

# An investigation of bra concerns and barriers to participation in horse riding

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## RESEARCH ARTICLE

### Abstract

Horse riding is a female-dominated sport where participation levels are declining. The influence of the breast on participation levels and current satisfaction with bras for this activity is unknown. This study aimed to investigate bra concerns and breast-related barriers to participation in horse riding. A 6-part, 32 question online survey was completed by 1,324 females who participated in horse riding. Descriptive and chi-squared analyses were utilised; inductive content analysis was completed to analyse qualitative responses. At least one breast-related barrier was reported by 25% of all participants. Larger-breasted riders were less satisfied ( $P < 0.001$ ) with their bras. 70% of riders stated that improvements needed to be made in bras to help reduce breast health issues, with support, style and fit the most common reasons cited. This study highlights the importance of addressing breast-related barriers and provides rationale for the development of equestrian-specific breast support garments and educational initiatives.

**Keywords:** barriers, equestrian, physical activity, self-efficacy, clothing design

### 1. Introduction

The physical health, mental health and social benefits of physical activity have been widely evidenced and as a result existing advice from the Department of Health recommends that adults should participate in 150 min of moderate intensity physical activity per week (DofH, 2011). Horse riding and associated activities expend sufficient energy to be classed as moderate intensity exercise (British Horse Society, 2011), and it is the 6<sup>th</sup> most popular activity for UK women (WSFF, 2011). There is a strong gender bias with females representing 74% of the UK riding population (British Horse Society, 2015). Participation in equestrian activities has however decreased by over 11% in the last decade (October 2005 to March 2015; Sport England, 2015), which reflects the general decline seen in physical activity participation by female adolescents (Collings *et al.*, 2014). A relatively high latent demand for horse riding has been identified though, with 90,000 women wanting to do more than they currently do (WSFF, 2011). Horse riding is distinctive as a high proportion of those people participating (48%) take part in no other sporting activity (British Horse Society, 2011). This suggests that horse riding is relied upon for moderate intensity physical exercise,

and unless participants changed their exercise habits they would be otherwise sedentary. It is therefore important that any potential barriers identified that prevent females from engaging more frequently in horse riding, or to start engaging with the sport, are reduced.

Recent evidence suggests that breasts may be a barrier to physical activity for female adults and school-aged girls (Burnett *et al.*, 2015; Scurr *et al.*, 2016); yet limited attention has been given to the breasts in physical activity research. Burnett *et al.* (2015) reported that the breast was a barrier to participation in 17% of females and was the fourth greatest barrier reported behind energy/motivation, time constraints and health. The leading breast-related barriers were 'I can't find the right sports bra' and 'I am embarrassed by excessive breast movement'. In a population of school girls 46% reported that their breasts had some effect on their participation in compulsory sports and exercise, which was more prevalent in larger-breasted girls (63%; Scurr *et al.*, 2016). These studies highlight the need to further explore the influence of breasts on physical activity participation, especially as having large breasts and/or embarrassment due to excessive breast motion may affect a rider's self-efficacy and confidence.

Unique to females is the challenge of effectively reducing undesired breast motion to facilitate participation in sport and exercise. Due to limited intrinsic support independent breast movement occurs during physical activity (Page and Steele, 1999), which increases with breast size (Bridgman *et al.*, 2010; Lorentzen and Lawson, 1987). This can lead to breast pain, breast sag and embarrassment (Mason *et al.*, 1999; White *et al.*, 2009). The type of activity undertaken affects the magnitude of breast motion (Risius *et al.*, 2014) and it is proposed that due to the large vigorous vertical movements produced during horse riding (Terada *et al.*, 2006) breast motion will be similarly high to that reported for running and jumping activities. These vertical movements must be absorbed by the rider, dependent on skill level (Bogisch *et al.*, 2014) and are directly related to gait velocity (Bystrom *et al.*, 2009). Burbage and Cameron (2017) reported a relatively high prevalence of breast pain in a horse riding population (40%), which increased with breast size, and which affected performance in 21% of riders. Pain when riding has been suggested as a limiting factor in effective application of cues to the horse, imperative in training and performance, and are directly related to the rider's ability to maintain postural control (Patterson *et al.*, 2010). The rider's ability to maintain postural control may be impacted by pain and indeed Lewis and Kennerley (2017) found a highly significant relationship between elite riders competing with pain and their perception of a negative impact on riding performance.

