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The Breast Size Satisfaction Survey (BSSS): Breast Size Dissatisfaction and its Antecedents
and Outcomes in Women from 40 Nations

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Abstract

The Breast Size Satisfaction Survey (BSSS) was established to assess women's breast size dissatisfaction and breasted experiences from a cross-national perspective. A total of 18,541 women were recruited from 61 research sites across 40 nations and completed measures of current-ideal breast size discrepancy, as well as measures of theorised antecedents (personality, Western and local media exposure, and proxies of socioeconomic status) and outcomes (weight and appearance dissatisfaction, breast awareness, and psychological well-being). In the total dataset, 47.5% of women wanted larger breasts than they currently had, 23.2% wanted smaller breasts, and 29.3% were satisfied with their current breast size. There were significant cross-national differences in mean ideal breast size and absolute breast size dissatisfaction, but effect sizes were small ($\eta^2 = .02-.03$). The results of multilevel modelling showed that greater Neuroticism, lower Conscientiousness, lower Western media exposure, greater local media exposure, lower financial security, and younger age were associated with greater breast size dissatisfaction across nations. In addition, greater absolute breast size dissatisfaction was associated with greater weight and appearance dissatisfaction, poorer breast awareness, and poorer psychological well-being across nations. These results indicate that breast size dissatisfaction is a global public health concern linked to women's psychological and physical well-being.

Keywords: Breast size; Breast ideals; Breast awareness; Personality; Psychological well-being; Cross-cultural psychology

1. Introduction

When a woman places her hand over her heart, it lies on and between her breasts. If her chest is the house of her being, from which radiates her energy to meet the world, her breasts are also entwined with her sense of self. [...] For many women, if not all, breasts are an important component of body self-image; a woman may love them or dislike them, but she is rarely neutral (Young, 1992, p. 215).

The body is a highly symbolic and important site for the creation, negotiation, and perpetuation of social and power relations (Backett-Milburn & McKie, 2001; Jeffreys, 2005; Scheper-Hughes & Lock, 1987; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). In this view, macro-level cultural factors – such as patriarchal structures (Bartky, 1990; Jeffreys, 2005), masculine aesthetics (Dworkin, 1974), and beauty systems (Bordo, 1993; Turner, 1984) – tie women’s moral, economic, and socio-political worth to their physical appearance and willingness to enact personal body projects. Concomitantly, those structures or systems also propagate prescriptive and unrealistic beauty ideals (Swami, 2015, 2020), rewarding women who strive and attain those ideals and punishing or denigrating those who do not (Forbes, Collinsworth, Jobe, Braun, & Wise, 2007; Kimmel, 2011; Ramati-Ziber, Shnabel, & Glick, 2019; Swami, Coles et al., 2010). To the extent that those beauty ideals are internalised by women, it often results in a host of detrimental outcomes (e.g., negative body image, symptoms of disordered eating, poorer psychological well-being) when women perceive themselves as being unable to embody those ideals (Rodgers, Campagna, & Attawala, 2019; Thompson et al., 1999; Tomiyama et al., 2018).

Much of the academic literature has focused on attainment of a thin ideal, but some work suggests this theorising may also apply to women’s breasts (Gripsrud, Ramvi, Froggett, & Hellstrand, & Manley, 2018; Lee, 1997) and “breasted experiences” (Young, 1992, p. 215).

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This is unsurprising considering evidence that the breasts play an important role in judgements and objectification of women (e.g., Bareket, Shnabel, Abeles, Gervais, & Yuval-Greenberg, 2019; Dixson, Grimshaw, Linklater, & Dixson, 2011; Swami & Tovée, 2013a), and are reported to be a focus of women's body anxieties (e.g., Beck, Ward-Hull, & McLear, 1976; Lee, 1997; Millsted & Frith, 2003; Young, 1992). Yet, comparatively little is currently known about women's breast dissatisfaction, particularly in terms of cross-national variations, as well as antecedents and outcomes. To rectify this gap in the literature, we report here on the results of the Breast Size Satisfaction Survey, a cross-national survey of breast size ideals and breast size dissatisfaction in women across 40 nations. Not only does this survey represent the largest multi-site study ever conducted on the issue of breast size dissatisfaction, it also provides important insights that will be of use to healthcare practitioners, policy-makers, and activists.

1.1. Breast Size and Dissatisfaction

Women's breasts vary along many dimensions, such as shape, symmetry, and firmness (Atiye & Chahine, 2018), but many contemporary beauty systems reportedly objectify women in terms of their breast size (Calogero & Thompson, 2010; Mazur, 1986; Seifert, 2005; Tantleff-Dunn, 2001). In particular, large breasts are commodified and fetishised in many forms of mainstream Western media (Einon, 2012; Gerald & Potvin, 2012; Ward, Merriwether, & Carruthers, 2006), particularly media that (re)produce stereotypical gender role discourse (Graff, Murnen, & Krause, 2013; Yockey, King, Vidourek, Burbage, & Merianos, 2019) and heteronormative expectations (Murnen, Poinsette, Huntsman, Goldfarb, & Glaser, 2015; Rodriguez & Hernandez, 2019; Rogers & Liebler, 2017; for a counter-point, see Webb, Vinoski, Warren-Findlow, Burrell, & Putz, 2017). That is, in contemporary cultural imagery, "female breasts are not celebrated or scrutinized for what they do, but for how they are supposed to look" (Naugler, 2009, p. 101). In addition to de-coupling breasts from their

functional purposes (e.g., child-feeding), contemporary popular culture also ties large breasts to conceptions of womanhood, so much so that large breasts have become a defining characteristic of femininity (Dozier, 2005; Gripsrud, 2008; Young, 1992).

This commodification and scrutinisation of breasts can influence how women feel about their own bodies (Bonillas, 2009; Goldsmith & Byers, 2016; Millsted & Frith, 2003; Webb, Jacox, & Temple-Oberle, 2019). Studies of North American and Western European women have documented high levels of breast size dissatisfaction – typically operationalised as a discrepancy between current and ideal breast sizes and, less frequently, as attitudes about breast size – since at least the 1950s (Forbes & Frederick, 2008; Forbes, Jobe, & Revak, 2006; Jacobi & Cash, 1994; Jourard & Secord, 1955; Tantleff-Dunn, 2002; Tantleff-Dunn & Thompson, 2000). For example, one large survey of North American heterosexual women ($N = 26,703$) reported that the majority (70%) were dissatisfied with some aspect of their breasts and that, of these participants, 28% wanted larger breasts (Frederick, Peplau, & Lever, 2008). In Western Europe, studies have reported that a majority of sampled women in the United Kingdom (Swami, Cavelti, Taylor, & Tovée, 2015, Study 3 = 54.3%, Study 4 = 53.3%) or close to a majority in the United Kingdom (Swami et al., 2015, Study 2 = 49.7%; Swami & Furnham, 2018: 44.2%) and Italy (Lombardo, Panasiti, Vacca, Grano, & Swami, 2019: 44.4%) wanted larger breasts than they currently had.

Much less research has examined rates of breast size dissatisfaction outside North America and Western Europe, a neglect that is important because the ethnographic record suggests some variation in ideal breast size, at least historically (Ford & Beach, 1951). In particular, some cultures may essentialise the performativity of womanhood and gender identity through symbolic associations with large breasts. For example, some scholars have discussed the heightened cultural pressure experienced by Latin American women to demonstrate femininity and sexuality through breast fullness (Correa & Shohamy, 2018;

Guimarães et al., 2015). Consistent with this view, Junqueira and colleagues (2019) reported that 65.5% of Brazilian women in their study desired larger breasts than they currently had, although it should be noted the sample consisted primarily of young women. In contrast, East and Southeast Asian women typically have smaller breasts than women in other parts of the world (Lim et al., 2018), and some literature has proposed that breasts have historically played a subsidiary role in terms of the cultural objectification of women in this region (Miller, 2003; see also Menon, 2019) and are emphasised less often in perceptions of femininity (Bak-Sosnowska, Pawlicka, & Warchał, 2016; see also Ching & Xu, 2019). Likewise, some non-Western communities may construe large breasts as problematic, either because large breasts are perceived as a cause of disease (e.g., breast cancer; Naanyu et al., 2015) or because being large-breasted is stereotypically associated with hypersexuality (Liebelt, 2019) and narcissism (see Smith, 2017).

