

Manuscript Number: JAH1573-27MAY15R1

Title: The influence of the breast on sport and exercise participation in school girls in the UK.

Article Type: Original Article

Keywords: Bras; Physical activity; Adolescence; Health; Females

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Abstract: Purpose

Emerging evidence suggests that breasts may be a barrier to physical activity for adult females. With only 12% of UK 14 year old girls achieving exercise guidelines, to understand deterrents to exercise in this population, we should consider whether breasts may also influence sport and exercise participation in school girls. This survey based study investigated the influence of the breast on sport and exercise participation and breast-specific concerns in UK school girls.

Methods

A survey was developed to assess demographics, breast characteristics, breast-specific concerns in sport, breast knowledge, views on breast education, and sport participation. Chi-squared tests assessed associations between participation and breast size, sports bra use, and breast concerns.

Results

2089 school girls aged 11 to 18 completed the survey, for 97 their breasts had begun developing and 96% reported wearing breast support. 46% of girls reported that their breasts had some effect on their participation in compulsory sport and exercise, which was more prevalent in girls aged 13 to 14 years (51%) and in larger-breasted girls (63%). >50% reported never wearing a sports bra during sport. Breast concerns were high with 73% reporting ≥one breast-specific concern in sport; with breast bounce being most prevalent (38%).

Conclusions

As most of the breast concerns raised in this survey could be addressed via education and 87% of girls wanted to know more about breasts, this study demonstrates a need for breast education for school girls, which may reduce the influence of the breast on sport and exercise participation.



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**Ref: JAH1573-27MAY15**

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Dear Editors,

Please accept this revised manuscript following reviewer's comments, for consideration for publication in the Journal of Adolescent Health. Thank you for giving us the opportunity to revise and resubmit this manuscript.

We have revised the manuscript based on the comments made by the reviewers and as requested, we have submitted a point-by-point response to the comments raised by the reviewers. We appreciate the time and detail provided by each reviewer and would like to take this opportunity to express our thanks to the reviewers who identified areas of our manuscript that needed corrections or modification. We have incorporated the suggested changes into the manuscript to the best of our ability and the manuscript has benefited from these insightful revision suggestions.

We look forward to hearing from you regarding our revised manuscript and to respond to any further questions and comments you may have.

Kind regards

Professor Joanna Scurr

The influence of the breast on sport and exercise participation in school girls in the UK.

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### **Sources of funding**

Internal funding from the University of Portsmouth

### **Acknowledgements**

This study received no external funding. We would like to acknowledge the schools/colleges and girls that participated in this study. Additionally, we would like to acknowledge Sophia Chantizara for initial work on the focus groups.

### **Conflict of Interest**

This study was funded internally by the University of Portsmouth, who had no role in the study. None of the authors have any conflicts of interest associated with this research. The first draft of the manuscript was written by Professor Joanna Scurr. No form of payment was given to anyone to produce the manuscript.

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## **Abstract**

### **Purpose**

Emerging evidence suggests that breasts may be a barrier to physical activity for adult females. With only 12% of UK 14 year old girls achieving exercise guidelines, to understand deterrents to exercise in this population, we should consider whether breasts may also influence sport and exercise participation in school girls. This survey based study investigated the influence of the breast on sport and exercise participation and breast-specific concerns in UK school girls.

### **Methods**

A survey was developed to assess demographics, breast characteristics, breast-specific concerns in sport, breast knowledge, views on breast education, and sport participation. Chi-squared tests assessed associations between participation and breast size, sports bra use, and breast concerns.

### **Results**

2089 school girls aged 11 to 18 completed the survey, for 97 their breasts had begun developing and 96% reported wearing breast support. 46% of girls reported that their breasts had some effect on their participation in compulsory sport and exercise, which was more prevalent in girls aged 13 to 14 years (51%) and in larger-breasted girls (63%). >50% reported never wearing a sports bra during sport. Breast concerns were high with 73% reporting  $\geq$ one breast-specific concern in sport; with breast bounce being most prevalent (38%).

### **Conclusions**

As most of the breast concerns raised in this survey could be addressed via education and 87% of girls wanted to know more about breasts, this study demonstrates a need for breast

1 education for school girls, which may reduce the influence of the breast on sport and exercise  
2 participation.  
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8 **Key words:** Bras; Physical activity; Adolescence; Health; Females  
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## 10 **Implications and Contribution**

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18 This is the first study to identify a substantial influence of the breast on sport and exercise  
19 participation in school girls. Breast concerns during sport were high with 73% of girls  
20 reporting  $\geq$ one concern. Most concerns are addressable via education; therefore this study  
21 provides evidence for such an intervention in schools.  
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## 31 **Introduction**