Appropriate breast support is effective at reducing the negative health implications associated with breast motion. As the level of breast support increases, breast displacement (Mason *et al.*, 1999; White *et al.*, 2009), breast velocity (Scurr *et al.*, 2010) and breast acceleration (McGhee *et al.*, 2013) reportedly decreases. Yet despite the evidence, sports bra usage in a general Australian community was as low as 41% (Bowles *et al.*, 2008). Encouragingly 91% of women running the London Marathon in 2012 wore a sports bra for vigorous activity (Brown *et al.*, 2014a), yet the prevalence of sports bra use within a horse riding population has been reported as much lower. Interestingly, Burbage and Cameron (2017) reported that only 14% of smaller-breasted riders and 19% of larger-breasted riders exclusively wore a sports bra for horse riding, suggesting that there is a perception within this population that sports bras are not as important for this activity, despite a high number of riders experiencing breast pain.

The highest breast-related barrier found by Burnett *et al.* (2015) was 'I can't find the right sports bra' highlighting the difficulty women face when seeking appropriate breast support in a large and often confusing marketplace. Dissatisfaction in sports bras has been reported, particularly with shoulder straps digging into the shoulders or slipping off the shoulder (Bowles *et al.*, 2012; Brown *et al.*, 2014a), and rubbing/chafing (Brown *et al.*, 2014a), however bra

dissatisfaction within equestrian activities has not been investigated. It would be useful to understand from female horse riders what ergonomic improvements could be made in bras for this activity, especially as current usage is low and excessive exercise-induced breast movement and pain may adversely influence rider/horse interactions (Burbage and Cameron, 2017).

Wearing a well-fitting and supportive bra is important (Chen *et al.*, 2010; White and Scurr, 2012). Although it has been reported that women with large breasts may avoid getting professionally fitted due to embarrassment (Wood *et al.*, 2008), Brown *et al.* (2014a) found that marathon runners with larger breasts were twice as likely to get fitted as smaller-breasted women. In addition, nearly three-quarters of marathon runners reported to have average or below-average breast health knowledge (Brown *et al.*, 2014a). The uptake of bra fitting services and current breast health knowledge in horse riders is not known, although it is important to investigate to aid the development of population-specific educational initiatives.

In summary, horse riding is a popular activity for females yet the influence of the breast on participation levels, and current satisfaction with bras utilised for this activity, is unknown. Therefore, this study aims to explore the influence of the breast as a barrier to participation in horse riding, identify satisfaction with bras utilised for horse riding and to understand the current levels of breast health and bra fitting knowledge in female horse riders.

## 2. Material and methods

Following full institutional ethical approval, a 6-part 32 question on-line survey (Google<sup>®</sup> Forms) was made available to females who were aged 18 and over and participated in horse riding activity. The on-line survey was accessible for a four-month period; no incentive was offered to participants. An online survey was chosen as they reduce time, cost and potential error arising from the transcription of paper questionnaires, in addition to allowing participants to respond at their convenience (Vehovar and Manfreda, 2008). Volunteer participants were recruited from personal contacts via email and posters were placed within local riding stables. In addition, a number of specialist equestrian social media sites (such as the Horse & Hound forum) were identified and a link to the survey was posted on these sites. A snowball sampling technique was employed where those receiving an email regarding the survey were asked to send on the email to other female horse riders that they knew. Due to the anonymity of the survey, completion of the form was considered as consent to take part in the study (as explained to them in the participant information sheet preceding the survey).

The survey included Likert scale, multiple-choice and free-text format questions and was designed to take no longer than 15 min to complete. Breast health questionnaires used in previous research with a general population (Burnett *et al.*, 2015) and a marathon runner population (Brown *et al.*, 2014a,b) were modified for this study to ensure questions were tailored to horse riders. Section 1 identified bra usage and bra fit issues using Likert scales, which are reported in a concurrent paper (Burbage and Cameron, 2017). Section 2 identified any barriers to participation in horse riding experienced, along with the participant's horse riding commitments and level using multiple choice questions. Section 3 of the survey explored breast pain with a mixture of Likert scales, closed and free-text questions, the results of which are also reported by Burbage and Cameron (2017). Section 4 asked participants for their comments and improvements on bras and breast health issues. Sections 5 and 6 identified demographic information on breast history and personal characteristics. Prior to distribution the survey was piloted on horse riders (n=8) to ensure timings and the wording were appropriate.

