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## **THE PREVALENCE, SEVERITY AND IMPACT OF BREAST PAIN IN THE GENERAL POPULATION**

**Joanna Scurr (PhD)<sup>1</sup>, Wendy Hedger (BSc)<sup>1</sup>, Paul Morris (PhD)<sup>2</sup>, Nicola Brown (PhD)<sup>3</sup>**

<sup>1</sup>Department of Sport and Exercise Science, University of Portsmouth

<sup>2</sup>Department of Psychology, University of Portsmouth

<sup>3</sup>School of Sport, Health and Applied Science, St Mary's University College

### **Nicola Brown (Corresponding Author)**

School of Sport, Health & Applied Science, St Mary's University College,  
Waldegrave Rd, Twickenham, TW1 4SX, UK

T: +44(0)20 8240 4821

F: +44(0)20 8240 4212

E: [nicola.brown@smuc.ac.uk](mailto:nicola.brown@smuc.ac.uk)

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## **ABSTRACT**

Breast pain has been investigated in clinical populations; however we have yet to understand the prevalence and severity of this condition in the general population to determine whether more should be done to minimise the impact of this condition on women's quality of life. Therefore, this study investigated the prevalence, severity and impact of breast pain on quality of life and factors associated with breast pain in a normal population sample. 1659 females ( $34.1 \pm 13.2$  years) completed the Breast Pain Questionnaire online, providing information on demographics, duration, frequency, and severity of breast pain, its association to the menstrual cycle, relieving and aggravating factors and the impact on quality of life. Over half the sample (51.5%) experienced breast pain, with a severity similar to that reported in clinical populations. There was a higher prevalence of breast pain in older participants, larger breasted participants and those who were less fit and active. 41% and 35% of symptomatic participants reported breast pain affecting quality of life measures of sex and sleep and 10% of symptomatic participants had suffered for over half their lives. The results of this study suggest that breast pain is a significant issue within the general population and yet this is the first study to investigate it. It is concluded that this condition warrants increased investigation, awareness and treatment. The reported relationship between breast pain and fitness/activity levels may offer an alternative treatment in the form of exercise intervention strategies to reduce breast pain.

## INTRODUCTION

Breast pain is one of the most common breast disorders experienced by women, and is reported as a frequent reason for breast related hospital visits (1). However, although the prevalence, severity and impact of this disorder has been studied in clinical populations, no studies have focused on the general population. In a review of breast pain, Ader and Shriver (1) reported a prevalence of 45% to 60% in UK clinical cohorts. In an epidemiological study Boyle et al., (2) reported that 41% of patients experienced premenstrual breast pain. Within a cohort of 2400 American women breast pain was the most frequent reason for visits to a Health Maintenance Organisation (3). Ader and Browne (4) investigated 1171 American women visiting obstetrics-gynaecology clinic and found that 69% experienced premenstrual breast discomfort.

The severity of breast pain has been reported within clinical cohorts (3-5). Carmichael et al., (6) recorded the intensity of breast pain for 76 women at a UK breast clinic using a 10 cm visual analogue scale. Breast pain was greater than 3.5/10 for 82% of women. Additionally, pain was rated as mild (26%), moderate (59%), and severe (15%), with 93% reporting pain for greater than 5 days in each menstrual cycle. In a sporting population, Brown et al., (7) identified that over half of symptomatic participants described the severity of breast pain as discomforting, yet 44% had done nothing to relieve their symptoms. Research into treatments for breast pain are limited; pain killers and/or breast support are the most common recommendations (8-9). However, the effectiveness of these treatments is varied

and for many women breast pain can negatively affect their lives, interfering with activity, relationships and quality of life (1, 6, 10).

Limited research has focussed on factors associated with breast pain. Cyclic breast pain has been associated with hormone changes during the menstrual cycle (3) and general breast pain has been associated with excessive breast movement (11) increases in breast size, body mass index and activity level (7). However, associated factors have not been investigated in the general population.