Nevertheless, it is also possible that breast size ideals are becoming increasingly homogenised across the globe. For example, in relation to the thin ideal, scholars have discussed how the inter-related forces of globalisation (particularly in terms of the proliferation of Western mass media and Westernised beauty ideals) and modernisation (e.g., changing nutritional and lifestyle patterns, disruptions to gender inequality and traditional gender roles) have served to enforce a homogenised preference for thinness across much of the globe (Anderson-Fye, 2018; Brewis, Wutich, Falleta-Cowden, & Rodriguez-Soto, 2011; Swami, 2015). This is supported by empirical data showing a relatively standardised preference for female thinness and similar rates of actual-ideal weight discrepancy across nations (e.g., Swami, Frederick et al., 2010). Similar processes have not been examined *vis-à-vis* breast size, although some scholars have suggested the increasing commodification and objectification of large breasts in some parts of the world (e.g., in East and Southeast Asia; Rongmuang et al., 2011; Wong, 2019), as well as a marked shift away from a focus on the

functions of the breasts toward their treatment in purely aesthetic terms (Miller, 2006). In the absence of empirical data, however, it is difficult to know to what extent a homogenising pattern could be observed globally, and so a first aim of the present study was to examine breast size ideals and breast dissatisfaction across diverse national sites.

1.2. Antecedents of Breast Size Dissatisfaction

Here, we also considered antecedents of breast size ideals and breast size dissatisfaction, which have not been investigated in any depth in previous research (Lombardo et al., 2019). One such potential antecedent is socioeconomic status: in terms of the thin ideal, for example, cross-sectional (e.g., Mintem, Horta, Domingues, & Gigante, 2015; Swami, Frederick et al., 2010; Swami, Jones, Einon, & Furnham, 2009; Swami & Tovée, 2005a, 2005b), experimental (Swami & Tovée, 2006), and ethnographic (Anderson-Fye & Brewis, 2017) research has documented an inverse relationship between socioeconomic status and idealisation of a thin ideal. In explanation, it has been suggested that individuals from sites of relatively low socioeconomic status may idealise larger body sizes because body fat is symbolic of resource security (e.g., access to food or wealth), whereas thinness comes to be associated with wealth and status in sites of relatively higher socioeconomic status (for reviews, see Fox, Feng, & Asal, 2019; Swami, 2015, 2020). A similar pattern has been proposed for breast size ideals, with cross-sectional and experimental research suggesting a preference for larger breast sizes with decreasing socioeconomic status (Dixson, Vasey et al., 2011; Swami & Tovée, 2013b; but see Gray & Frederick, 2012). As such, it might be expected that there would be variation in what is perceived to be the ideal breast size as a function of inter-individual differences in socioeconomic status.

On the other hand, rates of breast size dissatisfaction (i.e., a discrepancy between current and ideal breast sizes) might be expected to be lower among participants of lower socioeconomic status. For example, based on data from research sites in two nations

(Malaysia and South Africa) that differed in socioeconomic status, Swami, Frederick and colleagues (2010) reported significantly lower actual-ideal weight discrepancy in participants from sites of relatively low compared to high socioeconomic status. Similar findings have also been reported in Brazil (Laus, Miranda, Almeida, Braga Costa, & Ferreira, 2012), Malaysian Borneo (Swami, Kannan, & Furnham, 2012), and Mexico (Penelo, Negrete, Portell, & Raich, 2013), with participants from sites of higher socioeconomic status reporting more negative body image compared to those from sites of lower socioeconomic status. This suggests that participants of relatively low socioeconomic status would report lower rates of breast size dissatisfaction. There are a number of reasons for expecting this pattern of results (for reviews, see Anderson-Fye & Brewis, 2017; Swami, 2015), including lower pressure from beauty systems to attain beauty ideals in sites of relatively low socioeconomic status and lower exposure to Western mass media that construct large breasts as ideal.

In terms of the latter, previous cross-national research has shown that exposure to Western media is significantly associated with both the idealisation of thin female bodies and women's body dissatisfaction (Swami, Frederick et al., 2010). Some research has examined the impact of exposure to mass media on breast size ideals and breast size dissatisfaction. For example, qualitative research with women from the United States has implicated exposure to large breasts depicted in mass media as an important influence on breast size dissatisfaction, despite participants' stated dislike of those mediated images (Goodman & Walsh-Childers, 2004). Similarly, exposure to idealised bodies in mass media has been associated with a preference for larger breasts in college-aged North American women (Harrison, 2003) and has also been associated with negative feelings about women's own breasts (Frederick, Daniels, Bates, & Tylka, 2017). One study with rural Nicaraguans found that exposure to Western television was associated with a preference for larger breasts (Thornborrow, Jucker, Boothroyd, & Tovée, 2018), although the study only considered men's ratings of women.

Alternatively, some scholars have suggested that media effects have been exaggerated (e.g., Ferguson, 2018; Swami, 2020). For example, Ferguson's (2013) meta-analysis, which included studies that were mainly conducted in advanced economies, concluded there was no overall effect of media exposure on women's body dissatisfaction. Instead, they concluded that media effects on body dissatisfaction were limited to those with pre-existing body dissatisfaction or possibly those with vulnerable personality traits, such as high Neuroticism. In fact, aside from this potential moderating role, Neuroticism has also been found to be directly associated with more negative body image (Frederick, Sandhu, Morse, & Swami, 2016; Sutin & Terracciano, 2016; Swami, Taylor, & Carvalho, 2011; Swami et al., 2013). Indeed, one recent systematic review reported that Neuroticism was positively associated with negative body image in women (Allen & Walter, 2016), possibly because individuals high in Neuroticism are more self-conscious and vulnerable to body image threats. Relationships between other personality traits and body image are more equivocal (Allen & Celestino, 2017; Allen & Walter, 2016; Swami & Furnham, 2016), though it should be noted that no study has examined associations with breast size dissatisfaction specifically.

1.3. Outcomes of Breast Size Dissatisfaction

In terms of the body image literature, breast size dissatisfaction is typically conceptualised as a facet of negative body image more generally (Ålgars et al., 2011; Swami et al., 2015). Thus, we would expect significant associations between breast size dissatisfaction and other indices of negative body image. Indeed, the available evidence supports such associations: greater breast size dissatisfaction has been found to be significantly associated with greater body dissatisfaction (Forbes & Frederick, 2008; Frederick et al., 2006; Swami et al., 2015; Swami & Furnham, 2018), greater actual-ideal weight discrepancy (Junqueira et al., 2019; Swami et al., 2015), lower body appreciation (Junqueira et al., 2019; Swami et al., 2015), greater appearance preoccupation (Koff &

Benavage, 1998), and greater drive for thinness (Swami et al., 2015). The strength of associations has generally been weak-to-moderate (e.g., Swami & Furnham, 2018), although it should be noted that at least one study found no significant association with body image disturbance (Tantleff-Dunn & Thompson, 2000). Beyond indices of body image, two studies have reported that greater breast size dissatisfaction is significantly, albeit weakly, associated with lower self-esteem (Koff & Benavage, 1998; Swami et al., 2015; but for a null effect, see Tantleff-Dunn & Thompson, 2000).

Another important outcome of breast size dissatisfaction may be decreased breast awareness, which involves familiarity with one's breasts (i.e., how they normally look and feel, and how they change throughout a woman's life), as well as the confidence to notice and detect any change (e.g., through breast self-examination for breast cancer symptoms) and to seek immediate medical help when a change is detected (McCready, Littlewood, & Jenkinson, 2005; Thornton & Pillarisetti, 2008). Although healthcare policies in many countries continue to advocate breast self-examination alone, a growing body of evidence suggests that, when done on its own and without proper training, breast self-examination may not necessarily improve breast cancer detection and mortality reduction (for a review, see Kösters & Göttsche, 2008). Instead, a more holistic approach based on breast awareness appears to offer improved efficacy in terms of breast cancer detection (Harmer, 2011; Mant, 1991). Importantly, in a cohort of British women, greater breast size dissatisfaction – but not body dissatisfaction – was significantly associated with lower breast awareness (i.e., less frequent breast self-examination, lower confidence in detecting breast change, and greater delay in seeking professional help following a breast change) (Swami & Furnham, 2018). In explanation, the authors suggested that these associations may stem from women seeking to avoid focusing on the site of their dissatisfaction or negative emotions (e.g., shame and embarrassment) that result from visual inspection of one's breasts.

While these studies are important in their own right, it is important to note that they are generally limited to populations in a small handful of world regions (i.e., North America and Western Europe) and it is unclear to what extent similar associations (i.e., with negative body image, psychological well-being, and breast awareness) might be expected in samples from a greater diversity of populations. The association between breast size dissatisfaction and breast awareness in particular deserves greater attention across nations. For example, if scholars are to design interventions to promote improved breast awareness based on reducing breast size dissatisfaction, it will first be important to show that the associations between these variables are robust across national groups. However, cross-national differences in cultural beliefs and attitudes (e.g., body or breast embarrassment, lack of a preventive health orientation, and fatalism; for a review, see Lee, 2015) may attenuate any association between breast size dissatisfaction and breast awareness in some national groups. For these reasons, we examined associations between breast size dissatisfaction and key outcome variables in the present study, namely weight and appearance dissatisfaction, psychological well-being, and breast awareness.