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35 The physical changes that take place during puberty are considered of great psychological  
36 significance (1) and studies have reported that these physical changes have an influence on  
37 body image (1) and self-esteem (2). For girls, breast development is an important anatomical  
38 change that occurs during puberty. For approximately 85% of girls, the breasts are the first  
39 manifestation of puberty (3). In 2012, the Women's Sport and Fitness Foundation reported  
40 that girls in the United Kingdom (UK) dropped out of sport around the time of puberty, and  
41 that only 12% of 14 year old girls reached physical activity guidelines (4). Levels of physical  
42 activity among adolescent girls are known to be lower than those of boys (5) and associations  
43 have been found between personal factors such as body image and physical activity (6-8).  
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57 The first research on the effect of the breast on sport and exercise participation was recently  
58 published (9) and identified that the breast was a barrier to sports participation for 17% of  
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1 adult females. Burnett, White and Scurr (9) reported that the breast was the fourth greatest  
2 barrier to sport and exercise participation, behind energy/motivation (1st), time constraints  
3 (2nd), and health (3rd); however, the breast has rarely been considered in physical activity  
4 research. 'I can't find the right sports bra' and 'I am embarrassed by excessive breast  
5 movement' were the most influential breast related barriers to activity. Interestingly, Burnett,  
6 White and Scurr (9) also demonstrated that increased breast health knowledge was related to  
7 increased levels of sport and exercise participation, concluding that increasing breast health  
8 knowledge may reduce barriers to exercise participation in adult females. With the additional  
9 pressures of adolescence, it is reasonable to suggest that the breast may also play a role in  
10 deterring sport and exercise participation in adolescent girls.

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12 The breast contains weak internal support (10) and therefore physical activity causes  
13 independent breast movement, which increases with breast size (11). This independent  
14 movement has been associated with breast pain in up to 72% of exercising females (12).  
15 Additionally, it has been hypothesised that repeated loading of the supporting structures of  
16 the breast may cause irreversible stretch of these structures leading to breast ptosis (sagging)  
17 (10). This movement has also been suggested to cause embarrassment (13), and it may cause  
18 changes in functional movement (14). Although research has identified that appropriate  
19 breast support can be effective at reducing the negative consequences of breast movement  
20 (15), the bra marketplace can be overwhelming and confusing for the consumer. Bra fit  
21 issues are common and more problematic for larger-breasted women (16); poor bra fit may  
22 compromise the function of even the most appropriate breast support products (13). Research  
23 has identified that getting changed is an issue associated with school sports participation (17-  
24 19) and therefore, changing into a sports bra may also be difficult for school girls. These  
25 variables singularly or in combination add further rationale to the hypothesis that the breast  
26 may influence sport and exercise participation for school girls in the UK. However, school

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girl's breast-specific concerns during sport and exercise have yet to be investigated, and without this knowledge appropriate interventions in this area are difficult.

A previous breast education intervention for girls aged eleven to sixteen in Australia demonstrated improvements in bra knowledge, bra fit and levels of bra support worn (20). This study focused on adolescent athletes connected to sporting academies that provided sports science support and other specialist coaching services. However, in the UK little is known about the general adolescent female population's knowledge of breast health or bras and the influence that this may have on sport and exercise participation. Therefore, the aim of this study was firstly to investigate the influence of the breast on school and college girls' participation in sport and exercise, and secondly to understand their breast concerns. Based on the previous literature in the area, it was hypothesised that lower levels of sport and exercise participation would be associated with girls with larger breast sizes, girls with lower sports bra use, and finally with a greater number of breast-specific concerns. It was also hypothesised that reported effects of breasts on sport and exercise participation would be greater in year 8 onwards (from the age of 12 years onwards), compared to year 7 girls, and greater in larger-breasted girls compared to smaller-breasted girls.

## **Methods**

### **Survey Development**

Following full institutional ethical approval, a survey was developed using the following procedure. First, a literature review was conducted to aid the development of a discussion guide for four focus groups. These focus groups aimed to explore opinions, perceptions and experiences associated with the breast (not reported in this paper). Three of the focus groups were conducted with pupils aged 11 to 12 (n=6), 13 to 14 (n=6), and 16 to 18 (n=6) years respectively, and one was conducted with teachers (n=6). Focus group data were analysed using inductive content analysis, whereby raw data were grouped into themes, and themes

1 were grouped into higher order themes. Using these themes and the literature in the area as a  
2 framework, a group of four researchers (three breast health specialists and one psychologist)  
3 developed a six-part survey. The survey included multiple-choice, Likert scale and free-text  
4 format questions and was designed to take no more than 10 minutes to complete. An  
5 information sheet and consent form was included at the start of the survey, to enable  
6 participants to provide written informed consent. The survey assessed participant's  
7 demographics, sport and exercise participation, breast-related information (age, school  
8 attended, ethnic group, breast size and breast support preference), breast-specific concerns  
9 relating to sport and exercise and participants' views on breast education. The survey was  
10 piloted with five school girls who met the inclusion criteria for this study, leading to minor  
11 amendments to the wording and question order.  
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## 29 **Procedure**

30 Adolescent girls (n=2089) aged 11 to 18 years (15% in year 7; age 11 to 12, 23% in year 8;  
31 age 12 to 13, 25% in year 9; age 13 to 14, 25% in year 10; age 14 to 15, 7% in year 11; age  
32 15 to 16, 3% in year 12; age 16 to 17, and 2% in year 13; age 17 to 18) were recruited via  
33 schools and colleges (making it difficult to report a response rate). Inclusion criteria were  
34 minimal (female, in years 7 to 13). Schools and colleges were given the option to use an opt-  
35 in or opt-out procedure for parent/guardian consent. All schools and colleges chose the opt-  
36 out method which meant that if parents/guardians did not agree to their daughters'  
37 participation in the survey they informed the head teacher and their daughter was excluded  
38 from the study. Surveys were provided to each school or college, either in paper format  
39 (n=1869) or online (n=220). The questions and format of the online survey were identical to  
40 the paper-based survey to maintain equivalency and increase reliability of the mixed-mode  
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1 strategy (21). To establish descriptive statistics, electronic submissions were automatically  
2 logged and paper copies were collected, and manually entered into Microsoft Excel (2010).  
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## 6 7 **Statistical Analysis**