As outlined, the prevalence, severity and impact of breast pain has been investigated within sub populations however, little is known about breast pain within the general population and its effect on well-being. Furthermore, the relationship of demographics and lifestyle to breast pain is relatively unknown. Information about breast pain from the general population will determine whether this condition warrants greater reporting, awareness and treatment. Therefore, this descriptive study aims to assess the prevalence and severity of breast pain in the general population and identify the impact of breast pain on women's quality of life. Additionally, the study explores the relationship of participant's demographics and lifestyle to breast pain and identifies factors reported to increase, or relieve breast pain.

## **MATERIALS AND METHODS**

### **Setting and Sample**

Following full institutional ethical approval, a modified version of the McGill Pain Questionnaire, The Breast Pain Questionnaire (BPQ) was administered via the

Institutional website. In clinical populations the BPQ has been found to be suitable for use in larger cohort (5) and is considered a user-friendly, reliable and valid tool for assessing breast pain (6). On-line surveys are beneficial for researchers, reducing the time, cost and error arising from the transcription of paper questionnaires. It also allows the respondent to complete the questionnaire at their convenience and with an increased sense of privacy resulting in high data quality (12).

The only inclusion criteria for this study were women, over the age of 10 years. To ensure a high-response rate multiple recruitment strategies were employed. Participants were recruited via editorials in local and national newspapers and magazines in the UK and the USA and via the Institutional website. In addition a snowball recruitment approach was also adopted, this involved researchers emailing the web-link for the questionnaire to all their female contacts. The email requested questionnaire completion and the forwarding of the web link to all their female contacts. The questionnaire was live from November 2007 to August 2009. The principal investigators contact details were provided and participants were free to withdraw from the study at any time and did not have to give a reason. All data were anonymous.

### **Questionnaire**

The BPQ comprises 26 items and includes questions on breast pain (presence or absence, intensity, quality, frequency, duration since onset, relationship with menstruation, factors relieving or increasing pain) and a wide range of potentially associated factors (age, body mass, bra size, occupation, activity level, fitness level,

pre/post menopause, breast surgery, breast cancer). The BPQ also includes questions regarding the impact of breast pain on work schedules, sleep patterns and sexual activity. The questions vary in the nature of the responses required. Some answers are categorical, while others require a numerical analogue response. Free-text format responses identified factors that increase breast pain and methods used to relieve breast pain.

### **Data handling**

Responses were automatically downloaded into Microsoft Excel (2010) from the online survey and data were checked for accuracy by the principal investigator. Of the 1733 completed questionnaires, 39 cases were removed due to missing age responses, 27 were discarded due to missing bra size (a key variable of interest), and a further 7 cases were discarded due to nonsensical responses. This resulted in a final sample size of 1659 females.

### **Data analysis**

Descriptive and inferential statistical analyses were carried out using Predictive Analytic Software Statistics (version 18) and the alpha level for inferential analysis was set at 0.05. Data were analysed descriptively to summarise participant's demographic profiles and the prevalence and severity of breast pain. Chi-square tests were used for statistical comparison of breast pain across age, bra size, menopausal status, fitness level and activity level. Due to small frequency counts in cup sizes GG to JJ, these were condensed to one group ( $\leq$  GG) in order to meet Chi-square assumptions (13). Additionally, participants reported ages were grouped into six age categories ( $\leq$ 20.9 years, 21 to 30.9 years, 31 to 40.9 years, 41 to 50.9

years, 51 to 60.9 years,  $\geq 61$  years.) Less than 7% of participants had undergone breast surgery and less than 2% had been diagnosed with breast cancer, therefore exploratory analysis of these variables was not viable. Responses to open questions were content analysed by two independent researchers to establish key general dimensions.

## RESULTS

Participants had an average age [ $\pm$  standard deviation (SD)] of  $34.1 \pm 13.2$  years and the majority were pre-menopausal (85%) Reported breast cup size ranged from AA to JJ and underband size ranged from 28 to 54 inches (Table 1). In total 101 bra sizes were reported with the mode bra size a 34B, representing 12% of the study sample. Underband size was normally distributed; however the distribution of cup size was positively skewed.