1.4. The Breast Size Satisfaction Survey

While the number of studies focused on breast size dissatisfaction has grown, an important limitation of this research is that it has primarily considered the experiences of women in North America and Western Europe, to the exclusion of women in other parts of the world. This is notable because it should not be assumed that all populations will share similar experiences of their breasts or that findings from Western, educated, industrialised, rich, and democratic (WEIRD) societies will generalise to other settings (Henrich, Heine, & Norenzayan, 2010). Moreover, as discussed by Swami and colleagues (2015), there are additional limitations that hamper our understanding of women's breast experiences, even in WEIRD populations, including wide variation in the manner in which breast size

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dissatisfaction is operationalised, the use of measures of breast size dissatisfaction with unknown or untested psychometric properties, and a reliance on samples of college-aged women. In short, there is as yet no systematic investigation of breast size ideals and breast size dissatisfaction across a large and diverse set of nations, and scholars have called for further work that focuses on women's breasted experiences (Gillen & Markey, 2019; Prieler & Choi, 2014).

To address these issues, we report on the findings of the Breast Size Satisfaction Survey (BSSS), which involved 18,541 women in 61 research sites across 40 nations completing a validated measure of perceptual breast size dissatisfaction (i.e., current-ideal breast size discrepancy; Swami et al., 2015). This allowed us to examine the extent to which there exist cross-national differences in ratings of ideal breast size and breast size dissatisfaction. Based on previous cross-national research on body image (e.g., Swami, Frederick et al., 2010), we expected there to be significant cross-national differences across both scores, but also expected those differences to be negligible-to-small in strength (Hypothesis 1). This also mirrors the arguments presented above, which suggest that breast size ideals are becoming increasingly homogenised or uniform across the globe as a result of the processes of globalisation and modernisation. In addition to testing for these cross-national differences, the BSSS dataset also allowed us to examine antecedents and outcomes of breast size dissatisfaction.

In terms of antecedents, we included validated measures of the Big Five personality facets and novel measures of exposure to Western and local media, which we examined for cross-national measurement invariance here. In addition, we also included measures of financial security and urbanicity as proxies for socioeconomic status and, for exploratory purposes, participant age. In terms of outcomes, we included validated measures of appearance and weight dissatisfaction, breast awareness (breast self-examination frequency,

confidence in detecting breast change, and delay in seeking professional help following breast change), and psychological well-being (subjective happiness and self-esteem).

Multilevel modelling was used to examine the robustness of these antecedents and outcomes of breast size dissatisfaction across nations. In terms of antecedents, we hypothesised that personality (specifically, higher Neuroticism), greater exposure to Western and local media, greater financial security, and higher urbanicity would be significantly associated with greater breast size dissatisfaction (Hypothesis 2). In terms of outcomes, we hypothesised that greater breast size dissatisfaction would be significantly associated with greater appearance dissatisfaction, greater weight dissatisfaction, lower breast awareness (i.e., lower breast self-examination frequency, lower confidence in detecting breast change, and greater delay in seeking professional help following breast change), lower happiness, and lower self-esteem (Hypothesis 3). Figure 1 presents a schematic representation of these hypothesised associations, which we expected to be stable across all nations surveyed in the BSSS.

2. Method

2.1. Breast Size Satisfaction Survey Overview

The data reported here were collected as part of the BSSS, a collaborative research project involving 104 scientists working across 61 research sites in 40 nations. A call for collaborators was placed on a social networking site for scientists in September 2017, sent out to potential collaborators internationally by the first author, and disseminated opportunistically and directly to interested parties until December 2018. The BSSS dataset, therefore, represents sites that were selected on a convenience basis. This is reflected in the fact that, of the 61 research sites, most were in Asia (23) and Europe (22). In contrast, there were fewer research sites in South America (8), North America (5), Africa (2), and Australia (1). Once a collaborator agreed to be involved in the BSSS, they were expected to apply for local ethics approval where required, translate (where necessary) and adapt the BSSS survey

for local use, recruit a minimum of 200 women (relaxed in four cases: Koforidua, Osaka, Rijeka, and Tel Aviv) from the community (relaxed in four cases – Germany, Hungary, the Netherlands, and Peru – where participants were recruited online) to complete the BSSS survey, and return the data to the first author by April 2019.

2.2. Participants

The BSSS dataset included a total of 18,541 women from 40 nations, ranging in age from 19 to 94 years ($M = 34.19$, $SD = 13.71$) and in self-reported body mass index (BMI) from 12.04 to 49.78 kg/m² ($M = 23.57$, $SD = 4.54$). In terms of ethnic/racial affiliation, 78.9% self-reported as being members of the ethnic/racial majority of their respective nations and 9.6% as members of an ethnic/racial minority, whereas 11.5% were unsure. In terms of educational attainment, 0.7% had no formal educational qualification, 4.0% had completed primary education, 21.8% secondary education, 21.6% were still in full-time education, 30.8% had an undergraduate degree, 16.6% a postgraduate degree, and 4.5% had some other qualification. In terms of their current place of residence, 31.0% of participants lived in a capital city, 14.3% in capital city suburbs, 26.1% in a provincial city (more than 100,000 residents), 16.7% in a provincial town (more than 10,000 residents), and 11.8% in rural areas. With regards to their financial security, 22.5% of participants reported that they felt less secure relative to others of their own age in their country of residence, 57.8% equally secure, and 19.8% more secure.

The list of research sites and nations, including nation-specific sample characteristics are reported in Table 1 (for individual research sites and associated sample sizes, see Supplementary Materials). Nations differed with a large effect size in mean age, $F(39, 17441) = 73.92$, $p < .001$, $\eta^2 = .14$ (lowest: Malaysia, highest: Norway), with a medium effect size in mean BMI, $F(38, 18088) = 46.49$, $p < .001$, $\eta^2 = .09$ (lowest: China, highest: Egypt), and with a small-to-medium effect size in mean self-rated financial security, $F(39, 18422) = 21.28$, $p <$

.001, $\eta^2 = .04$ (lowest: Brazil, highest: United Arab Emirates). There were also significant between-nation differences in the distribution of participants by ethnicity status, $\chi^2(78, 18367) = 2875.01, p < .001, W = .40$ (lowest affiliation to majority: Costa Rica and India, highest: Thailand and Croatia), education (secondary/tertiary vs. other), $\chi^2(39, 18432) = 1891.20, p < .001, W = .32$ (lowest: China, highest: Austria), and urbanicity (urban vs. rural), $\chi^2(39, 18468) = 1871.53, p < .001, W = .32$ (lowest: Ireland, highest: Colombia, Pakistan, and Peru).

2.3. Measures

2.3.1. Breast size dissatisfaction. All participants were asked to complete the Breast Size Rating Scale (BSRS; Swami et al., 2015), a figural rating scale consisting of 14 computer-generated images of women with increasing breast size. Images were presented in greyscale and without the appearance of facial features so as to minimise the impact of these features on ratings. Participants were asked to rate the image that most closely matched their current breast size and the image they would most like to possess, with responses made on a 14-point scale (1 representing the figure with the smallest breast size, 14 representing the figure with the largest breast size). An index of breast size dissatisfaction can be computed as both the absolute difference between ideal and current breast size ratings (so that higher scores reflect greater breast size dissatisfaction regardless of the direction of this dissatisfaction) or as signed scores (so that negative values represent a desire for smaller breasts and positive values represent a desire for larger breasts). Both scores were used in our analyses, as signposted below. Scores derived from the BSRS have been shown to have good construct validity, acceptable test-retest reliability up to 3 months, and adequate patterns of convergent validity in women (Junqueira et al., 2019; Swami et al., 2015).

2.3.2. Appearance and weight dissatisfaction. Following Frederick and colleagues (2016), participants were asked to respond to two items asking about their satisfaction with

physical appearance and weight, respectively (1 = *Extremely dissatisfied*, 7 = *Extremely satisfied*). Although single-item measures of body image are unlikely to capture the complexity of body image constructs, their scores nevertheless present adequate evidence of convergent validity (Sandhu & Frederick, 2015). For analytic purposes, scores on both items were reverse-coded so that higher scores reflected greater dissatisfaction with one's appearance and weight.

2.3.3. Personality. Participants were asked to complete the Five-Item Personality Inventory (FIPI; Gosling, Rentfrow, & Swann, 2003), which measures the Big Five personality facets of Openness to Experience (“I see myself as open to new experiences”), Conscientiousness (“... as dependable and self-disciplined”), Extraversion (“... as extroverted and enthusiastic”), Agreeableness (“... as warm and sympathetic to others”), and Neuroticism (“... anxious and easily upset”) with one item for each facet. All items were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Although there are limitations to measuring the Big Five facets using single items, Rentfrow and colleagues (2003) reported that scores on the FIPI have adequate levels of convergent validity (e.g., significant correlations with other measures of the Big Five) and adequate test-retest reliability up to two weeks.