In total there were 1,324 survey responses and data from Google Forms were downloaded into a Microsoft Excel (2010) spreadsheet. Of the 1,324 completed surveys, 59 were removed due to a missing or invalid self-reported bra size (a key variable of interest), resulting in a final sample size of 1,265 for subsequent analyses. The mode body mass range of participants was 55–64 kg (29%); age was negatively skewed with the mode age range of participants being 18–24 years (33%). The most popular equestrian activity participated in was dressage (38%), followed by leisure hacking and trekking (19%), show jumping (17%) and eventing (12%); 64% of participants owned a horse and rode most days. Out of the 1,265 valid bra sizes self-reported there were 81 different bra sizes represented (Table 1); cup size ranged from an AA cup to a J cup and underband

size ranged from 28 to 44 inches. The modal bra size was a 34B (n=112).

### Data analysis

Descriptive analysis was used to summarise participants' demographic profiles and barriers to participation. Pearson's chi-square  $\chi^2$  goodness-of-fit tests were utilised to assess the association of cup size with the extent to which bras met the needs of the participants, the frequency of horse riding participation, the uptake of professional bra fit services and breast health knowledge, in addition to the association of age with breast health knowledge. Cup sizes AA to C were classed as small-breasted (49% of participants), with cup sizes D and above classed as large-breasted (51% of participants) (Scurr *et al.*, 2010) for the  $\chi^2$  analysis. Age ranges were condensed into eight categories (18–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54 and  $\geq 55$  years) to meet Chi-squared assumptions. Cramer's V effect sizes have been presented, with 0.10, 0.30 and 0.50 representing a small, medium and large effect, respectively (Cohen, 1992); 95% confidence levels have also been reported to aid data interpretation. All statistical analysis took place using the IBM SPSS 22 statistics package with an alpha level of 0.05.

An inductive content analysis was completed to analyse the qualitative responses to the following question: 'What improvements in bras could be made to reduce breast health issues you experience during horse riding?' Responses were coded into general dimensions by one researcher and the results triangulated by another experienced researcher. The frequency of response for each theme is reported as a percentage of the total responses (n=367) to allow for the identification of response variations (Gibson and Brown, 2009).

**Table 1. Distribution of participants self-reported bra size (UK underband and cup size) (n=1,265).**

	Cup size													Total	
	AA	A	B	C	D	DD	E	F	FF	G	GG	H	HH		J
28			1			1	1		1	3					7
30		1	3	8	4	4	6		3	5	4		2		40
32		20	52	71	52	33	29	11	2	7	3	1			281
34	1	40	112	111	77	55	33	11	11	7	4	6	3	1	472
36	3	17	50	73	38	43	27	12	3	9	6	1	2		284
38		3	14	27	33	20	15	9		3	1	4	1		130
40			5	4	8	13	7	2		1	2	1			43
42			1	1	1							1		1	5
44						1	1	1							3
Total	4	81	238	295	213	170	119	46	20	35	20	14	8	2	1,265

### 3. Results

Participants were presented with a list of common barriers to participation in horse riding, including five breast-related barriers (Table 2). At least one of the five barriers relating to the breast was reported in 25% of all participants and the breast accounted for 17% of the total barriers reported (n=3,858). When split by breast size, 11% of small-breasted riders mentioned that at least one of the five breast-related barriers applied to them, compared with 38% of large-breasted riders. The fourth highest barrier to horse riding participation for large-breasted riders was breast size (25% reported that ‘their breasts were too big’), which comes above cost and other health reasons. Breast size was not associated with the frequency of horse riding participation ( $\chi^2(3)=5.199, P=0.158, V=0.064, 95\%$  confidence interval (CI) [0.03, 0.13]).

