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# 1 **Potential impacts of body image perception in female equestrians**

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6

## 7 **Abstract**

8 Female body image (BI) has been investigated in many sports yet, in female-dominated  
9 equestrianism, there is a paucity of BI research. This study aimed to identify self-perceptions  
10 of BI, rider perceptions of judge and coach bias, relationships between BI and self-  
11 consciousness and effect of breast size. A 4-part, 27 question survey (GoogleForms™) was  
12 completed by female equestrians (n=493). The second smallest BI was considered ideal for  
13 equestrianism ( $\chi^2=352.751$ ,  $P<0.001$ ) regardless of age, own BI or level of riding commitment.  
14 There was a perception judges favour riders with smaller frames ( $\chi^2=54.2111$ ,  $P<0.001$ ) and an  
15 association between riders with a larger BI feeling self-conscious when riding ( $\chi^2=87.514$ ,  
16  $P<0.001$ ). More respondents perceived the ideal equestrian BI to be smaller than theirs  
17 (Median= -1.5,  $W=7777.00$ ,  $P<0.001$ ) and an association between those dissatisfied with their  
18 BI and self-consciousness when riding was seen ( $\chi^2=83.649$ ,  $P<0.001$ ). Perception of the ideal  
19 equestrian frame is smaller than many riders' own BI, and a larger BI perception negatively  
20 impacts self-confidence, potentially hindering performance and participation. Female riders  
21 with a larger frame feel they are perceived negatively by judges and further study is indicated  
22 to investigate the extent of this potential bias on subjective judging in equestrian disciplines.

23 Keywords: Horse riding; Self-Confidence; Physique; Appearance; Body Appreciation

24

25

## 26 **1. Introduction**

27 There is an array of popular equestrian disciplines [1]. Equestrian activities range from non-  
28 competitive to elite/World Class level [2]. Whilst many equestrian disciplines are objectively  
29 measured e.g. according to completion time, least obstacles lowered and so on, some, such as

30 dressage are subjectively judged [3]. Each movement in a test is scored, but impressions of the  
31 riding ability of each competitor are also scored and have impact on the overall placings [4]  
32 and of the three Olympic equestrian disciplines; dressage, show jumping and eventing, both  
33 dressage and eventing contain subjective judging to a varied extent. In excess of 31,000 riders  
34 compete in British Dressage and British Eventing affiliated competitions each year [5,6], with  
35 each organisation setting strategic goals to increase participation. These strategic aims to  
36 increase participation could be adversely impacted by any potential barriers to non-competitive  
37 riders taking up the sport.

38

39 The Sport England Active Lives Adult survey (2020) reported that 88% of horse riders are  
40 women [7] and horse riding is reported to be beneficial for improving cardiovascular fitness,  
41 stamina, balance, core and body strength [8]. Horse riding in all its forms increases feelings of  
42 happiness [9,10] and has a stress relieving effect, contributing to improved mental health [11-  
43 13]. Research has investigated the positive aspect of sports in relation to self-perception of  
44 body image [14,15] finding that those with a higher level of body appreciation participate more  
45 in physical activity [16]. Female athletes, however, have lower levels of positive body image  
46 perceptions than male athletes [17]. Although body image in females differs between sport  
47 types [18], participants in aesthetically focused sports where leanness is prominent e.g.  
48 gymnastics, figure skating and long-distance running, are associated with more body image  
49 disturbances [19,20]. Athletes that tend to identify an ideal BI close to their own are more  
50 satisfied with their BI than non-athletes [21-23], however, horse riders often do not consider  
51 themselves as athletes [24]. In contrast, the British Telecom (BT) Sport Body Image Survey in  
52 2014 found that 79.6% of elite female athletes, para- and retired athletes felt under pressure to  
53 conform to a certain type of body image, with 76.1% stating this had influenced their eating  
54 and training behaviour [25]. These negative associations have mental and physical health  
55 implications [26] and may be influenced by media sexualisation and objectification of female  
56 athletes performing in sports considered to be more feminine [27,28]. Media pressure  
57 influences body image, with publications portraying unrealistic depictions of a thin and toned  
58 physique [29]. Social media use and the thin ideal are linked [30], triggering body  
59 dissatisfaction in women [31].

60

61 In equestrianism synchrony between horse and rider creates a visually pleasing picture, with  
62 communication from the rider being as subtle as possible [4], however, dressage judging can  
63 be problematic due to subjectivity of scoring and judge bias [32,33]. Privette [1] identified

64 impacts of rider attire and rider physique in coach and judge opinions, the desired physique  
65 being tall and thin, influencing final ranking of riders. The coach is an instrumental part of an  
66 athlete's life influencing fitness, body ideals and weight-related pressures [34] and have  
67 leadership responsibility towards their athletes' self-perception of body image [35]. In  
68 equestrian sport, however, the coach must also consider horse welfare which may lead to  
69 sensitive topics regarding rider weight being addressed [36,37] but as Sabiston *et al.* [38] state  
70 there is a paucity of research on coaches' views and responsibilities for endorsing positive body  
71 image for athletes.

72

73 Equestrian athletes were found to perceive themselves as larger than their physical size but  
74 desire a smaller physique [39] and Torres-McGehee *et al.* [40] stated the pressures on female  
75 equestrian athletes to be thin, could potentially lead them to resort to drastic weight control  
76 methods. This study, however, may not represent the true age demographic of equestrians, a  
77 sport where career longevity can far exceed that in non-equestrian sports [41].

78

79 Rather than body image in its entirety, specific areas of the athlete's body may be of specific  
80 concern [28] and female breast size plays an important role in body image [42]. Swami *et al.*  
81 [43] found that females dissatisfied with their breast size were dissatisfied with their weight  
82 and appearance, and breast size is a barrier to sport participation due to both pain and negative  
83 body image in non-equestrian sports [44]. Burnett *et al.* [45] found breast size and movement  
84 was a barrier to participation due to embarrassment, a finding mirrored in female horse riders  
85 [46]. Burbage and Cameron [24] found that 40% of female riders experience breast pain when  
86 horse riding, related to breast size and body mass. Therefore, riders with larger breasts may  
87 feel less confident when riding due to a combination of breast support and negative BI.

88

89 Horse riders or potential riders who do not conform to the 'ideal' body image for equestrianism  
90 may avoid or reduce participation. Body self-consciousness in horse riders may be a barrier to  
91 participation, impact rider performance, influence judge perception, and may even impact  
92 communication between horse and rider horse through unnecessary rider tension and anxiety  
93 [47,48]. The aims of this study were to investigate body image in female equestrians,  
94 perceptions of other equestrian stakeholders' views and opinions, associations between rider's  
95 body image and self-consciousness while riding and competing, and to evaluate the effects of  
96 breast size on BI and self-consciousness when riding.