2.3.4. Media exposure. To measure exposure to Western and local mass media, we adapted the media exposure scale developed and used by Swami, Frederick and colleagues (2010). In its original version, the scale included 8 items that asked about frequency of exposure to Western (4 items) and local (4 items) television shows, movies, magazines, and music, but we replaced the two music items with two items about exposure to Internet sites in the present study. All items were rated on a 5-point scale (1 = *Less than once a month*, 2 = *Once or twice a month*, 3 = *Once a week*, 4 = *Several times a week*, 5 = *Every day*). The

dimensionality, internal consistency, and measurement invariance of scores on this measure are reported in the Results.

2.3.5. Breast awareness. To provide an index of breast awareness, we followed Swami and Furnham (2018) in using three items from the Breast Module of the Cancer Awareness Measure (BCAM; Linsell et al., 2010). The BCAM is a self-reported measure of multiple domains of breast cancer awareness with adequate construct validity and test-retest reliability up to 2 weeks. The first item asked about breast self-examination frequency (“How often do you check your breast?”) with responses made on a 4-point scale (1 = *Rarely or never*, 2 = *At least once every six months*, 3 = *At least once a month*, 4 = *At least once a week*). Linsell and colleagues (2010) suggested that women were more likely to be breast aware if they engaged in breast self-examination at least once a week or once a month. The second item asked about participants’ confidence in noticing a change in their breasts (“Are you confident you would notice a change in your breasts?”), with responses made on a 4-point scale (1 = *Not at all confident*, 2 = *Slightly confident*, 3 = *Fairly confident*, 4 = *Very confident*). The final item asked participants, using an open-ended format, how soon they would contact a health professional if they noticed a change in their breasts (“If you found a change in your breasts, how soon would you contact your doctor?”). Responses to the question were scored based on a 7-point scale developed by Swami and Furnham (2018): 1 = *Immediately or as soon as possible*, 2 = *Within a few days*, 3 = *Within a week*, 4 = *Within a month*, 5 = *Within three months*, 6 = *Delay as long as possible*, 7 = *Would not see doctor*. Researchers in each site scored participants’ responses as closely as possible to these response options and in some cases discussed categorisations with other scientists unaffiliated with the project and/or with the first author. For comparative purposes, women in the United Kingdom are encouraged to contact their doctor or a healthcare professional as soon as possible upon

discovering a change in their breasts, as early detection increases the likelihood of positive outcomes (National Health Service, 2015).

2.3.6. Psychological well-being. Two single-item measures were used to assess distinct aspects of psychological well-being. First, we asked participants to complete the Global Happiness Item (Bradburn, 1969), which provides an index of subjectively-assessed happiness (“Taking all things together, how would you say things are these days?”). The item was rated on a 3-point scale (1 = *Not too happy*, 2 = *Pretty happy*, 3 = *Very happy*) and scores have been shown to have adequate convergent validity (e.g., Lyubomirsky & Lepper, 1999; Swami, 2008). The second item was the Single-Item Self-Esteem Scale (SISE; Robins, Hendin, & Trzesniewski, 2001), in which participants are asked to rate the statement “I have high self-esteem” on a 7-point scale (1 = *Not very true of me*, 7 = *Very true of me*). SISE scores have been shown to have adequate construct validity (Robins et al., 2001).

2.3.7. Socioeconomic status. Because understandings of socioeconomic status are likely to vary both within and across nations, and due to difficulties creating a common metric of socioeconomic status across nations, we used two proxies for socioeconomic status in the present work. First, following Swami and colleagues (2012), we asked participants to self-report how financially secure they felt relative to others of their own age in their country of residence (1 = *Less secure*, 2 = *Same*, 3 = *More secure*). Second, we asked participants about their current place of residence (i.e., urbanicity), with response options adapted from Pedersen and Mortensen (2001) as follows: *Capital city*, *Capital city suburbs*, *Provincial city (more than 100,000 residents)*, *Provincial town (more than 10,000 residents)*, and *Rural areas*. Response options were collapsed into *urban* versus *rural* for descriptive purposes at the national level and were assigned values 1 to 5 (in the above order) for further statistical analysis.

2.3.8. Demographics. Participants were asked to provide their demographic data consisting of age, height, and weight using open-ended questions. Height and weight were recoded into kilograms and metres, and were used to compute self-reported BMI as kg/m^2 . Self-reported height and weight data are strongly correlated with measured data (Spencer, Appleby, Davey, & Key, 2002) and were included in the present study for descriptive purposes¹. Improbable BMI values (< 12 or $> 50 \text{ kg/m}^2$; Swami, Weis, Barron, & Furnham, 2018) were discarded (0.1% of the total dataset). Participants also indicated their highest educational qualification by selecting one of several options presented (*No formal education, Primary education, Secondary education, Still in full-time education, Undergraduate degree, Postgraduate degree, Other*). Response options were collapsed into *secondary/tertiary* (*Secondary education, Undergraduate degree, Postgraduate degree*) versus *other* (remaining categories) for descriptive purposes at the national level. Finally, to ensure comparability of ethnic or racial backgrounds across research sites, participants were asked to self-describe their ethnic/racial affiliation by selecting one of three presented options relative to their nation of residence (*Ethnic/racial majority, Ethnic/racial minority, Not sure*).

2.4. Test Adaptation

Where English was not the primary language or *lingua franca* in a nation, the measures included in the BSSS survey were translated into the appropriate local language (see Supplementary Materials for the list of languages). This was done using Brislin's (1970) back-translation technique, which uses an iterative process of independent forward- and back-translation by independent bilingual translators. Specifically, a bilingual translator first blindly translated the measures included in the BSSS questionnaire – along with instructions, response categories, an information sheet, and an informed consent form – from English to the local language. A second bilingual translator then back-translated the material from the local language to English. The two versions of the materials were compared for equivalence

and, where issues were raised, these were discussed with the first author and resolved through consensus. In practice, there were very few translational issues encountered. All translations are available from the first author.

2.5. Procedures

Ethics approval for the overall project and data management was obtained from the departmental ethics committee at Anglia Ruskin University (approval number: ESH17-006). In addition, most BSSS collaborators obtained ethics approval from local ethics committees or Institutional Review Boards. Three exceptions to this occurred in Austria, Costa Rica, and Germany, where national laws did not require ethics approval. In these and all cases, the project was conducted in accordance with the principles of the Declaration of Helsinki (6th revision, 2008) and following local institutional guidelines. Once the BSSS instruments had been translated and/or adapted for local use, collaborators recruited samples of women from the community using direct approaches in areas of congregate activity in each research site. Attempts were made to reduce selection bias by sampling at different times of the day and from different sites of congregate activity, and in some cases this method was supplemented with advertisements to potential participants placed in local media. Four exceptions to this general recruitment method occurred in Germany, Hungary, the Netherlands, and Peru, where data were collected online following best-practice guidelines (e.g., Meade & Craig, 2012). Inclusion criteria for all research sites included being fluent in the local language and being 18 years of age or older. Potential participants were given an information sheet, which provided brief details about the study and an estimated survey completion time (10 minutes). Participants who agreed to take part provided written informed consent or digital informed consent for online studies. The survey was anonymous and participants took part voluntarily and without remuneration. All participants received written debriefing information upon return of completed questionnaires. All data were collected in 2018-2019.

2.6. Analytic Strategy

All within-nation data were pooled so that analyses proceeded at the level of the nation, rather than individual research sites. Analysis of the BSSS data then proceeded in four stages. First, we investigated cross-national differences in current and ideal breast size, and in absolute mean breast size dissatisfaction, using analyses of variance, and report on the percentages of participants with a preference for larger breasts, smaller breasts, and no discrepancy between ideal and current breast sizes (Hypothesis 1). We then checked whether ideal breast size ratings were significantly associated with socioeconomic status (urbanicity and financial security) across nations using a multilevel model (Davidov, Schmidt, Billiet, & Meuleman, 2018; van der Vijver, van Hemert, & Poortinga, 2004) with the two variables as level-1 predictors and nation as a level-2 predictor. Intercepts were allowed to vary between nations. All level-1 predictors were grand mean-centred and Mplus 8.2 was utilised for analyses, using Monte Carlo integration to evaluate the likelihood function (Heck & Thomas, 2015). We report on the outcome variance explained by the model on levels-1 and -2 (R_1^2 and R_2^2) using approximate formulae provided by Bryk and Raudenbush (1992), which compares the model of interest to a baseline model and includes only random intercepts.