44% of participants felt that the bra they wore for horse riding sometimes, rarely or never met their needs for this activity (Figure 1); ‘Very often’ was the mode response. Breast size significantly affected responses ( $\chi^2(4)=52.218, P<0.001, V=0.204, 95\%$  CI [0.16, 0.26]). Small-breasted riders were more satisfied, with more respondents stating that their bra ‘Always’ (23%) or ‘Very often’ (42%) met their needs. Large-breasted riders were less satisfied, with more

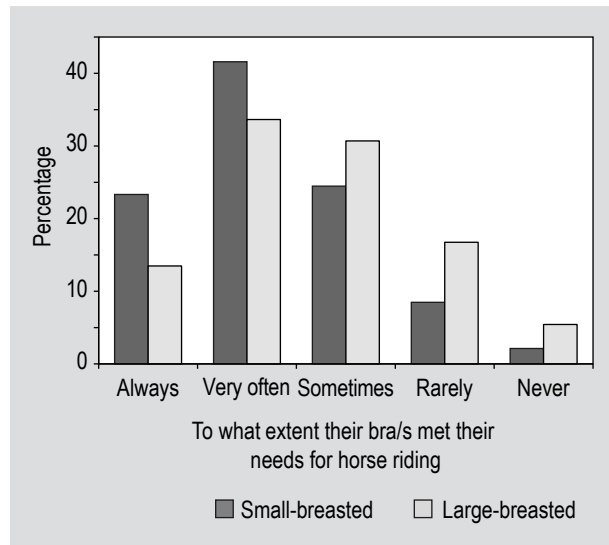


Figure 1. The extent to which participant’s bras met their needs for horse riding (n=1,258).

riders stating that their bra ‘Rarely’ (17%) met their needs than ‘Always’ (13%).

70% of participants stated that improvements needed to be made in bras to help reduce breast health issues in horse

Table 2. Percentage barriers to physical activity reported by small-breasted (n=586) and large-breasted (n=610) female horse riders. Barriers relating to the breast are in bold.

Small-breasted (n=586)	%	Large-breasted (n=610)	%
I haven’t got the time	36	I haven’t got the time	42
I don’t have time because of my work	33	I don’t have time because of my work	35
I haven’t got the energy	24	I haven’t got the energy	27
I need to rest or relax in my spare time	20	<b>My breasts are too big</b>	<b>25</b>
I can’t afford it	20	I need to rest or relax in my spare time	22
There’s no one to do it with	19	I have an injury or disability that stops me	21
I have an injury or disability that stops me	14	I can’t afford it	20
I’d never keep it up	11	<b>I am embarrassed by excessive breast movement</b>	<b>19</b>
I’ve got young children to look after	11	There’s no one to do it with	18
I’m not the sporty type	10	I’m not the sporty type	17
There are no suitable facilities nearby	8	I can’t find the right sports bra	17
I’m too shy or embarrassed	7	I am too fat	17
I might get injured or damage my health	7	I’ve got young children to look after	15
My health is not good enough	6	I don’t like the look of my breasts when I exercise	15
I am too fat	5	I’d never keep it up	14
<b>I can’t find the right sports bra</b>	<b>5</b>	I suffer with breast pain	14
I don’t enjoy physical activity	4	I’m too shy or embarrassed	11
<b>I don’t like the look of my breasts when I exercise</b>	<b>4</b>	There are no suitable facilities nearby	8
I haven’t got the right clothes or equipment	3	My health is not good enough	8
<b>I suffer with breast pain</b>	<b>3</b>	I might get injured or damage my health	7
I am embarrassed by excessive breast movement	2	I don’t enjoy physical activity	6
I’m too old	1	I’m too old	5
My breasts are too big	1	I haven’t got the right clothes or equipment	4

riding. There were 367 comments made in relation to this question and an inductive content analysis identified ten general dimensions: support, style, fit, size, comfort, specialist bras, cost, material, choice and shape (Table 3). The most frequent topic commented on was support (22%); namely riders commented that bras were not supportive enough for horse riding. This was followed by Style (16%); there were many comments relating to how the design of the bra could be improved to help increase support and to be more aesthetically pleasing. Fit was also an issue (15%), with comments suggesting that bras needed improved fit (i.e. be functional whilst also fitting well).

Nearly one-third of participants (31%) reported that it had been over a year since they were last professionally fitted for a bra, with 23% of participants reporting that they have never been fitted (Figure 2). Cup size was significantly related to the uptake of professional fitting services ( $\chi^2(4)=117.167, P<0.001, V=0.336, 95\% \text{ CI } [0.29, 0.39]$ ), with a higher proportion of participants with smaller breasts (42%) reporting never being fitted compared to participants with larger breasts (15%).