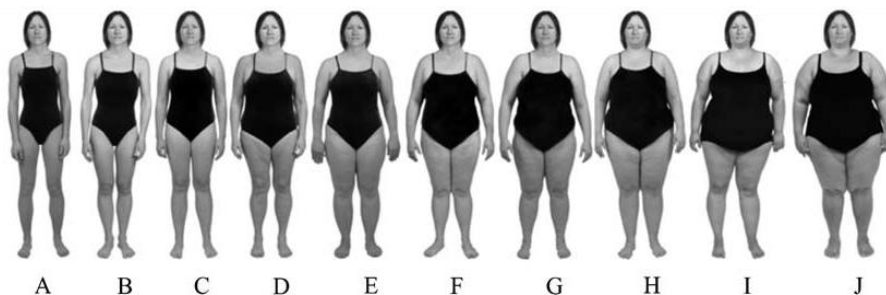
97 **2. Material and methods**

98 Following institutional ethical approval, a 4-part, 27 question online survey on Google  
99 Forms™ was distributed to establish current rider body image perception in female equestrians  
100 aged 18 and over in the UK, accessible from October 2020 to December 2020, with no incentive  
101 offered to participants. It was widely distributed via specialist equestrian social media sites  
102 (e.g. UK Equine Student Network) to recruit respondents currently participating in equestrian  
103 activities and respondents were encouraged to share the survey with other potential respondents  
104 to facilitate snowball sampling. Following an introduction to the survey, completion was  
105 considered consent to take part.

106  
107 Questions included closed multiple-choice, multiple-choice grid, Likert scale and open free  
108 text format taking approximately 5-10 minutes to complete. Part one of the study gathered  
109 participant demographics. Part two focused on equestrian activities, normal horse-riding  
110 commitment (by competitive level i.e. “do not compete”, “unaffiliated”, “affiliated”,  
111 “national”, “international”) and participant confidence whilst riding. Clothing and bra size  
112 (multiple choice of all UK clothing and bra sizes), usual level of breast support and breast pain  
113 associated with riding (10-point Likert scale) were also gathered. Part three questioned  
114 participant perception of the ideal female equestrian rider BI, self-perception of their BI using  
115 a validated scale [49] (Figure 1) and levels of self-consciousness when horse riding. Part four  
116 concerned participant perception of the impact of their body shape on riding ability and their  
117 perception of coach, spectator and judge views of their self-selected BI. Finally, a free text  
118 question allowed participants to add their own "story" and was analysed using both inductive  
119 and deductive content analysis.

120  
121 In total, there were subsequently 493 survey responses and data from Google Forms™ were  
122 downloaded to a Microsoft Excel spreadsheet.

123



124

125 *Figure 1 Body image scale used in questionnaire (Harris et al. [49]).*

126

## 127 *2.1 Data Analysis*

128 Minitab (V20) for PC was the chosen statistical software was used to complete statistical  
129 analysis. Data were assessed for normality using an Anderson Darling test. Pearson's chi-  
130 squared ( $X^2$ ) goodness-of-fit tests were utilised to assess the association of body image  
131 perceptions, perceptions of judge views and coach's comments on fitness. Analysis of  
132 qualitative data on specific areas of the rider's body perceived to be detrimental to judge  
133 perception were recoded and placed into specific categories (the category 'other' included the  
134 length of arms; general shape; back; shoulders; ankles; lack of muscle tone; and length of the  
135 torso) and was analysed using Pearson's chi-squared ( $\chi^2$ ) goodness-of-fit test. Pearson's chi-  
136 squared ( $\chi^2$ ) tabulated statistics were utilised to assess associations between participants'  
137 perceptions of own BI and self-consciousness levels when riding and competing, bra size and  
138 breast pain associated with riding, bra size (cup size  $\geq$ DD - large, cup size  $\leq$ D - small, [24])  
139 and self-consciousness levels, body image perceptions and coach's comments on weight loss.  
140 Riders' self-perceived BI and their stated ideal female equestrian BI were recoded and those  
141 who placed the ideal BI two or more images smaller than themselves were categorised as  
142 dissatisfied with their own BI. Wilcoxon Signed-Rank (W) analysis was utilised to assess  
143 associations between BI dissatisfaction and self-consciousness levels when riding. Qualitative  
144 data were analysed by identifying key words and frequency of appearance in free text answers  
145 recorded. Any key words that were referenced two times or less were placed in the 'other'  
146 category and included lack of muscle, length of torso, posture, stiff ankles, broad backed, top  
147 heavy, large hips, crooked, curved spine, back fat, and apple shaped.

148

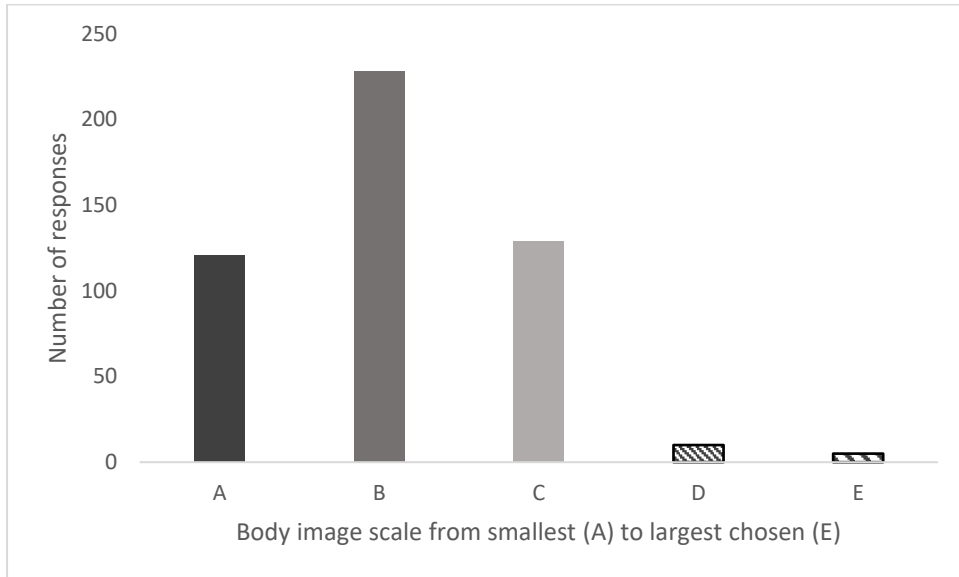
## 149 **3. Results**

150 All responses were suitable for analysis (n=493). The modal age range of the participants was  
151 18-29 years (36.7%), 54.6% of participants rode one horse per day, 56.8% were competitive  
152 riders of which 35.7% competed in dressage, and 43.2% were non-competitive riders.

### 153 *3.1 Ideal Body image perception*

154 There was a significant preference in ideal equestrian BI for the second smallest (B) (Figure 1)  
 155 ( $\chi^2 = 352.751$ ,  $P < 0.001$ ), (Figure 2). There were no significant effects of rider age, perception  
 156 of own BI, or level of riding commitment on this body image preference.