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9 Data were analysed using Predictive Analytic Software, the alpha level for statistical  
10 significance was set at 0.05 for all analyses. Chi-squared tests were used to assess the  
11 association of both compulsory (school) and non-compulsory sport and exercise participation  
12 with the following variables; breast size, school year, the frequency of sports bra use, and  
13 breast-specific concerns in relation to sport and exercise. For larger cross-tabulations, if the  
14 overall Chi-squared was significant, standardised adjusted residuals for the cell percentage of  
15 each subgroup were examined to determine which cell differences contributed to the Chi-  
16 squared test results. An adjusted residual score greater than 1.96 for a given subgroup  
17 percentage indicated that the subgroup differed significantly ( $p < 0.05$ ) from the overall group  
18 percentage. Effect size estimates for chi-square analyses were determined with the phi  
19 coefficient (Cramer's Variance ( $V$ ):  $V = 0.1$  is a small effect size,  $0.3$  is a medium effect size,  
20 and  $0.5$  is a large effect size (22)).  
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39 Participants were asked to rate the effect of their breasts on their sports participation on a  
40 scale of one to five and were categorised as no effect (1) and some effect (2 to 5). To explore  
41 if any of the associations outlined above differed between smaller and larger breasted  
42 participants, participants were categorised as having smaller breasts (A to C cup) or larger  
43 breasts ( $\geq D$  cup) (23-27).  
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## 53 **Results**

54 All participants attended a secondary school or college in England (40% single sex, 26%  
55 mixed sex and 34% single sex with boys only at sixth form). Of the respondents, 57% were  
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1 white, 22% were Asian, 10% were Black/African/Caribbean or Black British, 5% were  
2 mixed/multiple ethnic groups, and 6% reported other ethnic groups. Of those that responded  
3 to the question (n=1984), 97% stated that their breasts had started to grow and 96% reported  
4 wearing some form of breast support.  
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9 The mode participation in compulsory school sport and exercise was twice a week (n=831),  
10 compared to less than once a week (n=685) for non-compulsory sport (Figure 1).  
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13 Participation in compulsory sport was significantly associated with breast size ( $X^2=16.160$ ,  
14  $p=0.001$ , Cramer's  $V=0.121$ ), there was a significantly greater number of larger-breasted girls  
15 undertaking less than one compulsory session per week, compared with smaller-breasted  
16 girls. Interestingly, there was no association between breast size and participation in non-  
17 compulsory sport. Mode sports participation rates changed across school year reaching  
18 lower levels in years 10 and 11 for compulsory sport and 9, 10 and 11 for non-compulsory  
19 sport (Figure 2). Chi-squared analysis revealed no association between breast size and  
20 participation rates across any school year.  
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24 Overall, 46% of girls reported that their breasts had some effect on their sport and exercise  
25 participation, and this was significantly greater in larger-breasted girls (63%) compared to  
26 smaller-breasted girls (45%) ( $X^2=24.864$ ,  $p<0.001$ , Cramer's  $V=0.153$ ). There was also a  
27 significant association between school year and the reported effect of the breast on  
28 participation, with significantly less year 7 girls (38%) and more year 9 girls (51%) reporting  
29 that the breast had some effect on their participation in sport ( $X^2=14.323$ ,  $p=0.026$ , Cramer's  
30  $V=0.086$ ) (Figure 3).  
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34 Over half of the girls surveyed reported never wearing a sports bra, with only 10% always  
35 wearing a sports bra during sport and exercise. The frequency of sports bra use was  
36 significantly greater in those participating in more sport (compulsory  $X^2=22.301$ ,  $p=0.008$ ,  
37 Cramer's  $V=0.105$ , and non-compulsory  $X^2=65.592$ ,  $p<0.001$ , Cramer's  $V=0.181$ ). Of those  
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1 that reported their breast size, significantly more smaller-breasted girls reported never  
2 wearing a sports bra during compulsory sport (49%), compared to larger-breasted girls (35%)  
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4 ( $X^2=36.368$ ,  $p<0.001$ , Cramer's  $V=0.181$ ).  
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7 Seventy three percent of girls reported at least one breast-specific concern in relation to sport  
8 and exercise, with breast bounce when exercising (38%) and embarrassment when getting  
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10 changed because of breasts or bra (34%) being the most common concerns (Figure 4).  
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13 Additionally, 15% of girls were concerned that their breasts were too big to exercise. There  
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15 was a significant association between the number of breast-specific concerns in sport and  
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17 exercise and participation in compulsory sport ( $X^2=51.315$ ,  $p=0.009$ , Cramer's  $V=0.160$ ),  
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19 indicating that significantly more girls who experienced  $\geq$ eight out of nine concerns  
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21 participated in sport and exercise less than once a week, compared to girls with less concerns.  
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24 Compared to smaller-breasted girls, significantly more larger-breasted girls reported being  
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26 concerned about breast bounce when exercising (26%,  $X^2=52.621$ ,  $p<0.001$ , Cramer's  
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28  $V=0.221$ ) (Figure 4). Significantly more school girls taking part in compulsory sport more  
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30 than three times a week were concerned about 'how sports bras should fit' ( $X^2=13.375$ ,  
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32  $p=0.004$ , Cramer's  $V=0.083$ ) and 'the way breasts look during exercise' ( $X^2=10.551$ ,  
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34  $p=0.015$ , Cramer's  $V=0.074$ ), than those taking part in compulsory sport less than three times  
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36 a week (Table 1).  
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43 Of those surveyed, 87% wanted to know more about breasts in general and 44% wanted to  
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45 know more about breasts or sports bras for sports and exercise specifically. This was  
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47 significantly lower among those undertaking less compulsory sport, than those taking part in  
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49 more compulsory sport ( $X^2=19.234$ ,  $p<0.001$ , Cramer's  $V=0.101$ ). A significantly higher  
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51 proportion of larger-breasted girls wanted to know more about breasts or sports bra use  
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53 during compulsory sport and exercise, compared to smaller-breasted girls (60% and 48%,  
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55 respectively,  $X^2=10.984$ ,  $p<0.001$ , Cramer's  $V=0.103$ ).  
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## Discussion