\*Insert Table 1 here\*

The prevalence of breast pain in this sample was 52% ( $n = 854$ ). The mean severity of pain reported was  $4.2 \pm 2.1$  (out of 10), with 17 % reporting the severity of breast pain above 7 out of 10. The modal severity of breast pain reported by 24% of participants (24%) was 3 out of 10. Similar intensities of breast pain were reported for pre- ( $4.5 \pm 2.4$ ) and post-menopausal women ( $4.1 \pm 2.1$ ). Participants from 42 countries completed the questionnaire (Figure 1). The majority of responses were from the UK ( $n= 1313$ ) and USA ( $n= 184$ ) and display a similar prevalence of breast pain (52% and 50%, respectively).



\*Insert Fig. 1 here\*

The majority of symptomatic participants (59%) reported that their symptoms were discomforting, while 21% described their breast pain as mild and 10% as distressing. The pattern of breast pain was most commonly described as periodic (57 %) or intermittent (25%), with 11% of participants describing their breast pain as continuous or constant. Over 90% of symptomatic participants reported some degree of tenderness, with 43% rating the severity of tenderness as moderate, and 24% as severe (Figure 2). A further 17% and 15% of participants reported severe aching or heaviness, respectively.

\*Insert Fig. 2 here\*

Breast pain was reported to affect participants quality of life, with 41% of sufferers reporting that breast pain affected their sexual activity; 35% reporting that it affected their sleep and 5% reporting that it affected their work activity. Of the 660 participants that reported the duration that they had suffered from breast pain, the average duration was  $7.5 \pm 8.5$  years. Nearly 10% of participants had suffered from breast pain for over half their lives, with the majority (41%) of participants having suffered for up to 10% of their lives.

Figure 3 shows that the prevalence of breast pain increases linearly up to the age of 50, where it then decreases ( $X^2 = 66.696$ ,  $p < 0.05$ ). Between the ages of 41 to 50 years, 68% of participants reported suffering from breast pain within the last year.

\*Insert Fig. 3 here\*

In total 66% of participants with breast pain reported that it was linked to their menstrual cycle. As expected, the prevalence of breast pain was significantly higher in pre-menopausal women (71%) ( $X^2 = 65.963$ ,  $p < 0.05$ ). For those who experienced cyclic breast pain, this most frequently occurred in the week before menstruation (65%), or during menstruation (19%). Breast pain was not related to underband size ( $X^2 = 17.711$ ,  $p > 0.05$ ), however was significantly related to cup size ( $X^2 = 35.837$ ,  $p < 0.05$ ) with a higher incidence of breast pain in larger cup sizes (Figure 4).

\*Insert Fig. 4 here\*

The majority of participants rated themselves as moderately fit (69.9%) and described their level of activity as moderate (47%) or active (34%). Higher fitness and activity levels were associated with a lower prevalence of breast pain (activity:  $X^2 = 13.081$ ,  $p < 0.05$ ; fitness:  $X^2 = 14.997$ ,  $p < 0.05$ ) (Figure 5).

\*Insert Fig. 5 here\*

Despite the association between higher activity levels and lower prevalence of breast pain, 32% of symptomatic participants reported that activity/sport increased their breast pain. A further 23% of participants reported that bra-related factors, such as ill-fitting and non-supportive bras, also increased their breast pain. Other factors that were reported to increase breast pain included hormonal/menstrual factors (20%)

and increased pressure on the breast (19%). Over 10% of women reported that they did not know what increased their breast pain. A variety of methods were reportedly used by participants to relieve breast pain, with the most popular being wearing firm breast support (20%), heat therapy (15%) and pain medication (13%). In total, a fifth (20%) of participants reported either taking no measures to relieve their breast pain, ignoring their breast pain, or having not found a successful solution to their breast pain.

## **DISCUSSION**

The first aim of this investigation was to assess the prevalence and severity of breast pain in the general population and the impact of breast pain on women's quality of life. The prevalence of breast pain in clinical populations has been reported to range from 41% and 69% (1-3). The results of this study show that the prevalence of breast pain in the general population also falls within this range (52%). Two-thirds (66%) of sufferers reported cyclic breast pain, which is comparable with previous clinical findings (3), with symptoms most commonly occurring in the week before menstruation.