Less than a quarter (17%) of participants rated their current breast health knowledge or awareness as above average, with only 3% reporting excellent knowledge levels. Breast health knowledge significantly increased with age ( $\chi^2(21)=215.567, P<0.001, V=0.233, 95\% \text{ CI } [0.21, 0.27]$ ; Figure 3), with 15% of 18-24 year olds rating their knowledge as extremely poor, compared to just 1% of over 55's. Breast health knowledge also increased with breast size ( $\chi^2(4)=14.367, P=0.010, V=0.107, 95\% \text{ CI } [0.07, 0.17]$ ), with more larger-breasted participants rating their knowledge as above average or excellent than smaller-breasted participants.

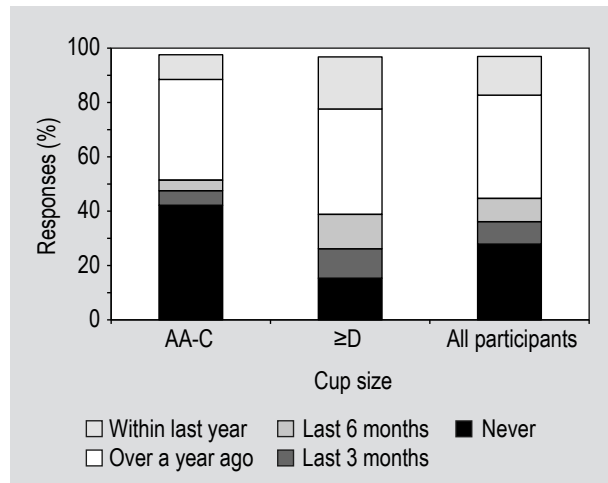


Figure 2. Frequency distribution of when small-breasted and large-breasted participants were last professionally measured for bra size (n=1,264).

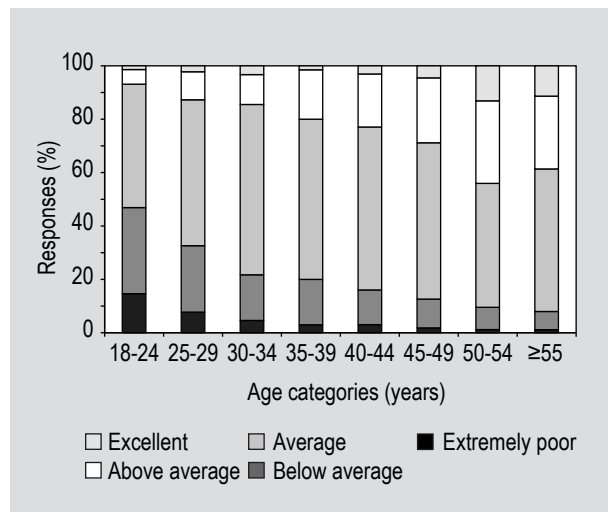


Figure 3. Age distribution of participants' rating of their knowledge or awareness of breast health issues (n=1,264).

Table 3. Improvements needed in bras to reduce breast health issues experienced (n=367).

General dimensions	% of response	Examples
Support	22	not supportive enough, need more support to reduce pain, need to minimise bounce more
Style	16	design to be improved (e.g. shoulder straps that do not slip), more aesthetically pleasing, easier to get on and off
Fit	15	better fitting bras needed, bras that are supportive without needing a tight fit, fitting without rubbing
Size	13	need better bras for larger riders, bras are not made small or large enough for needs
Comfort	8	more comfort needed, comfort for long rider sessions
Specialist bras	8	want a bra specifically designed for horse riding, modifications needed to existing products aimed at runners
Cost	6	sports bras available cost too much, need lower costs for quality products
Material	5	more wicking needed, more breathable fabrics, non-slip shoulder strap material
Choice	5	not enough choice on the market, wider range of sports bras needed
Shape	3	would like sports bras which give a nice shape, shape without flattening the breasts

## 4. Discussion

One of the key aims for this study was to ascertain the extent to which the breast acts as a barrier for females participating in horse riding. Overall, one quarter of female horse riders reported at least one breast-related barrier (38% larger-breasted riders and 11% smaller-breasted riders) (Table 2); this compares to 17% of women in the general population (Burnett *et al.*, 2015). Moreover, the breast accounted for 17% of the total barriers reported ( $n=3,858$ ), which is more than twice as high as what was reported by Burnett *et al.* (2015; 8%). These results suggest that breast-related barriers are more widespread in the horse riding population and may be contributing to the high latent demand for this activity (WSFF, 2011); they also highlight the importance of considering the breast when investigating the decline in physical activity levels in females.