This study addresses important gaps in the literature related to the influence of the breast on sport and exercise participation and breast-specific concerns in school girls in the UK. The results of this study show that the breast has a substantial influence on sport and exercise, with 46% of girls reporting that their breasts had an effect on their participation in compulsory sport. It was hypothesised that the reported effect of breasts on sports participation would be greater from year 8 onwards, compared to year 7; the results showed that the proportion of girls reporting an effect of their breasts on sports participation was lowest in year 7 (girls aged 11 to 12), and highest among year 9 girls (girls aged 13 and 14 years), supporting this hypothesis. With the later stages of puberty generally occurring in school year 9 (13 to 14 years of age; 28), it is interesting to note that over half of the girls in year 9 reported that their breasts had some effect on their participation in sport and exercise. Year 9 is also the age at which the Women's Sport and Fitness Foundation (4) reported the lowest participations rates for girls, with only 12% of 14 year olds meeting physical activity guidelines.

Additionally, it was hypothesised that compared to smaller-breasted girls, more larger-breasted girls would report an effect of their breasts on sport and exercise participation. Although the effect size was small, results showed that the proportion of girls reporting an effect of their breasts on sport and exercise participation was 18% greater in larger-breasted girls, supporting this hypothesis. Whilst it is recognised that other physical characteristics may also deter exercise participation, more larger-breasted girls reported taking part in compulsory sport and exercise less than once a week, compared to smaller-breasted girls, confirming the hypothesis that lower levels of sport and exercise participation would be associated with girls with larger breast sizes. If compulsory participation were truly

1 compulsory, participation levels should be comparable across breast sizes. These findings  
2 suggest that despite its compulsory nature, those who are self-selecting out of sport and  
3 exercise at school or college reported a larger breast size. This supports previous research that  
4 identified the breast as a barrier to physical activity for adult females. However, the  
5 prevalence of the effect in school and college girls (46%) is substantially higher than for the  
6 adult females who reported the breast as a barrier to exercise (17%) (9). This suggests that  
7 compared to adult females, it may be even more important to consider interventions for  
8 encouraging sport and exercise in school girls that incorporate breast specific aspects.  
9

10 Interestingly, there was no association between breast size and participation in non-  
11 compulsory sport. The limited research in this area makes it difficult to justify this finding,  
12 however, it may be that the types of compulsory sports are more challenging for larger-  
13 breasted girls and they opt to take part in different sports outside of school. Additionally, it  
14 may be that when taking part in non-compulsory sport, girls can avoid the use of communal  
15 changing rooms. Embarrassment getting changed because of their breasts or bra was reported  
16 by over a third of all school girls in this study.  
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18 Despite the influence of the breast on sport and exercise participation, half of the girls in this  
19 study never wore a sports bra, with only 10% reporting that they always wore a sports bra for  
20 sport and exercise. It was hypothesised that those reporting lower sports bra use would  
21 undertake less sport and exercise. The results showed that for those taking part in more sport,  
22 sports bra use was more prevalent, supporting this hypothesis. Although the associated effect  
23 size was small, interestingly, the statistics for sports bra use in school and college girls is  
24 much lower than that previously reported in adult females. Brown, Burnett and Scurr (29)  
25 reported 32% of a random cohort of adult females always wore a sports bra during sport and  
26 exercise, rising to 78% in active adult females, and Brown, White, Brasher and Scurr (23)  
27 reported sports bra adherence as high as 91% in adult female runners in the 2012 London  
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marathon. The lower levels of sports bra use in school and college girls, suggests an opportunity for breast education which has been previously shown as effective at increasing engagement in sports bra use in other populations (20) and may be even more important for young girls than adult females. Additionally, over a third of girls in the current study reported embarrassment when getting changed because of their breasts or bra. Previous research has identified that adolescent girls are reluctant to get changed in front of their peers (17-19), and therefore, the lower sports bra use among this population could also be attributed to lack of private changing facilities in schools.