The severity of breast pain in the general population has not previously been compared with that reported in clinical settings. The present study findings identify that in the general population the mean severity of breast pain (4.2/10) is comparable to that reported in clinical settings using the same scale (4.5/10) (4-5). Additionally, 77% of participants reported pain scores of 3/10 or greater which is comparable to the results obtained Carmichael et al., (6) in a clinical setting, where 82% reported experiencing breast pain greater than 3.5/10. This suggests that the

general population experience a similar prevalence and severity of breast pain to that reported for clinical cohorts despite these participants not necessarily admitting themselves into a clinical environment.

The results of this study support the clinical findings of Carmichael et al., (6) showing that breast pain has an effect on sexual activity and sleep patterns for 41% and 35% of participants respectively. These values are equivalent to 21% and 18% of the entire population investigated in this study. In addition, the results indicate that on average participants have experienced breast pain for  $7.5 \pm 8.5$  years, with 10% of participants having suffered from breast pain for over half their lives. This highlights the negative impact of this condition on quality of life and demonstrates the need to identify effective treatments for breast pain which are readily available for the general population.

The second aim of this study was to examine the relationship between the demographics and lifestyle of this general population sample with the prevalence of breast pain. Results identified a higher prevalence of breast pain in pre-menopausal participants compared to post-menopausal; however, the severity of breast pain did not differ between the groups. The results also identified that increasing age, larger breast cup size, and lower fitness and activity levels were associated with a higher prevalence of breast pain. These are important findings, because whilst women have no influence over their age and limited influence over their breast cup size, they can affect their fitness and activity level. It is not known whether this result is cause or effect; for example, participants who experience no breast pain may be able to exercise more, rather than increasing levels of exercise resulting in a lower

prevalence of breast pain. Therefore, future longitudinal studies are required to monitor the effect of an exercise intervention on the prevalence of breast pain.

Interestingly, despite the association between higher fitness and activity levels and lower prevalence of breast pain, exercise related factors were reported to increase breast pain in 32% of symptomatic participants. Appropriate support for the breast (such as sports bras) is a common treatment for breast pain (8-9, 11) and is a particularly important consideration for exercising females (11). Whilst a well-fitting supportive bra was one of the most commonly reported method utilised by participants to relieve breast pain in the current study, the high number of participants reporting an increase in breast pain when exercising highlights the need to educate women on the importance of appropriate breast support and improve design and manufacture of breast support garments. Heat application was also a frequently used method to relieve breast pain. To the authors knowledge no literature has investigated the influence of heat application on reducing symptoms of breast pain. Whilst evidence exists to support the use of superficial heating of tissues to provide pain relief (14) the efficacy of therapeutic heat treatment for breast pain warrants further investigation.

Despite 92% of symptomatic participants reporting breast tenderness and 84% reporting aching breasts, 13% had taken no action to relieve their breast pain. A further 6% reported 'waiting' for breast pain to resolve itself and 2% reported having tried a number of methods without success. This further highlights the need to identify and explore evidence-based treatments for breast pain.

In conclusion, 52% of the general population sampled in this study experienced breast pain which was of a similar severity to that reported in clinical populations and yet this is the first study to investigate this condition in the general population. With breast pain effecting quality of life measures of sex and sleep in the 41% and 35% of symptomatic women and 10% of women suffering for over half their lives, the results of this study show that breast pain is a significant condition that warrants increased investigation, awareness and treatments. Breast pain was more prevalent in older participants, participants with larger breast cup sizes and in those who are less fit and active. The relationship of fitness and activity level to the prevalence of breast pain is a key finding and warrants further investigation to determine the potential for physical activity intervention strategies to reduce the prevalence of breast pain. Firm breast support was the most commonly reported factor to relieve breast pain and yet little research has investigated the mechanism of this relief.