157

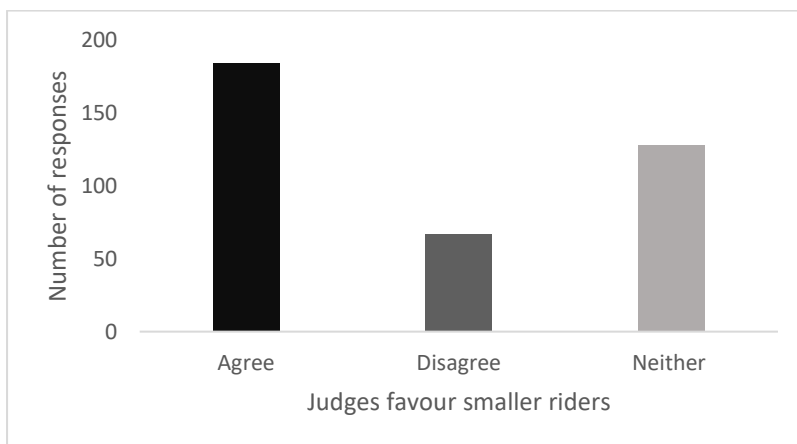


158

159 *Figure 2 Participants perceived ideal BI for the equestrian rider, starting with the smallest image (A), and showing the*  
 160 *number of responses for each image (Figure 1).*

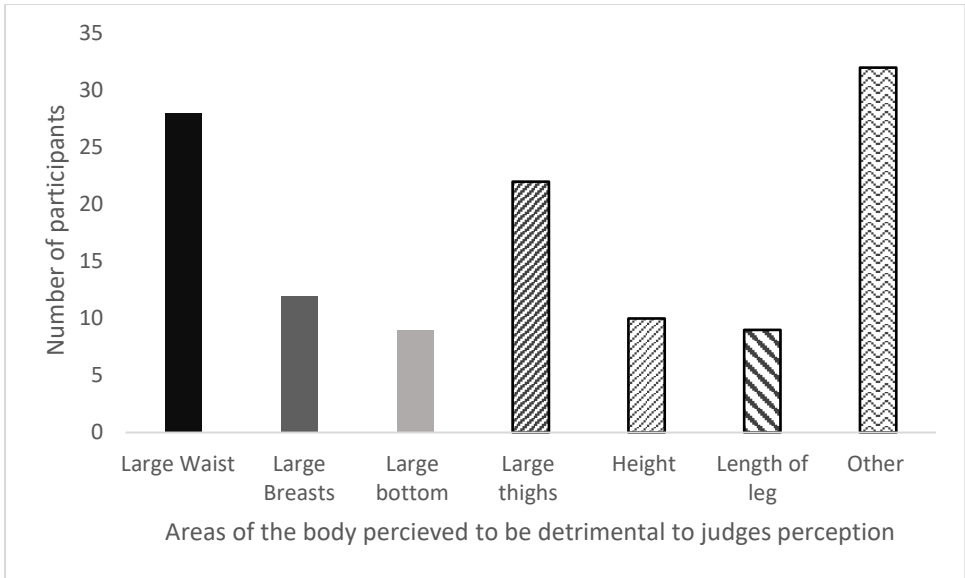
### 161 3.2 Perception of Judge views

162 There was a significant perception that judges favour riders with a smaller frame ( $\chi^2 = 54.2111$ ,  
 163  $P < 0.001$ ), (Figure 3) regardless of participants age, discipline and own perceived body image.  
 164 A significant difference was found when comparing specific areas of the body that riders  
 165 perceive to be detrimental to judge perception ( $\chi^2=32.8033$ ,  $P < 0.001$ ), (Figure 4) with large  
 166 waist (22.95%) and large thighs (18.03%) being considered most influential.



167

168 *Figure 3 The number of participants who agreed that judges do favour riders with a smaller frame.*

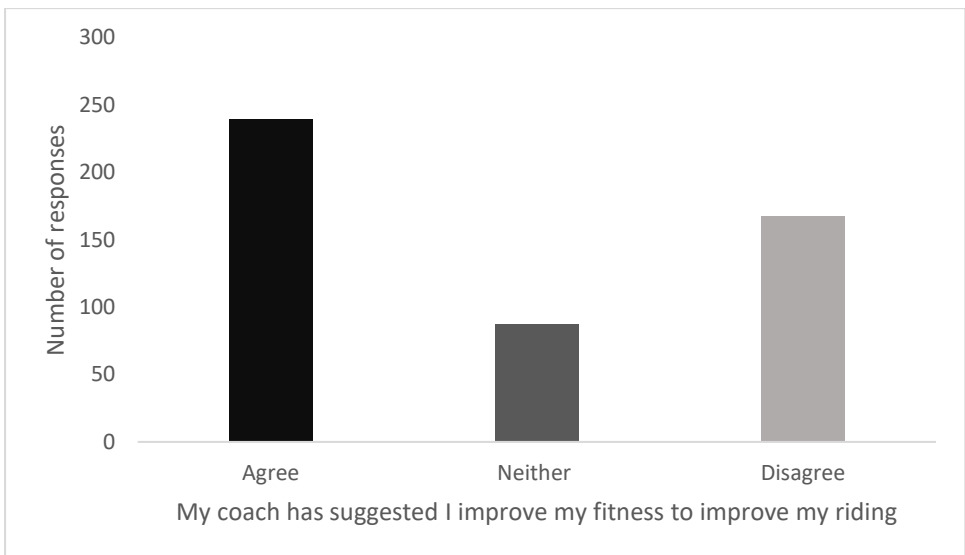


169

170 *Figure 4 Specific areas of the body participants perceived to be detrimental to judge's perception.*

171 **3.3 Coaches reported comments**

172 A significant association between riders perceiving their own BI as larger and their coach  
 173 suggesting weight loss to improve riding ability ( $\chi^2 = 64.248$ ,  $P < 0.001$ ) was identified.  
 174 Significantly more respondents had been told to improve their fitness by their coach ( $\chi^2 =$   
 175  $70.3611$   $P < 0.001$ ), (Figure 5) and a significant association between those categorised as  
 176 dissatisfied with their BI and being told by their coach to improve their fitness ( $\chi^2 = 16.606$ ,  
 177  $P < 0.001$ ), (Figure 6).