The second aim of this study was to understand school girls' breast-specific concerns during sport and exercise. Seventy three percent reported at least one breast-specific concern in relation to sport and exercise. Breast bounce during sport was the most prevalent concern, and it was significantly more prevalent in larger-breasted girls. The results of this study also showed that the girls who reported more breast-specific concerns during sport, participated in less compulsory school sport.. Concerns with how a sports bra should fit and the way breasts look during exercise, were more prevalent in those girls undertaking more sport. With 15% of girls concerned that their breasts were too big to exercise, at this sensitive life stage, these findings contribute to our understanding of why the breast may deter sport and exercise participation in school girls.

Within this study 87% of girls reported wanted to know more about breasts and 44% specifically wanted to know more about the breast related to sport and exercise participation. Therefore, the results of this study provide an evidence base for the opportunity for a breast education intervention. When considering an intervention to address the breast-specific concerns related to sport that were reported by the girls in this study, appropriate breast support is known to significantly reduce breast bounce and breast pain during sport, which may limit embarrassment about their breasts and the way their breasts look during exercise.

1 Education on these breast-specific concerns may redress the balance between the pros and  
2 cons associated with the breast during exercise, encouraging behaviour change (20). Along  
3 with other interventions such as consideration of changing facilities in schools, a breast  
4 education intervention that promotes the benefits of appropriate breast support for sport and  
5 exercise, and incorporates training on bra selection and fit may help reduce these breast-  
6 specific concerns and encourage greater participation in sport and exercise in school girls.  
7 In conclusion, this is the first study in the UK to investigate the influence of the breast on  
8 sport and exercise participation in school girls. With nearly half of school girls reporting  
9 some effect, the results of this study show that the breast has an influence on sport and  
10 exercise participation. This effect was more prevalent in year 9 (13 to 14 years of age) and in  
11 larger-breasted girls, with these girls reporting lower participation levels in compulsory sport.  
12 These findings suggest that the breast may have more of an effect on participation in sport  
13 and exercise at this life stage than has been previously reported in adult females (9). Of those  
14 school girls surveyed only 10% reported always wearing a sports bra during sport and  
15 exercise, while half reported never wearing one. Nearly three-quarters of school girls  
16 reported one or more breast concerns, with breast bounce being the most prevalent issue.  
17 Results also showed that girls who reported more breast-specific concerns participated in less  
18 sport and exercise. The majority of school girls reported that they wanted to know more  
19 about breasts and the majority of the breast-specific concerns reported in this survey could be  
20 addressed via an educational intervention covering the benefits of appropriate breast support  
21 during sport, and incorporating training on bra selection and fit. Any such intervention may  
22 encourage greater participation in sport and exercise for school girls, contributing to healthy  
23 living.

## 59 **Conflicts of Interest**

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There are no conflicts of interests.

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Figure 1. Frequency of participation in compulsory and non-compulsory sport and exercise reported by all participants and by participants with smaller (A to C cup) and larger ( $\geq$ D cup) breasts\* (\*938 participants did not report their breast cup size).

Figure 2. Frequency and mode participation in compulsory and non-compulsory sport and exercise reported by participants across each school year (7 to 13).

Figure 3. The percentage of participants that reported that their breasts had some effect on their participation in sport and exercise across each school year (7 to 13).

Figure 4. Frequency of breast-specific concerns related to sport and exercise reported by all participants and by participants with smaller (A to C cup) and larger ( $\geq$ D cup) breasts<sup>†</sup>. (\* significantly higher in larger-breasted participants). (<sup>†</sup>938 participants did not report their breast cup size).

Table 1. Frequency of breast-specific concerns related to sport and exercise by participation in compulsory sport and exercise for all participants and for participants with smaller (A to C cup) and larger ( $\geq$ D cup) breasts<sup>†</sup>. (<sup>†</sup>938 participants did not report their breast cup size).

## Highlights

1. For 46% of schoolgirls their breasts had some effect on their sports participation
2. 10% of schoolgirls always wore sports bras during sport, while half never wore one
3. 73% reported at least one breast concern, with breast bounce the most prevalent
4. The more breast concerns the lower the participation in sport
5. 87% wanted to know more about breasts, highlighting the need for education

Table 1. Frequency of breast-specific concerns related to sport and exercise participation in compulsory sport and exercise for all participants and for participants with smaller ( $\leq A$ - $C$  cup) and larger ( $\geq D$  cup) breasts<sup>†</sup>.