Second, to determine whether the media exposure items formed one-dimensional scales (separately for Western and local media), multi-group models were fitted on the items assessing media exposure, testing for measurement invariance of these items (Chen, 2008). For this analysis, data from Austria and Germany, Croatia and Slovenia, the United Kingdom and Ireland, and Japan and China, respectively, had to be merged in order to make computations feasible (that is, we merged data across nations with similar cultural backgrounds and that were geographic neighbours). We first examined configural invariance (i.e., whether scores on the 4 items of each measure formed one-dimensional scores in every nation) and then full measurement invariance (i.e., whether item parameters – see below –

were identical across nations). If full measurement invariance was not observed, item parameters were relaxed in individual nations to test for partial measurement invariance (which means that the parameters of some, but not all, items were equal across nations). Items were treated as ordered-categorical variables, using the matrix of polychoric correlations and the WLSMV estimator (weighted least square estimator using a diagonal weight matrix with standard errors and mean- and variance-adjusted chi-square test statistic that use a full weight matrix) in Mplus 8.2. Missing data (0.4%) were treated using full information maximum likelihood (FIML) estimation, which is superior to other methods for dealing with missing data (Enders & Bandalos, 2001). Each item was modelled with two sets of parameters: one discrimination parameter (item loading) and $m - 1$ (m = number of item response categories) threshold parameters, which describe the probability for each response option. Sets of item parameters were freed in tandem for partial measurement analyses (Sass, 2011). We report ω total as measure of reliability (Dunn, Baguley, & Brusnden, 2014) for the manifest scores of the two media exposure scales. However, standardised factor scores of Western and local media exposure were used for further analyses.

For the evaluation of model fit, the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the standardised root mean square residual (SRMR) were used, utilising guidelines provided by Hu and Bentler (1999) and Schermelleh-Engel, Mossbrugger, and Müller (2003) (CFI, TLI: $> .90$ acceptable fit, $> .95$ good fit; SRMR: $< .10$ acceptable fit, $< .05$ good fit). WLSMV estimates the model degrees of freedom (df) from the data (Muthén, du Toit, & Spisic, 1997); the df are not derived by comparing the number of available and estimated parameters, as in maximum likelihood (ML) estimation. CFI and TLI use the df to penalise for model complexity (the TLI more strongly than the CFI). Under ML estimation, this entails $TLI < CFI$. However, in the multi-group context of the present study, estimation of df by WLSMV could either excessively disadvantage TLI to CFI values (especially in models

with a larger number of estimated parameters; i.e., configural invariance models) or excessively disadvantage CFI to TLI values (especially in models with few estimated parameters, such as full and partial measurements models, leading to $CFI < TLI$, which is not possible under ML estimation). Thus, model fit was considered acceptable if the SRMR and either CFI or TLI values indicated an acceptable fit. For the various measurement invariance analyses, model fit was interpreted independently, as the WLSMV estimator does not allow for direct comparisons between models based on indices like ΔCFI (Sass, 2011); because of the large sample sizes involved, we also did not rely on $\Delta\chi^2$ tests, as these tend to become too liberal (rejecting the null hypothesis too often) with increasing N (Cheung & Rensvold, 2002).

In the third stage of analysis, using multilevel modelling, we examined associations of potential antecedents with breast size dissatisfaction, namely personality (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism), Western and local media exposure (factor scores from the aforementioned analyses), socioeconomic status (urbanicity, financial security), and age (level-1 predictors), using nation as a level-2 predictor and allowing for randomness in the intercept and the slopes of Western and local media exposure (i.e., allowing for differences between nations in these parameters; slopes and intercepts were allowed to correlate) (Hypothesis 2). Figure 1 presents a schematic representation of this model. Multilevel modelling was utilised because of the nested nature of the data (participants within nations) (Davidov et al., 2018; Hox, 1998). Furthermore, it allowed testing of whether associations of media exposure with breast size dissatisfaction varied across countries. Guided by the results of this initial model, level-1 predictors were then removed if they were not significantly associated with breast size dissatisfaction, and slopes of Western and local media exposure were estimated as fixed effects if these parameters did not exhibit significant amounts of randomness according to likelihood ratio

(LR) tests (Hox, 1998). The remaining set of level-1 predictors served in the analyses of the fourth stage.

In the fourth stage of analysis, the final model of the third stage incorporated appearance and weight dissatisfaction, breast awareness, and psychological well-being potential outcomes of breast size dissatisfaction (Hypothesis 3) (see Figure 1). Conceptually, we tested in this multilevel model whether breast size dissatisfaction mediated the effects of the antecedents on these outcomes. Differences between nations in the intercepts of outcomes were allowed for in this model. For the analyses in the third and fourth stages, all level-1 predictors were grand mean-centred (Hofmann & Gavin, 1998)². Mplus 8.2 was utilised, using Monte Carlo integration to evaluate the likelihood function (Heck & Thomas, 2015). In further analyses, we also investigated whether our results could be replicated among the subgroups of participants who preferred larger breasts (signed breast size dissatisfaction > 0) and participants who preferred smaller breasts (signed breast size dissatisfaction < 0). Significance was set to $p < .05$ in all analyses.

3. Results

3.1. Current Breast Size, Ideal Breast Size, and Dissatisfaction Across Nations

In the total dataset, 47.5% of participants desired larger breasts than they currently had, 23.2% desired smaller breasts, and 29.3% were satisfied with their current breast size. Nations differed with a small effect size in the proportions of participants desiring larger breasts (for descriptive purposes, lowest: Pakistan, highest: China), desiring smaller breasts (descriptively, lowest: Colombia, highest: Pakistan), and who were satisfied with their breast size (descriptively, lowest: Japan, highest: Colombia), $\chi^2(78, 18315) = 1400.07, p < .001, W = .28$ (see Table 1 for nation-specific frequencies).

In the total dataset, mean current breast size was 6.52 ($SD = 3.66$), mean ideal breast size was 7.27 ($SD = 2.77$), and mean absolute breast size dissatisfaction was 2.34 ($SD = 2.26$)

(see Table 2 for nation-specific means). Nations differed with small-to-medium effect sizes in all three ratings²: current, $F(39, 18388) = 23.46, p < .001, \eta^2 = .05$; ideal, $F(39, 18292) = 11.58, p < .001, \eta^2 = .02$; dissatisfaction, $F(39, 18275) = 12.74, p < .001, \eta^2 = .03$. These effects remained stable and significant even after controlling for age, BMI, and ethnicity (all $F_s \geq 9.73$, all $p_s < .001, \eta^2 = .02-.03$). For descriptive purposes, the five nations that reported the largest current breast size were, in ascending order, the Netherlands, Egypt, the United Kingdom, India, and Pakistan, whereas the nations reporting the smallest current breast size were Japan, China, Thailand, Malaysia, and Germany. The nations reporting the largest ideal breast size were India, Pakistan, Egypt, Lebanon, and the United Kingdom, whereas the nations reporting the smallest ideal breast size were Japan, the Philippines, Germany, Austria, and Malaysia. The nations with the greatest absolute breast size dissatisfaction were Brazil, Japan, China, Egypt, and the United Kingdom, whereas the nations with smallest breast size dissatisfaction were Ghana, Colombia, Spain, Paraguay, and Indonesia.

In the multilevel model, financial security did not predict ideal breast size (slope = $-0.045, SE = 0.032, p = .155$), but urbanicity did (slope = $0.034, SE = 0.017, p = .047, R_1^2 = 0.03\%, R_2^2 = 0.50$); that is, participants who lived in more rural environments (higher values denoted smaller cities of residence) reported larger breast size ideals.

3.2. Measurement Invariance Analyses

The four items assessing Western media exposure and the four items querying local media exposure each formed one-dimensional scores in the surveyed nations (see Table 3; configural invariance tests). However, the local media dimension appeared not to be fully measurement invariant, whereas the fit of the Western media dimension appeared to be improvable. By relaxing the equivalence of item parameters for individual items in some of the investigated nations step-by-step, acceptable levels of model fit for partial measurement invariance could be obtained and model fit was improved (see Table 3). Conceptually, partial

measurement invariance means that television, movies, magazines, and Internet sites contributed differently to media exposure (both for Western and local media) between some of the investigated nations. Using factor scores from the partial measurement invariance models, these differences were controlled for in subsequent analyses.

Reliability (ω total) of the manifest scale scores across nations ranged from .64 to .88 ($M = .79$) for Western media exposure and from .48 to .90 ($M = .74$) for local media exposure. Factor scores correlated at $r = .04$ ($p < .001$) in the total sample, with correlations ranging from $r = -.19$ ($p = .007$) in the United Arab Emirates to $r = .48$ ($p < .001$) in the United States. Mean standardised factor scores of the two scales in each nation are reported in Table 2. Even though comparisons of mean scores should be made with caution, given that only partial measurement invariance was observed, it is interesting to note that the top five nations for mean Western media exposure were, in ascending order, Italy, Peru, the United Kingdom, Hungary, and the United States, whereas the top five nations for mean local media exposure were Japan, China, Colombia, Poland, and India.