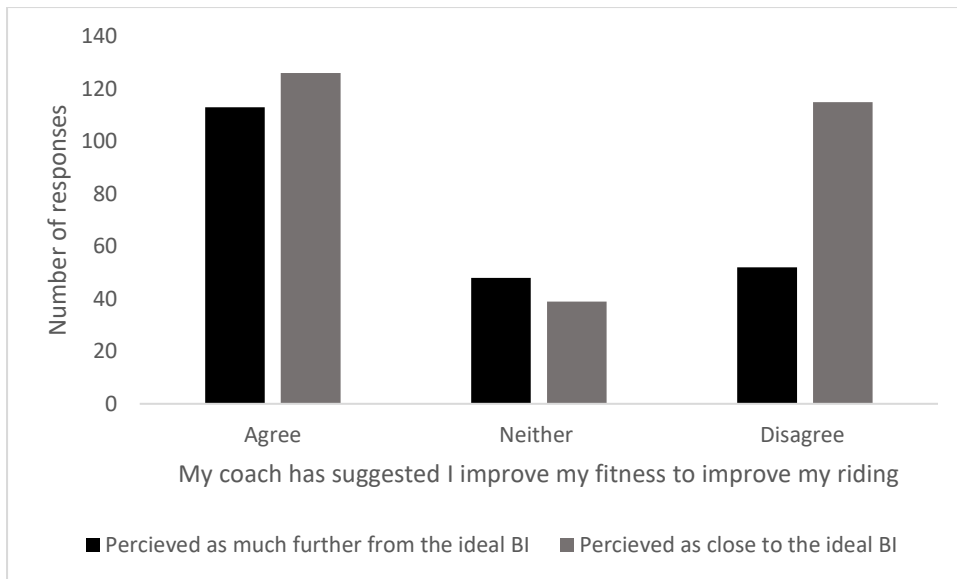


178

179 *Figure 5 Number of participants who agreed that their coach had suggested to improve fitness to improve their riding*  
 180 *ability.*

181



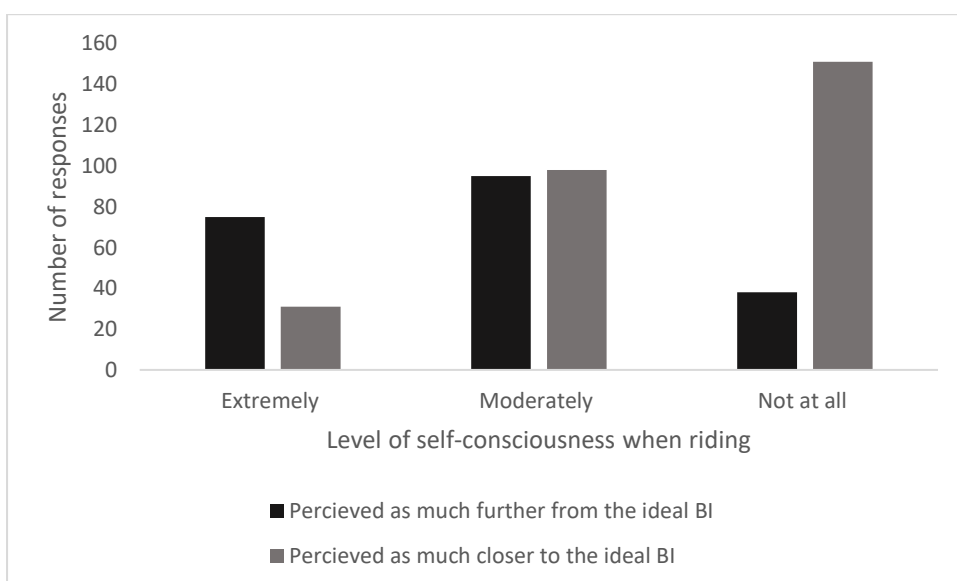


182

183 *Figure 6 Comparison between the number of participants stating their coach had suggested to improve fitness to improve*  
 184 *their riding ability, and BI dissatisfaction (categorised as perceived BI to be 2 images larger or smaller than what they*  
 185 *perceive to be the ideal BI)*

186 **3.4 BI effect on rider confidence**

187 A larger BI perception was significantly associated with self-consciousness when riding ( $\chi^2$   
 188 =87.514,  $P<0.001$ ) and competing ( $\chi^2=73.251$ ,  $P<0.001$ ) with those respondents with a larger  
 189 BI perception feeling more self-conscious when riding and competing. Significantly more  
 190 respondents perceived the ideal BI to be smaller than their own BI by one or more category  
 191 (Median= -1.5,  $W=7777.00$ ,  $P<0.001$ ). There was a significant association between those  
 192 categorised as dissatisfied with their BI and greater self-consciousness when riding ( $\chi^2=$   
 193 83.649,  $P<0.001$ ), (Figure 7). Only a very small number of respondents (2.03%) perceived  
 194 themselves as two or more categories smaller than their perceived ideal BI.