Participation in compulsory school sport and exercise		<u>Breast concerns</u>					
		How a sports bra should fit		Way breasts look during exercise		Different types of sports bra	
		(n = 1949)		(n = 1945)		(n = 1962)	
		n	%	n	%	n	%
All participants	< once a week	204	16.2	205	34.1	207	14.5
	Once a week	522	20.1	526	25.7	522	11.9
	Twice a week	795	22.1	790	27.5	800	12.9
	$\geq 3$ times a week	428	<u>27.8</u>	424	<u>33.5</u>	433	15.5
	X <sup>2</sup>	1949	13.375*		10.551*		3.055
Smaller breasted participants	< once a week	75	16.0	73	37.0	75	<u>16.0</u>
	Once a week	252	21.8	230	27.6	362	13.5
	Twice a week	311	24.1	305	30.2	314	15.9
	$\geq 3$ times a week	208	<u>32.7</u>	209	36.8	209	20.1
	X <sup>2</sup>		11.328*		5.771		3.647
Larger breasted participants	< once a week	37	29.7	39	59.0	37	18.9
	Once a week	75	28.0	77	36.4	76	15.8
	Twice a week	69	30.4	70	40.0	69	13.0
	$\geq 3$ times a week	49	<u>57.1</u>	47	<u>63.8</u>	48	<u>33.3</u>
	X <sup>2</sup>		13.217*		12.465*		8.461*

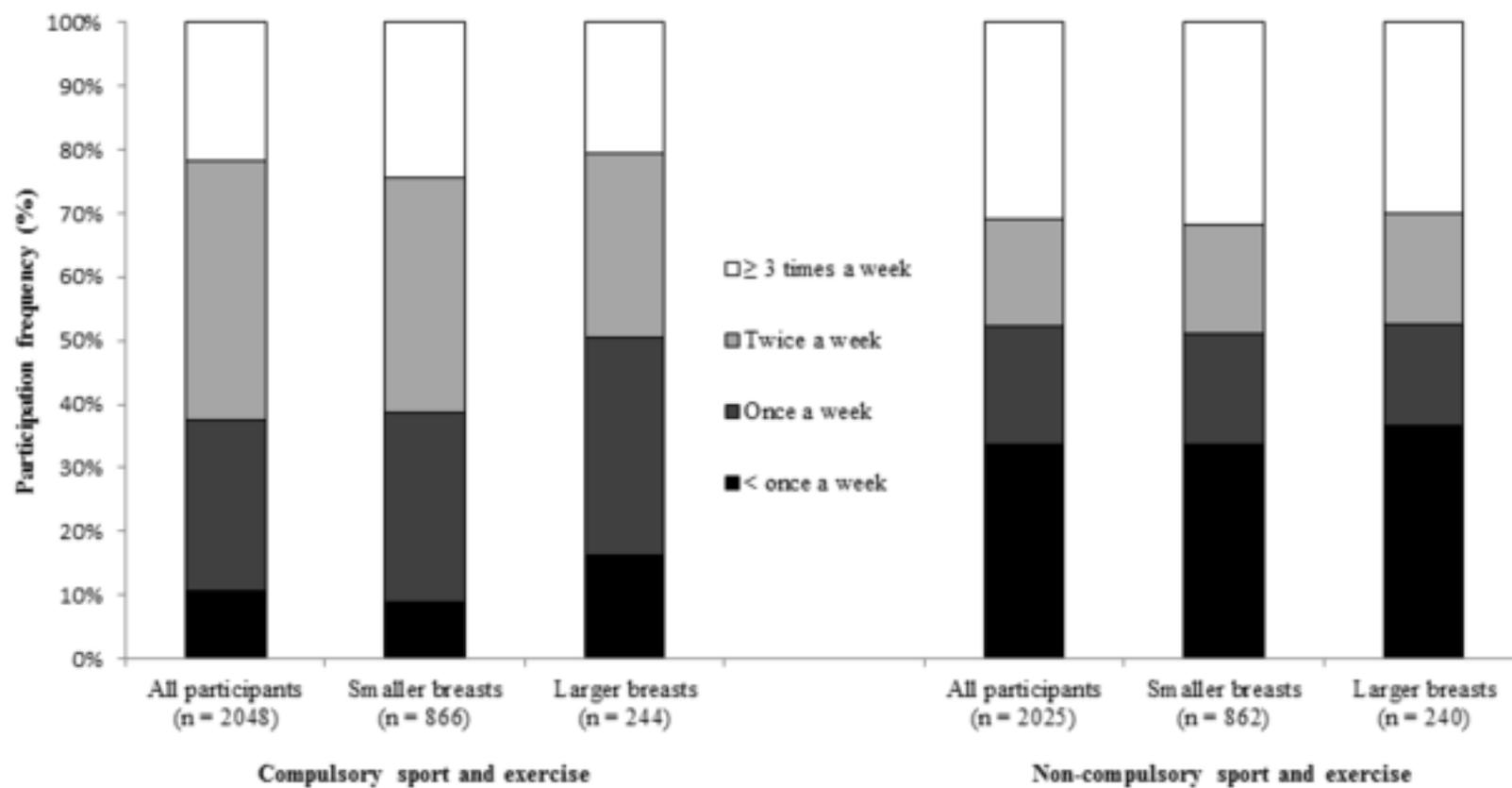
\* statistically significant association between breast concern and participation in compulsory school sport and exercise.