The fourth highest barrier for larger-breasted riders was breast size ('My breasts are too big'), which was rated higher than common barriers such as cost and other health reasons. Interestingly, 51% of the horse riders surveyed were classed as 'larger-breasted' (D cup or above; Scurr *et al.*, 2010), which is considerably higher than the 37% reported in a marathon running population (Brown *et al.*, 2014a), despite the modal bra size being a UK 34B in both populations. This suggests that although a relatively higher number of larger-breasted females may be participating in horse riding than running, breast size is also seen as the greatest barrier for them to participate more often in this activity. Breast size did not, however, affect the frequency of participation in the sport (i.e. the number of times they ride per month), similar to findings in the general population (Burnett *et al.*, 2015). Whilst this is encouraging, it also suggests that many larger-breasted women may be riding in some discomfort, the impact of which on riding ability and rider/horse interaction is yet to be investigated.

Appropriate breast support is especially important for larger-breasted women when participating in physical activity as they experience more breast motion and breast pain (Bridgman *et al.*, 2010; Burbage and Cameron, 2017; Lorentzen and Lawson, 1987). 19% of larger-breasted riders in this study said they were embarrassed by excessive breast movement when they ride (Table 2), indeed the most frequent topic commented on when asked about improvements in bras needed was support (22%; Table 3), namely that bras were not supportive enough for horse riding. With 44% of respondents stating that the bra they wore for horse riding only sometimes, rarely or never met their needs for this activity there appears to be a demand for more appropriate, and perhaps equestrian-specific, bras. Improvements in equestrian specific bra design may also contribute to a reduction in breast pain, reported by 40% of survey respondents (Burbage and Cameron, 2017). This may then lead to an improvement in rider performance

(Lewis and Kennerley, 2017), ostensibly enhancing ridden horse welfare. Designing sports bras specifically for the size D (and larger) woman has previously been promoted (Bridgman *et al.*, 2010; McGhee and Steele, 2010; McGhee *et al.*, 2013), although it is also important that women with smaller breasts receive optimum support as breast movement can cause breast discomfort across all breast sizes (Lorentzen and Lawson, 1987).

Sports-specific breast support has previously been encouraged due to differences in breast motion reported across varying activity types (Risius *et al.*, 2014), although equestrian sports have not, as yet, been investigated. A horse rider is subject to a range of vigorous movements in response to the movements of the horse, especially in trot, canter and the collected form of these gaits (Bogisch *et al.*, 2014; Byström *et al.*, 2015; Münz *et al.*, 2014) and investigation is needed to quantify the potentially novel effect on breast motion to better inform the ergonomic design of equestrian-specific breast support. This may encourage greater usage of appropriate breast support in female horse riders and help to reduce breast-related barriers, such as excessive breast movement and not being able to find an appropriate bra. In particular, equestrian-specific breast support may need to come in a wider range of bra sizes to cater for the larger-breasted riders who perceive their breast size to be a barrier to them participating in the sport.

70% of participants felt that improvements were needed in bras to help reduce breast health issues in horse riding. After support, 'style' was the second highest area commented on in relation to improvements needed (Table 3), with frequent remarks relating to bras needing to be more aesthetically pleasing, an improved design and easier to get on and off. The notion of bras being more aesthetically pleasing for equestrian sports is interesting as in dressage, show jumping and the dressage aspect of eventing the 'look' of the outfit worn (often light coloured breeches, a white shirt with a black, blue or tweed jacket on top) is important; with the dressage element being subjectively judged, feeling 'smart' and 'elegant' may be important to rider self-confidence within this particular equestrian discipline. Træen *et al.* (2015) indicated that self-efficacy was important in successful horse-rider partnerships, which was negatively impacted by 'health issues'. Although breast health issues were not specifically mentioned in this study, having large breasts and an inappropriate bra which leads to embarrassment due to excessive breast motion, are negative issues which may be affecting rider's self-efficacy and subsequent self-confidence. Dashper and St John (2016) highlighted that the female horse rider was particularly vulnerable to issues of body image and reported that the act of donning 'competition' clothing made their sample change their own self-perception, with potential performance consequences. This may be of particular importance in

the subjectively judged dressage element of equestrianism where rider position and postural control contribute to the overall performance score (Hawson, 2010), as inadequate breast support could negatively influence this element (Burbage *et al.*, 2016).