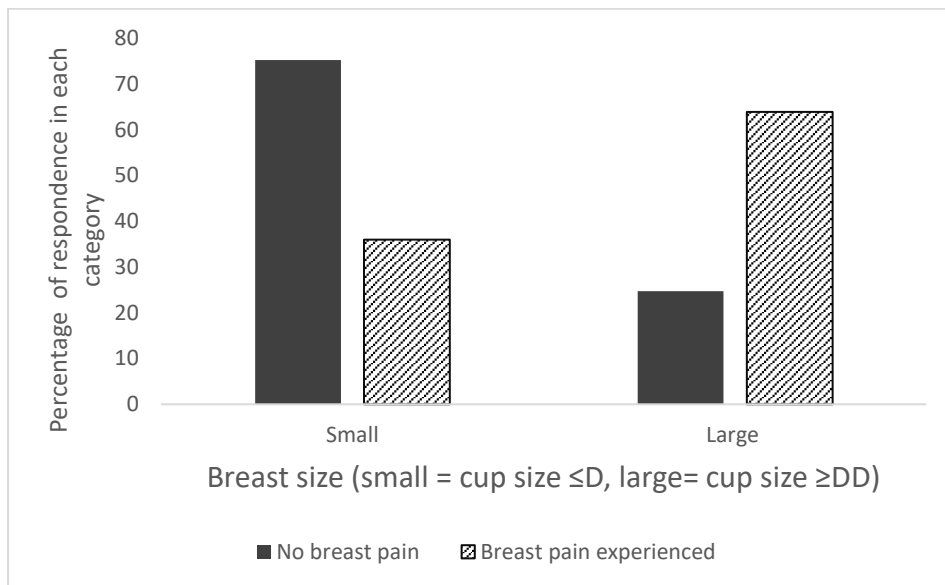


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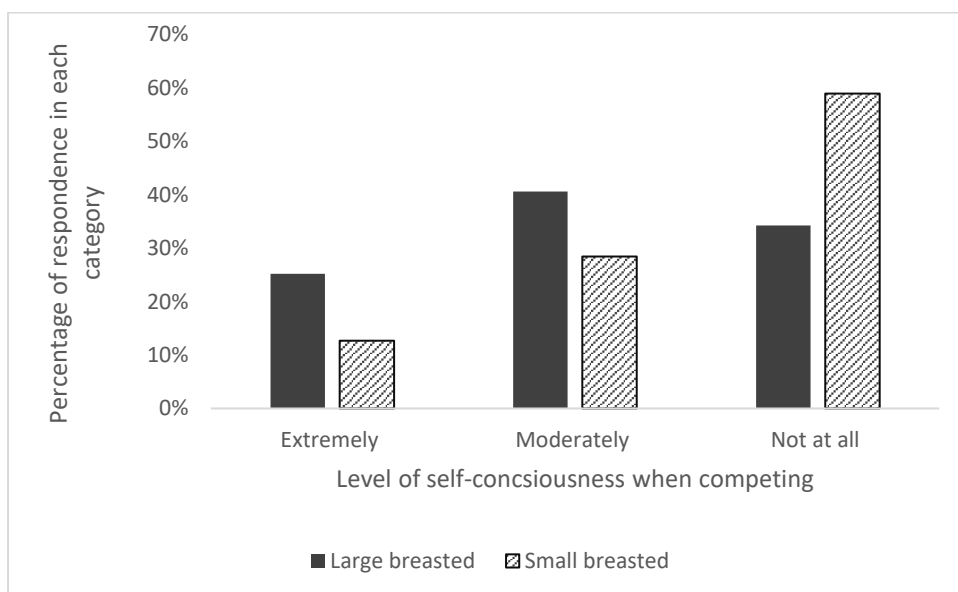
196 Figure 7 A comparison of the levels of self-consciousness when riding to BI dissatisfaction (categorised as perceived BI to be  
 197 2 images larger than what they perceive to be the ideal BI).

198 3.5 Effects of breast size

199 There was a significant association between riders with larger breasts (cup size  $\geq$ DD) and  
 200 greater reporting of breast pain whilst riding ( $\chi^2 = 39.336$ ,  $P < 0.001$ ), (figure 8). Larger breast  
 201 size was also significantly associated with more self-consciousness whilst competing  
 202 ( $\chi^2 = 25.850$ ,  $P < 0.001$ ), (Figure 9).



203  
 204 Figure 8 Comparison of breast size (small -  $\leq$  D, large -  $\geq$  DD) and breast pain associated with horse riding.



205  
 206 Figure 9 Comparison of breast size (small -  $\leq$  D, large -  $\geq$  DD) and level of self-consciousness when horse riding.

207

208

## 209 **4. Discussion**

### 210 *4.1 Ideal Body image perception in female horse riders*

211 The perception that the ideal female equestrian body shape is located towards the smaller end  
212 of the body image scale (Figure 1) corresponds with other sports' physique perceptions. No  
213 effect was found of riders age and perception of own BI, although it should be noted that the  
214 majority of respondents were aged 18-29 years and this may not be representative of the age  
215 range within the female riding population, a sport where Olympic medals are still being won  
216 by athletes in their 50s and 60s. Crissey and Honea [19] found that girls participating in  
217 "feminine" sports are more conscious of their physique and perceive the sport's ideal image to  
218 be smaller than their own, yet it is unclear if equestrianism is considered "feminine" despite  
219 the large female bias in participation. The ideal female equestrian body image being at the  
220 smaller end of the scale may be due to media influence encouraging unrealistic body imagery  
221 [30] and equestrian clothing brands continuing to promote products using models of this size  
222 [1]. Although the general media now tend to portray the ideal image of woman to be strong,  
223 slender and muscular, but this may then place additional pressure on equestrian athletes to  
224 conform to these changing body image ideals [31]. Equine welfare concerns may also  
225 contribute to the perception that female riders should have a smaller body shape with recent  
226 research on the adverse effects of overweight riders on the equine musculoskeletal system and  
227 gait kinematics [36,37] garnering much current interest within the equestrian press.

228 The results of this study are however based on participants' perceptions of other people's  
229 opinions and of their own BI which may not be wholly accurate. Requiring respondents to  
230 report parameters such as body weight and height may have been desirable [39] however there  
231 is a lack of accuracy within self-reporting of body weight and Body Mass Index (BMI), often  
232 not corresponding to self-perception [50,51], which may be more influential on self-confidence  
233 that the actuality of appearance, size or shape.

### 234 *4.2 Perception of Judge views*

235 There was a perception that judges in disciplines requiring subjective judging favour riders  
236 with a smaller frame across all respondent groups regardless of age and BI. Hawson *et al.* [33]  
237 suggested this is due to a supposed bias of people's opinions of judge's views and may not be  
238 the case. However, as this may be based on respondents' lived experience, future research

239 should consider exploring this experience, possibly requesting examples rather than relying on  
240 rider perception. Perceived judge bias has also been suggested in branding of clothing and  
241 equipment in equestrianism. This can have a negative effect on rider confidence [52,1] and  
242 indeed rider size and body shape may have even greater influence on judge's marking. An  
243 overweight rider may be deemed a distraction to the judge and, therefore, impair their ability  
244 to accurately assess the rider's influence on the horse. Ideally a judge should be evaluating the  
245 horse's way of going and the ease and harmony of the movements and not be influenced by the  
246 rider body size [4], but this may not be the case. Dressage judges may not be biased against  
247 larger body sizes, but these rider perceptions may contribute to respondents identifying the  
248 body images at the smaller end of the scale as ideal for the female equestrian. Moreover, this  
249 perceived judge bias may undermine rider confidence in their own appearance when competing  
250 and could be a barrier to non-competitive respondents taking part in competitive dressage.

251 The areas of the body perceived to be most prone to judge perception included large waist or  
252 large thighs (40.98%). Other comments included large breasts, large bottom, height and length  
253 of the leg. Many of these comments specified the detrimental area to be large, with very few  
254 comments mentioning lack of muscle. However, responses did include rider morphology (i.e.  
255 body segment proportions) rather than just body weight, showing that judges are not only  
256 perceived as bias to rider weight but also rider body proportions, yet a typical body morphology  
257 for equestrians is yet to be established [53]. Osório [54] states there is limited research in  
258 perceived judge bias of BI and physique in both equine and other sports and that this judge bias  
259 warrants further investigation.

#### 260 *4.3 Coach comments*

261 A significant association was found between riders perceiving their own BI as larger and their  
262 coach suggesting weight loss to improve riding ability, but significantly more had been told to  
263 improve their fitness than control their weight. Christensen *et al.* [34] stated that the coach is  
264 influential in an athlete's life, and their words and advice are taken seriously by riders. Coaches  
265 should, however, choose their words carefully when referring to rider weight as this may  
266 negatively impact coach – athlete partnerships [35]. Coaches may use “fitness” as a less  
267 contentious term to initiate these conversations, but this cloaked communication may leave  
268 riders unaware of the detrimental effect of an overweight rider on the horse. However, it could  
269 be argued that someone can be of a larger size and have more core strength compared to a  
270 smaller framed rider who is unfit and rides with less horse-rider synchrony being less able to

271 support themselves [55]. As the equestrian coach has responsibility for the welfare of both  
272 horse and rider and recommending rider weight loss may be essential to ensure adequate horse  
273 welfare, this could be at the expense of rider well-being, leading to conflicting priorities for the  
274 coach. However, it is possible that rider body size, either weight, height, or proportions, could  
275 be performance limiting [56] and the honesty of the coach's comments could be vital for both  
276 horse and rider welfare and success.