3.3. Antecedents of Breast Size Dissatisfaction

In the multilevel model, age, financial security, and Conscientiousness were negatively associated with absolute breast size dissatisfaction across all investigated nations, whereas Neuroticism was positively associated (see Table 4); that is, younger, less financially secure, less conscientious, and more neurotic participants reported higher levels of absolute breast size dissatisfaction. Overall, Western media exposure had a negative, and local media exposure a positive, association with absolute breast size dissatisfaction; that is, participants who reported lower exposure to Western media and higher exposure to local media reported higher levels of absolute breast size dissatisfaction. Neither the slopes of local media exposure (LR test: $\chi^2 = 2.51$, $df = 2$, $p = .285$), nor the slopes of Western media exposure (LR test: $\chi^2 = 0.67$, $df = 2$, $p = .669$), showed significant amounts of randomness across nations

according to subsequent stepwise tests. Hence, these associations were modelled as fixed effects in the final model of this stage (see Table 4).

In participants with a desire for larger breasts (signed breast size dissatisfaction > 0 ; $n = 8,698$), urbanicity, financial security, Conscientiousness, Neuroticism, and Western media exposure were associated with breast size dissatisfaction. Participants who reported lower exposure to Western media and participants who lived in more rural areas, were less financially secure, were less conscientious, and were more neurotic reported higher scores, that is, more dissatisfaction with their breast size (see Table 4). Local media exposure had no significant mean effect. Hence, local media exposure was excluded as a level-1 predictor in the final model.

In participants with a desire for smaller breasts (signed breast size dissatisfaction < 0 ; $n = 4,254$), age, financial security, Conscientiousness, and Agreeableness predicted breast size dissatisfaction. Financial security and the Big Five traits only achieved significance once Western and local media exposure, which had no discernible effects in this group, were eliminated from the model. Less financially secure, more conscientious and agreeable individuals, and older (not younger; see main analyses) participants reported more dissatisfaction with their breast size (see Table 4).

3.4. Outcomes of Breast Size Dissatisfaction

Absolute breast size dissatisfaction had effects on all potential outcome variables except delay in contacting a health profession, across nations (see Table 5). Higher absolute breast size dissatisfaction was associated with lower breast self-examination frequency, lower confidence in noticing a change in the breasts, higher appearance and weight dissatisfaction, and lower happiness and self-esteem. All outcomes exhibited significant levels of randomness across nations with regards to their intercepts (see Table 5).

Among participants with a desire for larger breasts, higher breast size dissatisfaction had effects on all outcomes, except delay in contacting a health professional (see Table 5). Among participants with a desire for smaller breasts, higher breast size dissatisfaction had mediating effects on all outcomes, except breast self-examination frequency, confidence in noticing a change in the breasts, and delay in contacting a health professional (Table 4; note that the reversal of signs of the slope coefficients in the table is due to the fact that lower scores denote higher levels of breast size dissatisfaction in this group; no change of direction of associations is implied here).

4. Discussion

Women's breasts – particularly breast size – play an important role in shaping body and appearance anxieties (e.g., Lee, 1997; Millsted & Frith, 2003; Swami et al., 2015), yet comparatively little research has considered these issues from a cross-national perspective. Even less research has examined antecedents and outcomes of breast size dissatisfaction across nations, which is important because it is unclear to what extent women's breast experiences in WEIRD nations can be generalised to women in other cultural and national contexts. The BSSS was set up to address these gaps in the literature: through analyses of our data from 18,541 women in 40 nations, we are able to draw a number of important conclusions about cross-national differences and similarities in breast size ideals and dissatisfaction, as well as antecedents and outcomes of breast size dissatisfaction in diverse national contexts. Below, we provide a summary of the main findings of the BSSS before considering implications of our work.

4.1. Breast Size Ideals and Dissatisfaction Across Nations

The BSSS dataset suggests that breast size ideals were relatively homogeneous across nations. Although there was a significant cross-national difference in ideal breast size, the effect size of the difference was small and suggestive of only minor cross-national variation.

In fact, ideal breast size ratings were relatively homogeneous, with mean values falling between figures 6 through 8 in the BSRS. This is consistent with the suggestion that, despite historical differences across nations, breast size ideals have become largely homogenous in nations sampled in the BSSS. Just as there now appears to be a near-global idealisation of thinness in sites of high socioeconomic status (Swami, 2015; Swami, Frederick et al., 2010), the BSSS data indicate a similar homogenisation of breast size ideals in women. This finding is important because it suggests that the objectification of medium-to-large breasts is now a global phenomenon, including in parts of the world that may have historically de-emphasised breast aesthetics (Miller, 2003, 2006). It should also be noted that, partially consistent with our hypothesis, greater rurality (but not financial security) was associated with the idealisation of larger breasts, although effect sizes were weak and likely a reflection of sampling issues – a concern we return to below.

Importantly, mean ideal breast size ratings were higher than mean current breast size ratings in the vast majority that we sampled, although the magnitude of the difference varied. In the total dataset, just under a majority of women (i.e., 47.5%) that were sampled indicated a preference for larger breasts than they currently had, while just under a quarter (i.e., 23.2%) desired smaller breasts and under a third (i.e., 29.3%) reported no discrepancy between their ideal and current breast sizes. This is consistent with existing research in WEIRD nations suggesting that a majority (Swami et al., 2015) or close to a majority of women (Lombardo et al., 2019; Swami & Furnham, 2018) wanted larger breasts than they currently had. Nevertheless, it should be noted that there was some cross-national variation in (absolute) breast size dissatisfaction ratings, with a small effect size. Of note, larger breast size dissatisfaction in some nations (particularly the United Kingdom, Egypt, China, Japan, and Brazil) appeared to be primarily driven by smaller current breast size; that is, while ideal

breast size was largely homogeneous across nations, greater breast size dissatisfaction was found in nations where women reported smaller mean current breast sizes.

4.2. Antecedents of Breast Size Dissatisfaction

4.2.1. Socioeconomic status. In the BSSS, we also examined a number of potential antecedents of breast size dissatisfaction, but our results were inconsistent with our hypotheses. That is, we hypothesised that greater financial security and urbanicity (i.e., proxies for higher socioeconomic status), respectively, would be associated with greater breast size dissatisfaction. However, our results suggested that urbanicity was not significantly associated with breast size dissatisfaction (except in women who desired larger breasts than they currently had), whereas lower rather than higher financial security was associated with greater breast size dissatisfaction. One possibility here is that, unlike body dissatisfaction (Swami, Frederick et al., 2010), increasing financial security affords women greater opportunities to negotiate breasted experiences by, for instance, de-emphasising the importance of breast size, de-coupling the breasts from an aesthetic gaze, or (re-)defining breast size ideals in a manner that is healthier in terms of one's body image. Conversely, the pressure to view the breasts in purely aesthetic terms or to internalise a male gaze of breasts as providers of gratification for men may be heightened for women who are less financially secure, precisely because their financial insecurity affords fewer opportunities to negotiate breasted experiences. That is, among financially insecure women, there may be greater pressure to treat the breasts as assets that play performative roles, such as in terms of attracting potential partners or to attain material benefits (see Edmonds, 2010).

Of course, it should be noted that the weak relationships between proxies of socioeconomic status and breast size dissatisfaction likely reflect the fact that participants in the BSSS were all recruited from largely urbanised sites. That is, we did not include samples from explicitly rural research sites, which means there was limited within-nation variation in

actual socioeconomic status to warrant a fuller test of our hypotheses. It may also reflect the fact that both urbanicity and perceived financial security are imprecise indices of socioeconomic status (Braveman et al., 2005). The most direct way of examining this issue in further research would be to sample participants from the same nation but from sites varying in socioeconomic status (e.g., Swami & Tovée, 2005a, 2005b). Although such studies have previously examined breast size ideals within a single nation (Swami & Tovée, 2013b), it is noteworthy that no previous study has extended this to include examinations of breast size dissatisfaction. Doing so would provide a fuller understanding of the relationships between socioeconomic status and breast size dissatisfaction and also help clarify some of our explanations above.

4.2.2. Personality. Consistent with our hypothesis, we found that higher Neuroticism was significantly associated with greater breast size dissatisfaction. This corroborates previous work indicating that Neuroticism is associated with more negative body image generally (for a review, see Allen & Walter, 2016) and may reflect the fact that individuals who score highly on this trait are more likely to experience negative emotional states and become dissatisfied more easily. In addition, individuals who score highly on Neuroticism may also be more sensitive to appearance evaluation and rejection, which heightens breast size dissatisfaction. There is also some evidence that women scoring higher on Neuroticism are more likely to misperceive their body size as larger than they actually are (Hartmann & Siegrist, 2015; Sutin & Terracciano, 2016), and it might be suggested that these individuals are also more likely to misperceive their current breast size.

Beyond Neuroticism, our results also indicated that lower Conscientiousness was significantly associated with greater breast size dissatisfaction. Although this result was unexpected, one recent review concluded that there was a negative relationship between Conscientiousness and negative body image, but only in studies classified as having low risk

of bias (Allen & Walter, 2016; see also Allen, Vella, Swann, & Laborde, 2018). Examining associations between facets of Conscientiousness and breast size dissatisfaction may help scholars to better understand this relationship. For example, there is evidence that lower scores on some Conscientiousness facets – primarily low self-control (i.e., greater impulsivity, spontaneity, and carelessness) – are associated with greater body preoccupation (Ellickson-Larew, Naragon-Gainey, & Watson, 2013). Facet-level analyses may also be useful in terms of other personality dimensions (Roberts & Good, 2010), as it may help to more accurately determine personality traits that shape breast size dissatisfaction.

