sup> Finally,  
346 disordered eating is a problematic concept when the issue is the 'job description' of high  
347 performing gymnastics reflected in a highly controlled and restricted intake characteristic of  
348 Anorexia Nervosa.

349  
350 Many gymnasts in the study had a heavy training load (approximately 25 to 30 hours per week) in  
351 addition to their mainstream educational demands. The BDI responses showed no individuals  
352 with thoughts of self-harm or suicide, which contrasts very favourably with 20-45% of the  
353 adolescent population which reports suicidal thoughts.<sup>67,68</sup> Instead, the gymnasts' questionnaire  
354 responses reported difficulties going to sleep, and high levels of anxiety and tiredness. In  
355 qualitative data many athletes cited a busy life and restrictions upon their spare time, while also  
356 referring to the gains from participating in sport at this level.

357  
358 *Erm ... the worst is probably all the time it takes, like with training every single night. I wish I did*  
359 *have a little bit more spare time and stuff. But the best is when you're at a competition and then*  
360 *you just go on the floor and then that just ... that feeling that you get. And especially if you win the*  
361 *competition, when you're on the podium it just ... it's just an amazing feeling (female gymnast).*

362  
363 The findings are not straightforward to interpret, and present conceptual difficulties. There are also  
364 limitations to our study. Access to elite sports populations for the purposes of non-performance  
365 enhancing research. Despite a variety of approaches to weighing practices by coaches, it was not  
366 within the scope of the study for the authors to conduct any weighing, physical measurements or  
367 clinical assessments, because the study focussed on in-depth interviews yet attempted to be  
368 minimally disruptive to the gymnasts' busy training schedules and minimally physically intrusive.  
369 The formal diagnosis of any mental disorder requires a full clinical interview, which was also  
370 beyond the remit of this study. The method of selection meant that the clubs that volunteered to  
371 participate could not be assumed to be representative of high performing clubs in general, and

372 there can be no overarching claims of the representativeness of the data of these high performance  
373 gymnasts. Nevertheless, the participants were confident, self-motivated and ambitious young  
374 people, a markedly different population from the standard mental health clinic or indeed the  
375 standard school. This was borne out by the high self-esteem scores, which we would suggest  
376 reflects the high levels of success, public esteem and validation associated with successful  
377 participation in high performance sport.

378  
379 Given the ‘occupational requirements’ of being a high performance athlete in a particularly  
380 physically demanding sport, one may ask whether the high scores on the eating disorder  
381 questionnaires simply a reflection of a (possibly coincidental) similarity of characteristics between  
382 eating disordered people and elite athletes, and the high depression scores are simply a reflection  
383 of juggling hectic ‘jobs’ in addition to being in fulltime education? Or is this a highly stressed  
384 population constantly performing at their limits, and compromised in their mental health with  
385 respect to disordered eating, anxiety and depression as a result? As suggested by one participant,  
386 one distinguishing feature of a functional rather than pathological preoccupation with weight and  
387 shape was whether the individual was able to ‘switch off’ this preoccupation when on holiday  
388 from training or, indeed, after retirement from competitive sport. A problem, however, that  
389 gymnasts pointed out was that unlike some other international sports, modern competitive  
390 gymnastics does not appear to have any particular ‘off season’ when gymnasts can allow  
391 themselves to eat at liberty and gain weight prior to returning to intensive training and  
392 conditioning. Enforcing some kind of ‘off-season’ for athlete rest and recovery, could be respite  
393 from the constant training and self-discipline which might lend itself to loosening of control and  
394 more disordered eating, and that respite might also help to discriminate between those who can  
395 stop their ‘anorexic’ attitudes and behaviours when it is not needed and those who cannot. A  
396 further issue is that even if functional rather than ‘mentally disordered’, the constant  
397 preoccupation with weight and constant idealisation of an unrealistic shape, particularly at an  
398 important developmental period of self-regulation and self-image is likely to have longer term



399 implications for the way these gymnasts conceptualise and view food and their own bodies or  
400 indeed their identities, long after they have retired from sport.<sup>40,69</sup>