#### 277 *4.4 BI effect on rider confidence*

278 Riders who perceived themselves to have a larger BI and those dissatisfied with their physique  
279 experienced feeling self-conscious when riding more than those of a smaller BI and satisfied  
280 with their BI. Riders lacking in confidence when riding may result in added body tension,  
281 potentially negatively effecting communication, such as application of cues or release of  
282 pressure, between horse and rider [48]. Additionally, rider tension can cause uneven weight  
283 distribution, potentially causing discomfort to the horse [36]. Keeling *et al.* [47] found that a  
284 nervous rider can increase the likelihood of the startle reaction from the horse and although  
285 McKinney *et al.* [57] found no evidence for increased transfer of anxiety from the rider to the  
286 horse, Wolframm and Micklewright [48] found that riders' self-confidence is a crucial factor  
287 in equestrian performance. Self-confidence relates to athletic success in non-equestrian sports  
288 [58] and a lack of self-confidence is closely associated with athletic failure [59]. Therefore,  
289 rider weight management, BI and its impact on rider self-confidence requires further  
290 investigation to identify the impact on performance and horse welfare.

291 Other than physical benefits to riding, participating in riding enhances mental well-being [10].  
292 Gabriels *et al.* [11] found that riders diagnosed with autism spectrum disorder benefitted from  
293 therapeutic horse-riding. Consequently, the smaller ideal equestrian physique may have an  
294 adverse effect on the positive effects of riding for those who do not believe they conform to  
295 these expectations. Overall, riders lacking in confidence or feeling self-conscious when riding  
296 may experience barriers to participation at both elite and non-elite levels.

#### 297 *4.5 Effects of breast size*

298 A significant correlation was found between riders with larger breasts (cup size  $\geq$  DD) and  
299 breast pain associated with horse riding. This is likely to due to a lack of appropriate breast  
300 support as Burbage and Cameron [24] found that only 19% of riders with large breasts chose  
301 to ride in a sports bra, possibly due to marketing focus on sports such as running. Burbage *et*

302 *al.* [46] found that breast pain was significantly reduced in a sports bra compared to a daily bra,  
303 however those with low BI self-esteem may be reluctant to seek out advice on sports bras or  
304 sports bra fit and this may be a barrier to participation for riders at all levels [42,44].

305 A significant association was found between riders with larger breasts feeling self-conscious  
306 when competing. If breast size impacts rider confidence to this extent it suggests that body  
307 image dissatisfaction may not only be related to body size or body weight [45]. As equestrian  
308 sports have more female participants with larger breasts compared to sports such as running  
309 [24] and improved rider position is seen with appropriate breast support, especially in larger  
310 breasted riders [60] further research in this area is warranted. The importance of this has been  
311 recognised by over one hundred British Olympic and Paralympic athletes receiving bespoke  
312 sports bras for the Tokyo games due to enhanced performance being linked to appropriate  
313 breast support [61]. Further studies should investigate the impact improved breast support has  
314 on not only equestrian performance, but body image of female riders.

#### 315 *4.6 Limitations*

316 The survey was distributed for two months, although receiving 493 responses, a larger sample  
317 size may have been achieved if the survey was distributed for longer. Additionally, the survey  
318 was only distributed via the social media site Facebook possibly excluding older riders for the  
319 sample in a sport with acclaimed athlete longevity. However, body dissatisfaction decreases  
320 with age, and therefore, older females may have been less attracted to participate in this study  
321 [62,63]. Additional questioning could have been included regarding perceived judge bias  
322 against specific areas of the rider's body to inform future studies on judge perception, but these  
323 may prove challenging to substantiate.

### 324 **5. Conclusion**

325 The perception of the ideal female equestrian BI was found to be a smaller frame and was  
326 smaller than many riders' own BI. A larger BI negatively impacted rider self-confidence and  
327 warrants further research. Female riders with larger breasts experienced riding associated  
328 breast pain and felt more self-conscious when competing; therefore, breast size may also be a  
329 barrier to participation. Previous research has found females with larger breasts are commonly  
330 larger in body size, thus potentially lowering self-confidence when riding. Female riders with  
331 a larger frame felt they were perceived negatively by judges and further study is indicated to  
332 investigate the extent these influences may have on the subjective judging of equestrian sport.

333

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### 337 **CRedit authorship contribution statement**

338 **Sofia Forino:** Methodology, Investigation, Data curation, Formal analysis, Visualization,  
339 Writing, Original Draft; **Lorna Cameron:** Conceptualization, Methodology, Writing, Review  
340 & Editing, Supervision, Project administration, Formal analysis, Visualization; **Natalie**  
341 **Stones:** Conceptualization, Methodology, Review & Editing, Supervision; **Marianne**  
342 **Freeman:** Methodology, Review & Editing, Supervision, Formal analysis, Visualization.

### 343 **Author contributions**

344 All authors participated equally in designing and executing the study, including data collection,  
345 data analyses, and writing the paper. All authors approved the final version of the manuscript  
346 for submission.

### 347 **Data availability statement**

348 Data available on request from the authors.

### 349 **Declaration of Competing Interest**

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### 355 **Reference List**

356 [1] Privette, P. (2012). The role of physical appearance in equestrian sports: An analysis of  
357 collegiate riders' attitudes towards expectations of rider costume and physique. *THESIS-*  
358 *The Ohio State University.*

- 359 [2] British Equestrian, (2021). Available at: <https://www.britishequestrian.org.uk/>. Accessed  
360 12/03/2021.
- 361 [3] British Dressage, (2021). Available at: <https://www.britishdressage.co.uk/>. Accessed  
362 12/03/2021.
- 363 [4] Stachurska A, Bartyzel, K. Judging dressage competitions in the view of improving horse  
364 performance assessment. Acta Agriculturae Scandinavica, Section A - Animal Science  
365 2011;61(2):92-102 Aug 1.
- 366 [5] British Dressage, (2020). British Dressage Strategic Plan: From Tokyo 2020 to Paris 2024.  
367 Available at: <https://www.britishdressage.co.uk/>. Accessed 30/07/2021.
- 368 [6] British Eventing, (2021). About British Eventing. Available at:  
369 <https://www.britisheventing.com/> Accessed 12/03/2021.
- 370 [7] Sport England, (2020). Active Lives Adult Survey May 2019/20 Report. Available at:  
371 [https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2020-  
372 10/Active%20Lives%20Adult%20May%2019-  
373 20%20Report.pdf?AYzBswpBmlh9cNcH8TFctPI38v4Ok2JD](https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2020-10/Active%20Lives%20Adult%20May%2019-20%20Report.pdf?AYzBswpBmlh9cNcH8TFctPI38v4Ok2JD). Accessed 12/03/2021.
- 374 [8] Villafaina S, Cordón-González C, Collado-Mateo D, Fuentes-García J, Adsuar J,  
375 Merellano-Navarro E, Parraca, J. Influence of Horseback Riding and Horse Simulator  
376 Riding on Heart Rate Variability: Are There Differences? Appl Sci 2019;9(11): 2194 May  
377 29.
- 378 [9] Haywood, R. (2020). 6 very good reasons to take up horse riding. Horse And Hound.  
379 Available at: <https://www.horseandhound.co.uk/features/health-benefits-of-horse-riding>  
380 Accessed 02/02/2021.
- 381 [10] Lönker N, Fechner K, Abd El Wahed A. Horses as a Crucial Part of One Health. Vet Sci  
382 2020;7(1):28 Feb 29.
- 383 [11] Gabriels R, Pan Z, Dechant, B, Agnew J, Brim N, Mesibov G. Randomized Controlled  
384 Trial of Therapeutic Horseback Riding in Children and Adolescents With Autism  
385 Spectrum Disorder. J Am Acad Child Adolesc Psychiatry 2015;54(7):541-49 Jul 1.