Underlined cells show significant adjusted standardized residuals

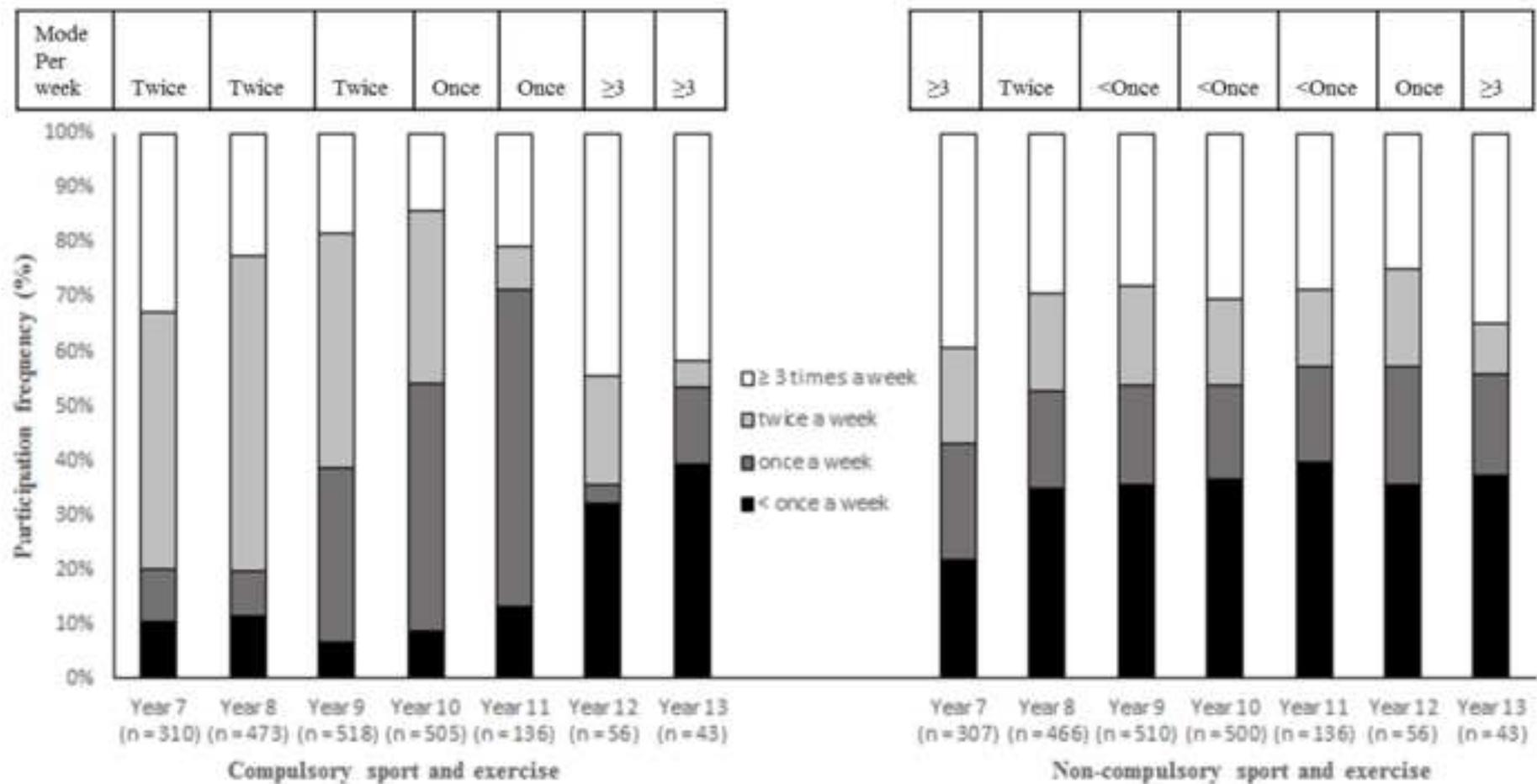
<sup>†</sup>938 participants did not report their breast cup size