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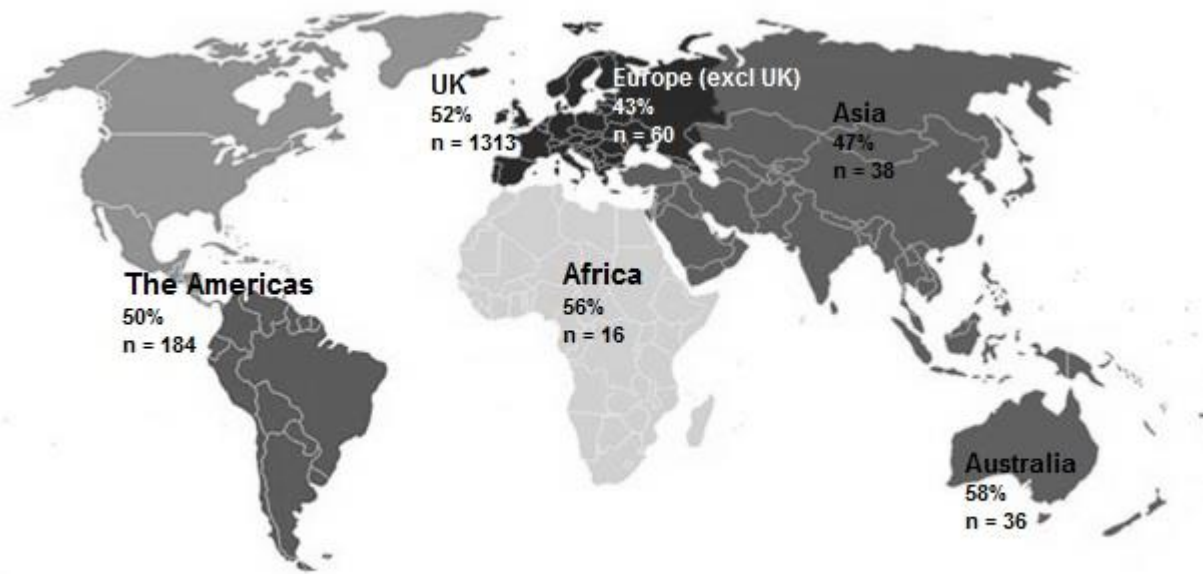
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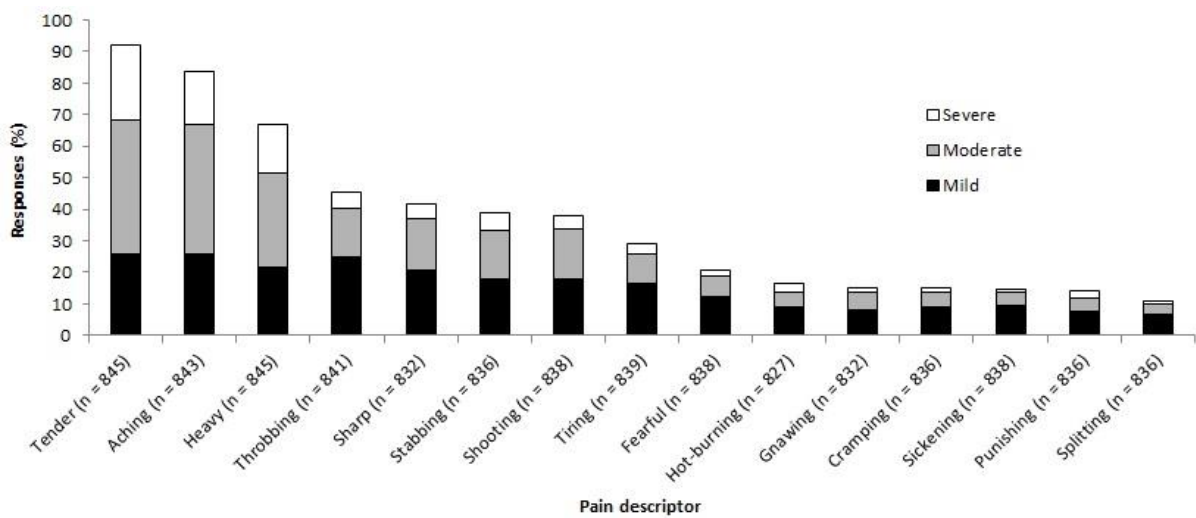