- 386 [12] Johnson R, Albright D, Marzolf J, Bibbo J, Yaglom H, Crowder S. *et al.* Effects of  
387 therapeutic horseback riding on post-traumatic stress disorder in military  
388 veterans. *Military Med Res* 2018;5(1):1-13 Jan 19.
- 389 [13] Martin R, Graham F, Levack W, Taylor W, Surgenor L. Exploring how therapeutic  
390 horse riding improves health outcomes using a realist framework. *Br J Occup Ther*  
391 2019;83(2):129-139 Aug 19.
- 392 [14] Allen C, Telford R, Telford R, Olive L. Sport, physical activity and physical education  
393 experiences: Associations with functional body image in children. *Psychol Sport Exerc*  
394 2019;45:101572 Aug 7.
- 395 [15] Sabiston C, Pila E, Vani M, Thogersen-Ntoumani C. Body image, physical activity, and  
396 sport: A scoping review. *Psychol Sport Exerc* 2019;42:48-57 May 1.
- 397 [16] Soulliard Z, Kauffman A, Fitterman-Harris H, Perry J, Ross, M. Examining positive body  
398 image, sport confidence, flow state, and subjective performance among student athletes  
399 and non-athletes. *Body Image* 2019;28:93-100 Jan 7.
- 400 [17] Steinfeldt J, Zakrajsek R, Carter H, Steinfeldt M. Conformity to gender norms among  
401 female student-athletes: Implications for body image. *Psychol Men Masc* 2011;12(4):  
402 401-416.
- 403 [18] Abbott B, Barber B. Differences in functional and aesthetic body image between sedentary  
404 girls and girls involved in sports and physical activity: Does sport type make a  
405 difference? *Psychol Sport Exerc* 2011;12(3): 333-42 Oct 23.
- 406 [19] Crissey S, Honea J. The Relationship between Athletic Participation and Perceptions of  
407 Body Size and Weight Control in Adolescent Girls: The Role of Sport Type. *Sociol Sport*  
408 *J* 2006;23(3): 248-72.
- 409 [20] Voelker D, Petrie T, Huang Q, Chandran A. Bodies in Motion: An empirical evaluation  
410 of a program to support positive body image in female collegiate athletes. *Body Image*  
411 2019;28:149-58 Feb 2.
- 412 [21] DiBartolo P, Shaffer C. (2002). A Comparison of Female College Athletes and  
413 Nonathletes: Eating Disorder Symptomatology and Psychological Well-Being. *J Sport*  
414 *Exerc Psychol* 2002;24(1):33-41.

- 415 [22] Robinson K, Ferraro F. The Relationship Between Types of Female Athletic Participation  
416 and Female Body Type. *J Psychol* 2004;138(2):115-28 Aug 7.
- 417 [23] D'Arcy A. Body image: Athletes and nonathletes. (Master's thesis). 2007:Library and  
418 Archives Canada (ISBN: 978-0-494-29557-1).
- 419 [24] Burbage J, Cameron L.J. An investigation into the prevalence and impact of breast pain,  
420 bra issues and breast size on female horse riders. *J Sports Sci* 2016;35(11):1091-97 Jul 25.
- 421 [25] BT Sport. (2014). BT Sport body image survey results. BT.com. Available at:  
422 <http://sport.bt.com/watchnow/programmes/bt-sport-live-S11363867250679>. Accessed  
423 14/03/2021.
- 424 [26] Olive L, Byrne D, Cunningham R, Telford, R, Telford R. Depression and body image in  
425 children: Is physical activity beneficial and how is this translated into clinical practice?  
426 Lifestyle of our kids study. *J Sports Sci Med* 2014;18:114 Dec 1.
- 427 [27] Carrard I, Rothen S, Rodgers R. Body image and disordered eating in older women: A  
428 Tripartite Sociocultural model. *Eating Behaviors* 2020;38:101412 Jul 12.
- 429 [28] Varnes J, Stelfefson M, Janelle C, Dorman S, Dodd V, Miller M. A systematic review of  
430 studies comparing body image concerns among female college athletes and non-athletes,  
431 1997–2012. *Body Image* 2013;10(4):421-32 Jul 12.
- 432 [29] Tamplin N, McLean S, Paxton S. Social media literacy protects against the negative  
433 impact of exposure to appearance ideal social media images in young adult women but  
434 not men. *Body Image* 2018;26:29-37 May 26.
- 435 [30] Mingoia J, Hutchinson A, Wilson C, Gleaves D. The Relationship between Social  
436 Networking Site Use and the Internalization of a Thin Ideal in Females: A Meta-Analytic  
437 Review. *Front Psychol* 2017;8 Aug 7.
- 438 [31] Mulgrew K, Findlay C, Lane B, Halliwell E. Does body appreciation or satisfaction buffer  
439 against idealised functionality-focused images of models?. *Body Image* 2021;36:45-52  
440 Nov 16.
- 441 [32] Peham C, Licka T, Kapaun M, Scheidl M. A new method to quantify harmony of the  
442 horse-rider system in dressage. *Sports Eng* 2001;4(2):95-101.