F. Figure

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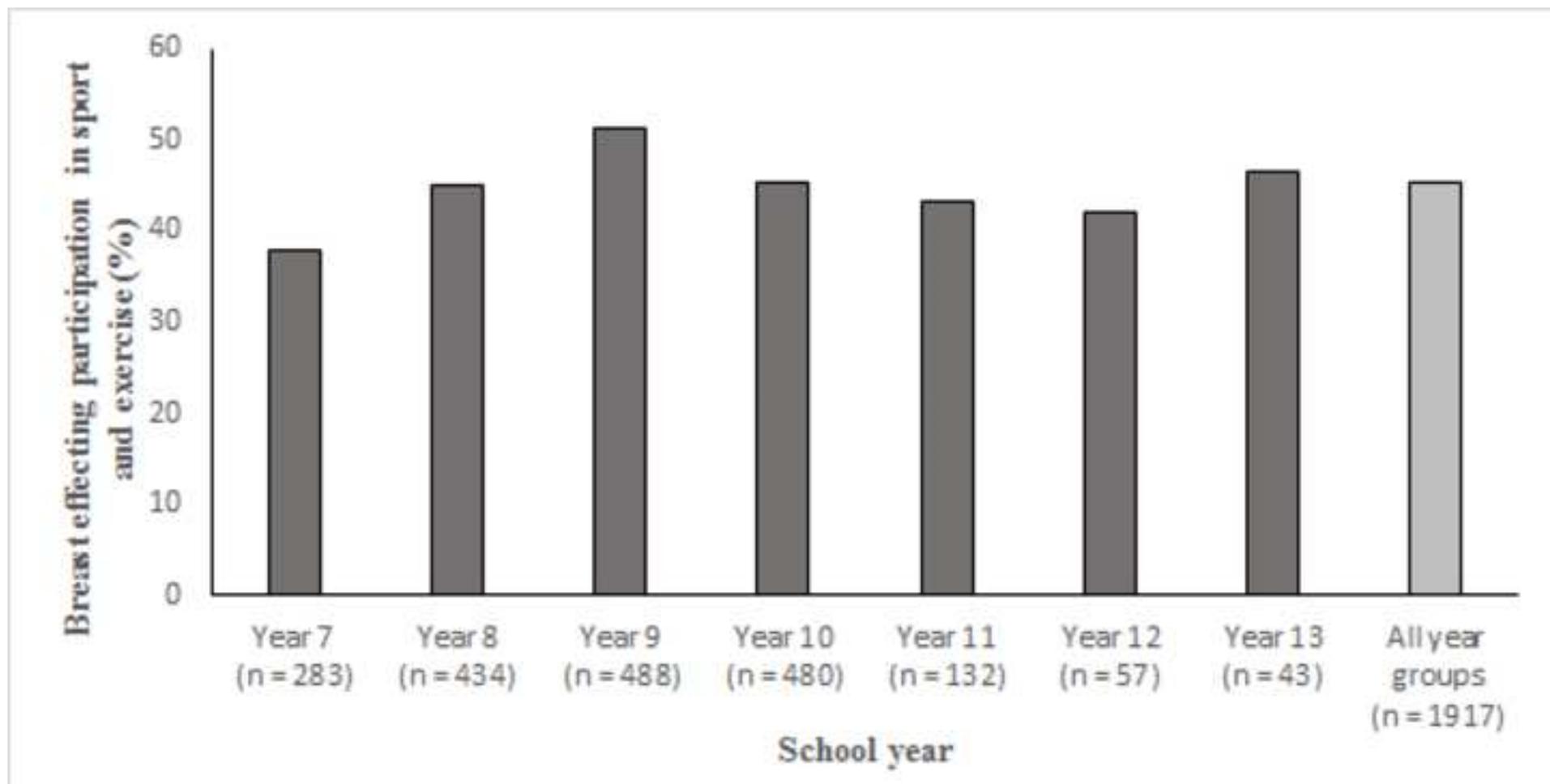


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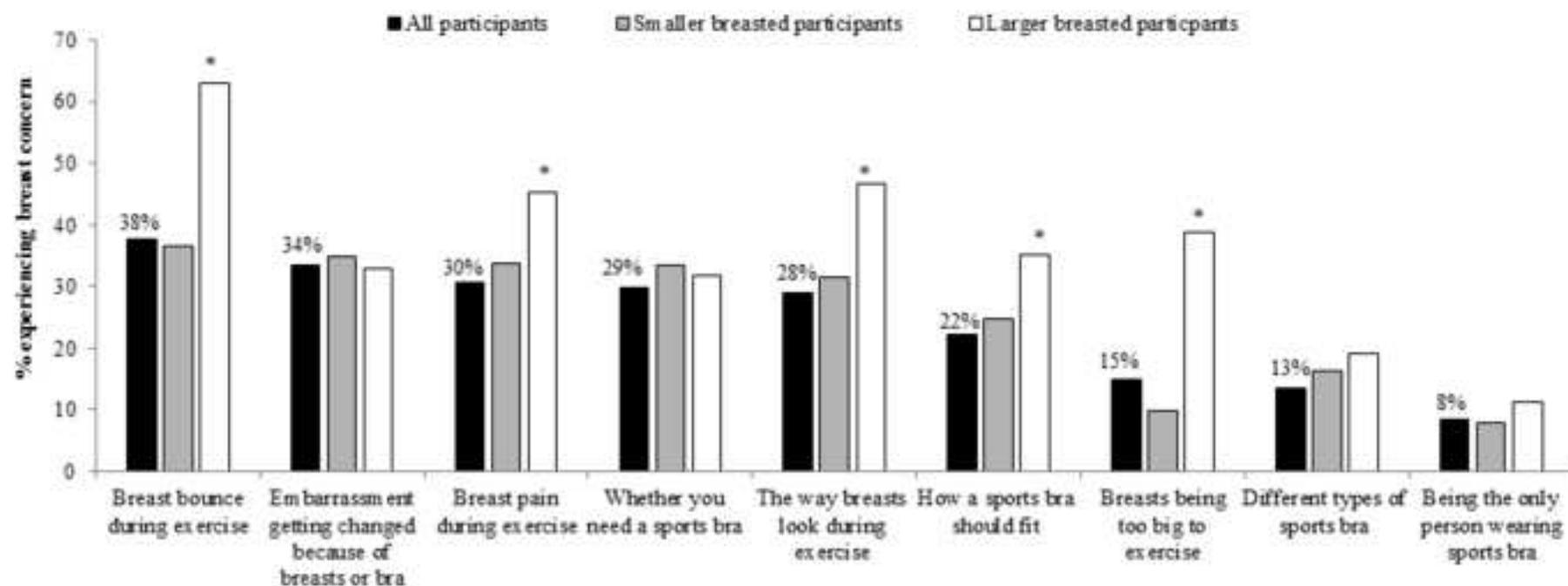
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All n =	1974	1972	1959	1949	1952	1956	1962	1969	1967
Smaller n =	848	848	843	844	840	849	842	840	847
Larger n =	238	230	229	229	233	230	234	230	232