401  
402 Does the prevalence or normalisation of such behaviours and attitudes within a sporting discipline  
403 imply that these are normal, healthy or morally acceptable? To what extent can a physician not  
404 intimately familiar with the training demands and milieu of elite gymnasts interpret the fine  
405 grained judgements about weight and shape that gymnasts and coaches do as part of the normal  
406 everyday encounter with their sport?<sup>62</sup> To the extent that that the physician is an insider to the  
407 norms and values of the population, how will they guard against “going native” – the  
408 anthropologists’ nightmare of uncritically accepting the norms of a host population? Without  
409 wishing to pathologise emotionally healthy and well-functioning athletes, there is a strong  
410 argument that exposure to a negative energy balance and constant preoccupation with weight and  
411 shape and high levels of tiredness and anxiety cannot be healthy, especially amongst young  
412 developing minds and bodies at a uniquely susceptible time of life. Some research suggests that  
413 post-retirement release of high performance athletes from the constraints of low caloric intake can  
414 lead to ‘rebound/catch-up’ physical growth and eventual normal adult height and weight, and there  
415 is also an argument that these sports may be self-selecting for smaller, leaner, or slower maturing  
416 individuals.<sup>41,70</sup> There is, however, currently relatively little evidence concerning the long-term  
417 psychological or emotional implications of these practices, although one study suggests that  
418 gymnasts’ eating disorder symptoms do abate somewhat after retirement; this is clearly an area for  
419 researchers to explore further.<sup>71</sup>

420  
421 There are many similarities but also many differences between eating disorders (in particular  
422 Anorexia Nervosa) and high performance gymnastics. Many people with Anorexia Nervosa are  
423 perfectionistic and obsessional; they are also often highly disciplined and self-controlled and able  
424 to focus solely on their goal of weight loss, being able to sacrifice other interests and enjoyments  
425 to this goal.<sup>72,73</sup> The similarities in personality between high performance athletes and people with

426 Anorexia Nervosa places this individuals at particular risk of developing an eating disorder; the  
427 contextual pressures within the sport to lose weight and idealisation and focus on low weight and  
428 slim shape compound these risks.<sup>56</sup> There are arguments that high performance gymnasts may  
429 self-select both for body type and also ability to exert high levels of discipline and control over  
430 their own bodies and over food intake, and therefore may also be self-selected as being more  
431 susceptible to eating disorders as opposed to the sport by its nature inducing these disorders.

432  
433 There are, however, many differences between high performance sport and eating disorders. For  
434 the ‘functional eating disordered’ athlete, the attitudes and behaviours around eating and shape are  
435 secondary to an overarching goal of improving performance. In psychiatric ‘eating disordered’  
436 populations, the attitudes and behaviours have no goal other than themselves, or else serve as  
437 some maladaptive coping mechanism, for example in trying to take control of one’s own life in  
438 the face of abusive situations or a chaotic family background, although overexercise is often used  
439 as a tool to achieve control and weight loss.<sup>74</sup> The non-functional and ultimately self-defeating  
440 nature of eating disorders is the hallmark of all mental disorders, and such individuals continue to  
441 perceive themselves as fat and have a drive to lose weight even when their gain or function is  
442 diminishing from malnutrition, psychological difficulties or poor physical health. In contrast, one  
443 might expect an athlete with a ‘functional eating disorder’ to have the power to cease their weight  
444 loss behaviours as they tip over from helpful to harmful with regard to performance and  
445 competitiveness. The problem, however, is that there is a fine line between ‘functional’ and  
446 ‘pathological’ eating attitudes and behaviours; indeed, there may be no line at all. Again, the  
447 quality of the athlete-physician relationship will be crucial in interpreting this phenomenon with  
448 validity and care.<sup>62</sup>

449  
450 Well known elite athletes have spoken in hindsight of their own struggles with eating disorders.<sup>75</sup>  
451 It may be possible that eating disorders may coexist at the same time as a highly successful  
452 sporting career if the athlete succeeds in a precarious balancing act of maintaining control over

453 behaviour so that it does not (seriously) harm performance; this may correspond with what  
454 clinicians recognise as subclinical eating disorders in the normal population. At the same time, it  
455 can be argued that something which is functional in nature may nevertheless be pathological both  
456 in terms of its harmfulness and its grip over the psyche.

457

## 458 **CONCLUSIONS**

459 The conceptual challenge facing researchers and physicians confronted with potential eating  
460 disorders in high performing gymnastics is in distinguishing between functional and pathological  
461 eating attitudes and behaviours in high performance sport. This is crucial if we are to identify  
462 those mentally ill individuals (including those with subclinical variants) who need prompt and  
463 appropriate help to prevent them from coming to harm, without intervening needlessly in the lives  
464 of other individuals who are engaging in similar practices out of necessity without any negative  
465 psychological consequences. The practical challenge is in understanding what is harmful for  
466 athletes, especially young athletes who are still in the process of physical, emotional and social  
467 development, in order to promote their current and future wellbeing; and having understood it, to  
468 modify the pressures within the sport to promote wellbeing and prevent harm.

469

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