4.2.3. Media exposure. In contrast to our hypothesis, we found that exposure to Western media was negatively, rather than positively, associated with greater breast size dissatisfaction. This finding stands in marked contrast to the extant literature indicating that exposure to Western media is associated with more negative body image (e.g., Swami, Frederick et al., 2010; Swami, Mada, & Tovée, 2012). Interpreting the present finding is complicated by the fact that we were working with the total BSSS dataset, which may obscure the meaning, importance, and impact of Western media in specific national and cultural contexts (Anderson-Fye, 2004; Becker, 2004; Swami, 2020). It should also be noted that these analyses are limited by the focus on media exposure *per se*, rather than perceived pressure from, and the internalisation of, breast size ideals that are communicated through Western media. In addition, there were likely ceiling effects in mean Western media exposure across nations (a reflection of the fact that all research sites were largely urbanised), as well as limited variation in breast size dissatisfaction scores that any predictor could account for.

In contrast to the effects of exposure to Western media, our results indicated that greater exposure to local media was significantly and positively associated with breast size dissatisfaction. Indeed, the strength of the relationship between local media exposure and breast size dissatisfaction was stronger than that of Western media exposure. Thus, it would

seem that local media play an important role in engendering breast size dissatisfaction, possibly through the communication of breast size narratives that are “tailored” for local populations (Swami, 2020). A good example of such local transmission is Latin American telenovelas, which idealise larger breast sizes though in ways that are often specific to local socio-political and gendered narratives (Edmonds, 2010; Smith, 2017). More generally, it has been reported that local (Asian) media play a more important role than Western media in predicting appearance concerns in Chinese women (Jackson, Jiang, & Chen, 2016). The BSSS results fit this broader perspective and suggests that local media may play a crucial role in communicating narratives about ideal breast size, which in turn pressure women to attain culturally-sanctioned ideals.

4.2.4. Age. The results of our analyses also indicated that age was inversely related to breast size dissatisfaction. Previous studies have neglected to explore associations between breast size dissatisfaction and participant age, whereas the broader literature examining associations between negative body and age have returned equivocal results, with large-sample studies indicating a positive relationship (Frederick et al., 2006; Swami, Frederick et al., 2010; Swami, Tran, Stieger, Voracek, & The YouBeauty.com Team, 2015), a negative relationship (Frederick et al., 2016), or no significant association (Runfola et al., 2013). In terms of breast size dissatisfaction specifically, it is possible that breast objectification pressures decline with age (see Tiggemann & Lynch, 2001), such that older women experience less pressure to attain breast size ideals or develop embodiment practices that challenge constraining appearance ideals (Piran, 2016). Older age may also be associated with lifespan experiences, such as the transition to motherhood and breastfeeding, that help focus women’s attention on breast functionality (e.g., a maternal view of breasts that emphasises nurturing; Chang, Chao, & Kenney, 2006; Earle, 2003) and reduces preoccupation with the sexual uses of breasts (Bojorquez-Chapela, Unikel, Mendoza, & de

Lachica, 2013; Harrison, Obeid, Haslett, McLean, & Clarkin, 2019; Lombardo et al., 2019), though it should also be noted that midlife breast changes may also impact sexual satisfaction (Thomas, Hamm, Borrero, Hess, & Thurston, 2019).

4.3. Outcomes of Breast Size Dissatisfaction

4.3.1. Body image and psychological well-being. As hypothesised, greater breast size dissatisfaction was significantly and positively associated with both weight and appearance dissatisfaction. This is consistent with previous work showing that greater breast size dissatisfaction is significantly associated with higher scores on a range of indices of negative body image (Forbes & Frederick, 2008; Frederick et al., 2006; Junqueira et al., 2019; Swami & Furnham, 2018). The most straightforward interpretation of the present finding is that breast size dissatisfaction is an important facet of global negative body image (Swami et al., 2015). Importantly, the BSSS data also indicated that greater breast size dissatisfaction was significantly associated with lower self-esteem and subjective happiness. The former finding corroborates previous research showing that breast size dissatisfaction is associated with lower self-esteem (Koff & Benavage, 1998; Swami et al., 2015). Taken together, the present results suggest that breast size dissatisfaction may have substantive and detrimental links to both global body image and psychological well-being.

4.3.2. Breast awareness. Partially consistent with our hypothesis and previous research with British women (Swami & Furnham, 2018), analysis of the BSSS dataset indicated that greater breast size dissatisfaction was associated with poorer breast awareness, as indexed through lower breast self-examination frequency and lower confidence in detecting breast change, though not greater estimated delay in seeking professional help upon discovering breast change. These effects appeared to be primarily driven by participants who desired larger breasts than they currently had, whereas associations in participants who desired smaller breasts were not significant. These findings nevertheless remain important:

breast cancer is the leading cause of cancer-related mortality in women worldwide (Torre, Siegel, Ward, & Jemal, 2016) and poor survival rates are reliably associated with poorer breast awareness (for a review, see Richards, Westcombe, Love, Littlejohns, & Ramirez, 1999). Conversely, more positive breast awareness is associated with improved efficacy in breast cancer detection (Harmer, 2011; Mant, 1991; World Health Organization, 2017) and early diagnosis (Gadgil et al., 2017), but our results suggest that breast size dissatisfaction may act as a barrier to optimal breast awareness. As discussed by Swami and Furnham (2018), breast size dissatisfaction may result in avoidance behaviours and cognitions (i.e., avoiding or distrusting one's breasts) that reduce breast awareness, particularly if one's breasts trigger feelings of anxiety, shame, and embarrassment. Importantly, our results indicated that the negative association between breast size dissatisfaction and self-examination frequency and confidence in detecting breast change, respectively, was stable across nations sampled in the BSSS, which requires urgent public health intervention.

4.4. Implications

The results of the BSSS suggest a relatively homogenised idealisation of medium-to-large breasts, in tandem with similar levels of breast size dissatisfaction across all sites that were sampled. Indeed, over two-thirds of women sampled in the BSSS reported some form of breast size dissatisfaction, with most of these women indicating that they wanted larger breasts than they currently had. Just as a thin ideal for women's bodily attractiveness is now dominant across many nations (Swami, 2015; Swami, Frederick et al., 2010), our results point to the homogenisation of breast size ideals, which in turn may shape women's breast experiences. Perhaps most importantly, greater breast size dissatisfaction was robustly associated with poorer psychological well-being and lower breast awareness. Based on these results, one conclusion we might draw is that breast size dissatisfaction represents a global

public health, with important consequences for the psychological and physical well-being of women in many places.

Most immediately, we urge greater scholarly attention to issues related to breast size dissatisfaction and, concomitantly, the development of targeted interventions aimed at reducing breast size dissatisfaction. Various techniques – such as cognitive restructuring, changing negative body language, and size-estimate exercises – have been shown to successfully promote healthier body image (for a meta-analysis, see Alleva, Sheeran, Webb, Martijn, & Miles, 2015), but it will be important to determine the extent to which such methods are efficacious at reducing breast size dissatisfaction specifically. Of course, it is possible that reducing breast size dissatisfaction will require more tailored interventions. Such a tailored approach might involve interventionist and therapeutic techniques designed to reduce self-objectification of one's breasts and effective negotiations of sociocultural contexts that value idealised feminine embodiment (see Roberts & Waters, 2004; Tylka & Augustus-Horvath, 2011). In addition, interventions that promote greater appreciation of the functional value of women's breasts (e.g., their role in nurturing and sustenance) may be vital to shift attention away from unrealistic and unattainable beauty ideals, though this should not come at the expense of women's own needs (Piran, 2016; Schmied & Lupton, 2001). Such interventions may be particularly valuable if they also promote better breast awareness, which could empower women to take a more active role in breast cancer practices (Anastasi & Lusher, 2019). Importantly, whatever intervention methods are developed will need to be sensitive to national contexts and meet the informational, healthcare, and corporeal needs of women.

4.5. Directions for Future Research

The BSSS offers what is currently the largest dataset on cross-national breast size ideals and dissatisfaction, but a number of issues limit the generalisability of our findings.

First, the BSSS included a preponderance of research sites in (East and Southeast) Asia and Europe, with much less coverage of South and Central America, the Caribbean, Africa, Oceania, and Central Asia in particular. In addition, the opportunistic recruitment method used in most BSSS research sites means that our samples are unlikely to be fully representative of women either within nations or in specific world regions. Thus, an important next step for future research will be to include a wider range of nations and/or to recruit representative samples of women within particular nations to determine to what extent our findings are replicable and generalisable. In a similar way, it will be important to determine to what extent our findings can be replicated in research sites that vary in socioeconomic status: the BSSS provides data from urbanised research sites, which limits our understanding of women's breast experiences in other cultural groups. Concurrently, it would also be useful to examine sub-national and subcultural differences, including as a function of sexual orientation (Koff, Lucas, Migliorini, & Grossmith, 2010) and relationship status (Goldsmith & Byers, 2016).