**Table 1.** Distribution of participants bra size (underband and cup size) (n = 1659).

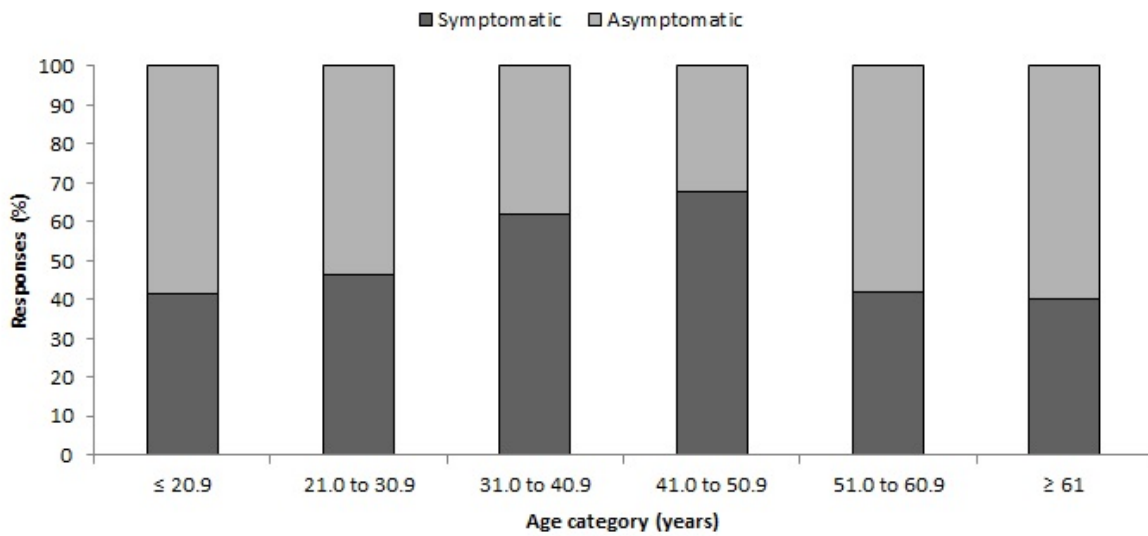
Underband (inches)	Cup Size														Total	
	AA	A	B	C	D	DD	E	F	FF	G	GG	H	HH	J		JJ
<b>28</b>	3	5	1	1		1		1	1	1						14
<b>30</b>	1	6	10	10	4	8	5	7	2	3		1	1			58
<b>32</b>	4	37	69	36	49	32	17	17	12	6		3				282
<b>34</b>	9	63	197	120	78	53	17	9	7	10	2	2			1	568
<b>36</b>	8	32	105	109	73	38	19	12	6	2	1	2		2		409
<b>38</b>	2	7	44	48	48	26	10	8	2	6	1	2	1			205
<b>40</b>			5	21	8	13	10	5	2	3	1					68
<b>42</b>			2	7	10	4	4	2		1						30
<b>44</b>				1	5	3	1	2		1						13
<b>46</b>					3		2	1		1						7
<b>48</b>							1	1	1				1			4
<b>52</b>				1												1
<b>Total</b>	27	150	433	354	278	178	86	65	33	34	5	10	3	2	1	1659