There is no difference between the male and female competition wear which can mean that maintaining a feminine 'shape' can be important to some riders (Plymoth, 2012). Consequentially, compression sports bras which reduce the feminine shape by redistributing the mass of the breasts closer to the chest (Page and Steele, 1999) may be seen as inappropriate to some riders. Furthermore, wearing a brightly coloured or black sports bra may not be an attractive option to riders due to the potential visibility of this garment, especially in the summer when many will warm-up for long periods of time at competitions in their white shirt before putting their jacket on to enter the arena (Murray *et al.*, 2006). The style, colour and shape of an equestrian-specific bra would therefore need to be sympathetic to these factors.

Interestingly, horse riding is often not considered a 'sport' by many participants, general public and researchers (Devienne and Guezennec, 2000; Meyers, 2006; Sainas *et al.*, 2016), despite it being a moderate intensity exercise (British Horse Society, 2011) that can increase flexibility and joint torque in young adults (Kang *et al.*, 2013). This perception of horse riding as a 'pastime' rather than a 'sport', and the high percentage of participants who are requesting improvements in bras in this study, may be contributing to the low uptake of sports bra use in this population (33%; Burbage and Cameron, 2017), compared to running (91%; Brown *et al.*, 2014a). As nearly half of horse riders take part in no other sporting activity (British Horse Society, 2011) it could be reasonable to assume that they do not own a sports bra for other activities and may have a lower awareness of the products available, especially as sports bras are often targeted at runners. They may therefore be more comfortable purchasing and wearing a supportive bra if it were specifically marketed for equestrian sports, consequently increasing the sports bra usage in this population.

Improvements needed in bra fit were also frequently commented on (Table 3), with participants suggesting that bras need to be able to support without being a very tight fit or rubbing. However, 54% of participants had either never been professionally fitted, or it had been over a year ago (Figure 2). Despite a higher proportion of larger-breasted riders utilising a bra fitting service than smaller-breasted riders, which was also reported by Brown *et al.* (2014a) in a marathon running population, these results demonstrate either a lack of awareness of the importance of bra fitting or reflect the difficulty riders have finding appropriate breast support in the correct size. Improved education specific to

horse riding is needed to help this population understand how to achieve an appropriate bra fit. This will help to reduce fit issues that can lead to rubbing, poor posture and upper body pain (Burbage and Cameron, 2017), and may positively impact on sports bra uptake in this population.

Only 20% of participants rated their current breast health knowledge as above average or excellent (Figure 3), similar to a marathon runner population (Brown *et al.*, 2014a). Older and larger-breasted riders were the most aware of breast health issues but this study highlights that much more needs to be done to help improve these levels, especially for young riders entering the sport. Increased breast health knowledge will aid horse riders to identify appropriate breast support for their activity, to reduce excessive breast motion and embarrassment, and hopefully help to improve their own bra fit. Better awareness of breast health issues and specific information targeted at horse riders may help to reduce the breast-related barriers to participation, which is so important for a female-dominant sport where the numbers participating are declining (WSFF, 2011).

## 5. Conclusions

Breast-related barriers to participation in horse riding were commonly reported, with breast size being the fourth highest barrier to participation for larger-breasted riders (25%). This highlights the importance of addressing breast-related barriers to encourage more participation in equestrian sports, which has been declining in popularity. 70% of participants called for improvements to be made in bras for horse riding, providing rationale for the development of equestrian-specific breast support garments that are suitable for a wide range of breast sizes and are sensitive to the unique nature of the sport, which requires specific styling, shape and potentially support. It was also evident that greater awareness of bra fit and breast health issues was needed within this population, which could be addressed by specific educational initiatives.

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