- 443 [33] Hawson L, McLean A, McGreevy P. Variability of scores in the 2008 Olympic dressage  
444 competition and implications for horse training and welfare. *J Vet Behav* 2010;5(4):170-  
445 76 Jun 25.
- 446 [34] Christensen K, Raposa E, Hagler M, Erickson L, Rhodes J. (2019). Role of athletic coach  
447 mentors in promoting youth academic success: Evidence from the Add Health national  
448 longitudinal study. *Appl Dev Sci* 2019;25(3):217-27 Apr 2.
- 449 [35] Hudson S. How does formal leadership influence a district content coaching  
450 program? (Dissertation) 2010. Kansas State University.
- 451 [36] Dyson S, Ellis A, Mackechnie-Guire R, Douglas J, Bondi A, Harris P. The influence of  
452 rider:horse bodyweight ratio and rider-horse-saddle fit on equine gait and behaviour: A  
453 pilot study. *Equine Vet Educ* 2019;32(10):527-539 Mar 31.
- 454 [37] Gunnarsson V, Stefánsdóttir G, Jansson A, Roepstorff L. The effect of rider weight and  
455 additional weight in Icelandic horses in tölt: part II. Stride parameters responses. *Animal*  
456 2017;11(9):1567-72 Dec 7.
- 457 [38] Sabiston C, Lucibello K, Kuzmochka-Wilks D, Koulanova A, Pila E, Sandmeyer-Graves  
458 A, Maginn D. What's a coach to do? Exploring coaches' perspectives of body image in  
459 girls sport. *Psych Sport Exer* 2020;48:101669 Feb 11.
- 460 [39] Monsma E, Gay J, Torres-McGehee T. Physique Related Perceptions and Biological  
461 Correlates of Eating Disorder Risk among Female Collegiate Equestrians. *J Athl Enhanc*  
462 2013;2(2) Feb 18.
- 463 [40] Torres-McGehee T, Monsma E, Gay J, Minton D, Mady-Foster A. Prevalence of Eating  
464 Disorder Risk and Body Image Distortion Among National Collegiate Athletic  
465 Association Division I Varsity Equestrian Athletes. *J Athl Train* 2011. Available at:  
466 [https://watermark.silverchair.com/1062-6050-46\\_4\\_431.pdf](https://watermark.silverchair.com/1062-6050-46_4_431.pdf)
- 467 [41] British Equestrian Trade Association - Market Information. (2021). Available at  
468 <https://www.beta-uk.org/pages/industry-information/market-information.php>. Accessed  
469 05/02/2021
- 470 [42] Scurr J, Brown N, Smith J, Brasher A, Risius D, Marczyk A. The Influence of the Breast  
471 on Sport and Exercise Participation in School Girls in the United Kingdom. *J Adolesc*  
472 *Health* 2016;58(2):167-73 Feb 1.

- 473 [43] Swami V, Tran U, Barron D, Afhami R, Aimé A, Almenara, C. *et al.* The Breast Size  
474 Satisfaction Survey (BSSS): Breast size dissatisfaction and its antecedents and outcomes  
475 in women from 40 nations. *Body Image* 2020;32:199-217 Feb 4.
- 476 [44] Coltman C, Steele J, McGhee D. Does breast size affect how women participate in physical  
477 activity? *J Sci Med Sport* 2019;22(3):324-29 Mar 1.
- 478 [45] Burnett E, White J, Scurr J. The Influence of the Breast on Physical Activity Participation  
479 in Females. *J Phys Activ Health* 2015;12(4):588-94.
- 480 [46] Burbage J, Cameron LJ, Goater F. The effect of breast support on vertical breast  
481 displacement and breast pain in female riders across equine simulator gaits. *J Vet Behav*  
482 2016;15:81 Nov 4.
- 483 [47] Keeling L, Jonare L, Lanneborn L. Investigating horse–human interactions: The effect of  
484 a nervous human. *Vet J* 2009;181(1):70-1 Apr 25.
- 485 [48] Wolframm I, Micklewright D. Pre-competitive arousal, perception of equine temperament  
486 and riding performance: do they interact? *Comp Exerc Physiol* 2010;7(1):27-36 Jun 11.
- 487 [49] Harris C, Bradlyn A, Coffman J, Gunel E, Cottrell L. BMI-based body size guides for  
488 women and men: development and validation of a novel pictorial method to assess weight-  
489 related concepts. *Int J Obes* 2008;32(2):336-42 Aug 14.
- 490 [50] Nawaz H, Chan W, Abdulrahman M, Larson D, Katz D. Self-reported weight and height:  
491 Implications for obesity research. *Am J Prev Med* 2001;20(4):294-298.
- 492 [51] Zhou X, Dibley M, Cheng Y, Ouyang X, Yan H. Validity of self-reported weight, height  
493 and resultant body mass index in Chinese adolescents and factors associated with errors  
494 in self-reports. *BMC Public Health* 2010;10(1):190 Apr 12.
- 495 [52] Dashper K, St John M. Clothes make the rider? Equestrian competition dress and  
496 sporting identity. *Annals Leisure Res* 2015;19(2):235-50 Oct 14.
- 497 [53] Randle H, Loy J. First steps to establishing an equestrian morphology: can Vitruvian ratios  
498 help? *Comp Exerc Physiol* 2020;16(1):63-74 Oct 15.
- 499 [54] Osório A. Performance Evaluation: Subjectivity, Bias and Judgment Style in Sport. *Grp*  
500 *Dec Neg* 2020;29(4):655-678 May 7.

- 501 [55] De Oliveira K, Clayton H, Dos Santos Harada É. Gymnastic Training of Hippotherapy  
502 Horses Benefits Gait Quality When Ridden by Riders with Different Body Weights. J  
503 Equine Vet Sci 2020;94:103248 Sep 12.
- 504 [56] Budden T, Dimmock J, Smith B, Beauchamp M, Rosenberg M, Jackson B. Overweight  
505 and obese men's experiences in a sport-based weight loss intervention for men. Psychol  
506 Sport Exer 2020;50:101750 Jun 30.
- 507 [57] McKinney C, Mueller M, Frank N. Effects of Therapeutic Riding on Measures of Stress  
508 in Horses. J Equine Vet Sci 2015;35(11-12):922-28 Aug 22.
- 509 [58] Stanger N, Chettle R, Whittle J, Poolton J. The Role of Preperformance and In-Game  
510 Emotions in Cognitive Interference During Sport Performance: The Moderating Role of  
511 Self-Confidence and Reappraisal. Sport Psychol 2018;32(2):114-24.
- 512 [59] Woodman T, Hardy L. The relative impact of cognitive anxiety and self-confidence upon  
513 sport performance: a meta-analysis. J Sports Sci 2003;21(6):443-57 Feb 7.
- 514 [60] Cameron LJ, Burbage J, Lewis V, Dumbell L, Billingsley E, Young K, *et al.* Breast  
515 biomechanics, exercise induced breast pain (mastalgia), breast support condition and its  
516 impact on riding position in female equestrians. Comp Exerc Physiol 2021; In Press:1-12  
517 Aug 16.
- 518 [61] BBC Sport. Sports bras: GB athletes to get bespoke underwear for Tokyo Olympics  
519 2021. Available at:  
520 <https://www.bbc.co.uk/sport/olympics/56293467#:~:text=More%20than%20100%20British%20Olympic,of%20several%20teams%20to%20benefit> Accessed 12/07/2021  
521
- 522 [62] Liechty T, Yarnal C. Older women's body image: a lifecourse perspective. Ageing Soc  
523 2010;30(7):1197-218 Jul 20.
- 524 [63] Runfola C, Von Holle A, Trace S, Brownley K, Hofmeier S, Gagne D, Bulik C. (2012).  
525 Body Dissatisfaction in Women Across the Lifespan: Results of the UNC-SELF and  
526 Gender and Body Image (GABI) Studies. Eur Eat Disord Rev 2012;21(1):52-9 Sep 5.
- 527  
528  
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