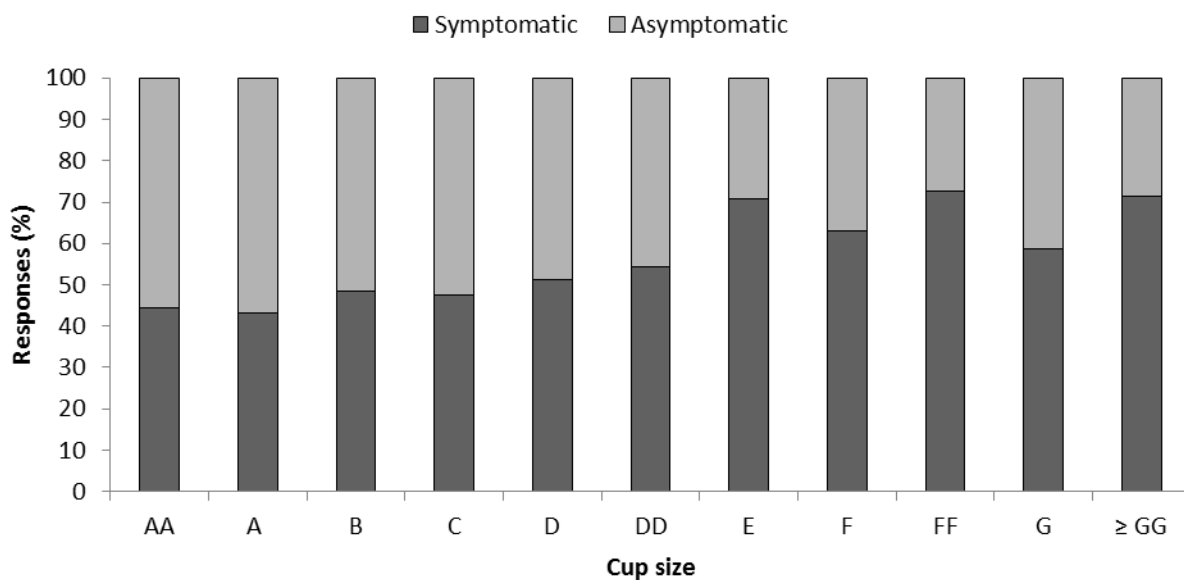
**Fig. 1.** World map denoting the prevalence of breast pain (percentage) reported by participants from each continent (plus the UK) (n = 1659).



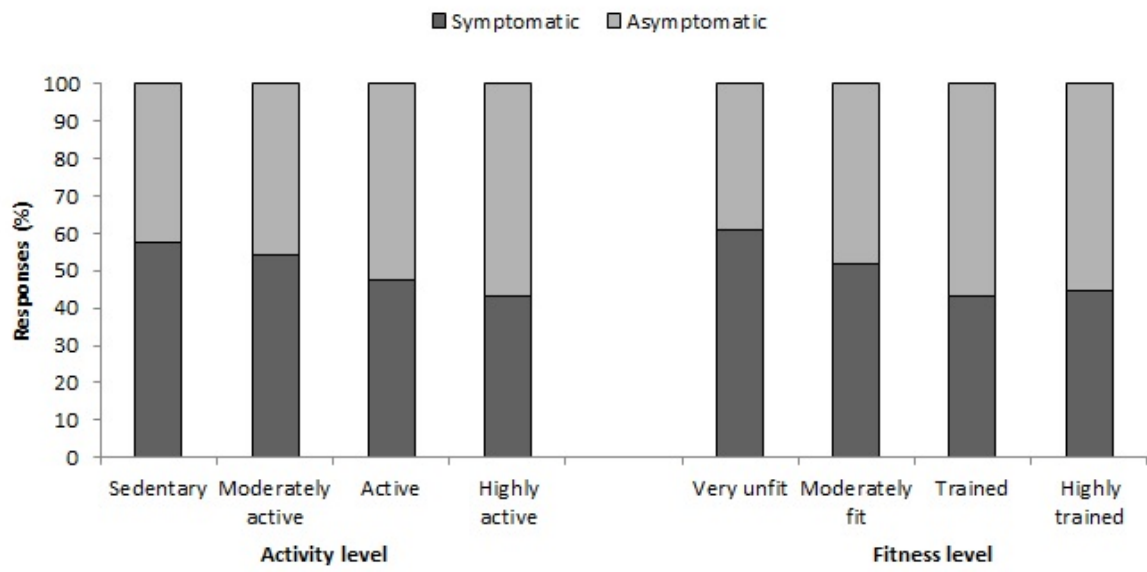
**Fig. 2.** Severity rating (mild, moderate, severe) of descriptors used to characterise breast pain.



**Fig. 3.** Prevalence of breast pain across age (n = 1659).



**Fig. 4.** Prevalence of breast pain across breast cup size (n = 1659).



**Fig. 5.** Prevalence of breast pain within each of the self-reported activity (n = 1657) and fitness categories (n = 1656).