In order to facilitate test adaptation and data collection in multiple research sites, the BSSS utilised relatively brief instruments of several constructs (e.g., personality, self-esteem, and subjective happiness), which impacts on score reliability and validity. For example, it is possible that the one-item instruments we used in the present study do not fully capture the meaning and complexity of the measured constructs, particularly in cross-national contexts. To take one example, use of the Global Happiness Item to measure subjective happiness may have obscured cross-national differences in understandings of happiness. Nevertheless, it should also be noted that scores on all one-item instruments that we utilised in the present study have been shown to have adequate construct validity, including in cross-national settings (e.g., Lyubomirsky & Lepper, 1999; Swami, 2008). In terms of the multi-item instruments we used (i.e., measures of Western and local media exposure), it should be noted

that internal consistency coefficients in some national sites were less-than-adequate, which may have impacted our results. In future research, it would be useful to replicate our findings using more reliable instruments, though this will need to be balanced with a need for measures that demonstrate measurement invariance across national and linguistic groups (Swami & Barron, 2019).

Likewise, while the BSSS was focused on a number of key antecedents and outcomes that were derived from a review of relevant theory and research, there are also important gaps in knowledge that could be bridged in future work. For example, it may be useful to examine the extent to which breast size dissatisfaction impacts additional outcomes, such as participation in, and embodied discomfort during, physical activity (Brisbine, Steele, Phillips, & McGee, 2019; Coltman, Steele, & McGhee, 2019), consideration of breast augmentation (Didie & Sarwer, 2003; see also Hopner & Chamberlain, 2020), post-mastectomy body acceptance (La, Jackson, & Shaw, 2019), and the navigation of clothing size standards (Bishop, Gruys, & Evans, 2018; Grogan, Gill, Brownbridge, Kilgariff, & Whalley, 2013). Another area worthy of scholarly attention is the extent to which motherhood and pregnancy may impact on breasted experiences (see Bartlett, 2000; Fuller-Tyszkiewicz et al., 2020; Lombardo et al., 2019) and, relatedly, whether breast size dissatisfaction is associated with breastfeeding behaviours (e.g., initiation, duration, and public breastfeeding; Morley-Hewitt & Owen, 2019).

While our data highlight the importance of considering breast size dissatisfaction, it is important to note that women's cognitions and affective experiences of their breasts are likely to be informed by other breast dimensions, such as shape, symmetry, firmness, and sensation (Cornelissen, Tuinder, Heuts, van der Hulst, & Slatman, 2018; Frederick et al., 2008; Nuzzi et al., 2014). In this regard, there are a number of other ways in which future research could advance current knowledge. Qualitative and semiotic research may be useful in helping

scholars better understand the ways in which women negotiate tensions between the breast's life-affirming qualities and the objectification of breasts in cultures that privilege the male gaze (Gripsrud et al., 2018), especially in the context of lived experiences within specific cultural traditions and histories (El Jurdi & Smith, 2018; Suh, 2013). In addition, longitudinal research may help researchers understand developmental trajectories that lead to breast size dissatisfaction, particularly during puberty (see Summers-Effler, 2004; Yuan, 2012). Such research may also be useful in providing a better understanding of the ways in which early-life embodiment and maturation shape breasted experiences in adulthood. Finally, further research is required to understand the role that breasts can and do play in disrupting and reconfiguring gender relations and patriarchal breast ideals (Iisahunter, 2018; Matich, Ashman, & Parsons, 2019). Such research may be particularly important to address the ways in which patriarchal structures affect women's withdrawal from active participation in social and political life (see Roberts & Waters, 2019).

4.6. Conclusion

The BSSS was established to overturn the relative neglect of scholarly research on women's breast size dissatisfaction, particularly from a cross-national perspective. With 18,541 participants from 40 nations, the BSSS is the largest multi-site study that has been conducted on the issue of breast size dissatisfaction specifically and one of the largest on body image generally. Two key findings from the BSSS are worth repeating: first, that breast size dissatisfaction appears to be common across all the nations that were surveyed and, second, that breast size dissatisfaction is associated with detrimental outcomes for women across nations, particularly in terms of psychological well-being. Interventions and therapeutic practices that reduce breast size dissatisfaction are now urgently required, particularly if they can be demonstrated to be effective across national, cultural, and social identity groups. However, such interventions are likely to only be stopgaps in the absence of

broader social and political initiatives that challenge patriarchal structures that tie women's worth to their physical appearance (Bordo, 1993; Calogero & Tylka, 2014; Jeffreys, 2005).

Footnotes

¹There were difficulties in understanding and completing height and weight data in the Philippines, so these data were omitted here.

²Grand mean-centering subtracts the grand mean of a predictor using the mean from the sample, but this leads to a conflation of within- and between-group effects. An alternative centering method is group mean-centering, which assumes that the difference of the individual value to the group mean is a better predictor than the individual value itself and generally requires the inclusion of group means as level-2 predictors in the model. An oft-cited motivation for utilising group-mean centering is the “frog pond effect”; that is, situations that give rise to the assumption that the effect of high versus low scores in a predictor should depend on the mean score of the group the individual is part of (a medium-sized frog is “large” in a pond of small frogs, but “small” in a pond of large frogs). However, concerning our research questions, there were no clear reasons why a “frog pond effect” should be assumed in the first place. There are neither clear theoretical nor empirical reasons to assume that (all or even some of) the effects of the examined antecedents of breast size dissatisfaction should depend on the observed nation means. Moreover, as the nation means were obtained via convenience sampling, it is also questionable whether these were in fact good estimates of the nation-level means of the various predictors investigated in the current study. In the absence of clear reasons for group mean-centering (see Snijders & Boskers, 2012, who stress that clear reasons should be present in order to adopt group-mean centering), we opted to use grand mean-centering in our analysis.

However, we also re-ran our analyses using group mean-centering, which did not substantially alter our results (for a full report, contact the corresponding author). Here, we

highlight the main discrepancies and direct readers interested in fuller results to the corresponding author. First, in terms of absolute breast size dissatisfaction, there was an additional significant effect of Extraversion on level-2 (slope = -0.336, $SE = 0.135$, $p = .013$), but not on level-1 ($p = .095$), and significant level-2 effects of Conscientiousness (slope = -0.650, $SE = 0.135$, $p < .001$) and Neuroticism (slope = 0.281, $SE = 0.117$, $p = .016$), which, however, did not alter the effects of these two predictors at level-1 (slopes = -0.113 and 0.089, $ps < .001$). The significant level-2 effects indicate that higher nation-level means in Extraversion and Conscientiousness, and lower nation-level means in Neuroticism, were associated with lower nation-level means of absolute breast size dissatisfaction. Level-1 effects (within-nation) and level-2 effects (between-nation) of Conscientiousness and Neuroticism were directionally aligned.

In terms of signed breast size dissatisfaction in participants preferring larger breasts, there was an additional significant effect of Conscientiousness on level-2 (slope = -0.320, $SE = 0.138$, $p = .021$), which, again, did not change the effect of this predictor on level-1 (slope = -0.059, $SE = 0.023$, $p = .010$). Higher nation-level means in Conscientiousness were associated with lower nation-level means of breast size dissatisfaction. The effects of Conscientiousness on level-1 and level-2 were directionally aligned. Finally, in terms of signed breast dissatisfaction in participants preferring smaller breasts, there was an additional significant effect of age on level-2 (slope = -0.050, $SE = 0.008$, $p < .001$), which did not change the effect of this predictor on level-1 (slope = -0.016, $SE = 0.003$, $p < .001$). Higher nation-level age means were associated with lower nations-level means of breast size dissatisfaction (i.e., greater dissatisfaction in this group). The effects of age on level-1 and level-2 were directionally aligned.

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Breast Size Satisfaction Survey

Table 1. *Sample Descriptions of Data from the Breast Size Satisfaction Survey.*

Nation	<i>n</i>	Mean age	Mean body mass index	% Ethnic/ racial majority	% Secondary/ tertiary education	% Urban residence	Mean financial security	% Preference for larger breasts/smaller breasts/satisfied with current breast size
Australia	201	36.30 (13.95)	24.54 (4.87)	86	90	97	2.17 (0.57)	43/28/28
Austria	229	27.20 (11.28)	22.56 (3.57)	83	91	87	2.13 (0.69)	45/24/31
Brazil	822	31.74 (10.85)	24.36 (4.12)	53	70	95	1.68 (0.64)	51/21/28
Canada	463	38.19 (15.46)	25.19 (5.30)	79	75	90	2.21 (0.64)	41/30/29
China	897	24.16 (9.19)	20.45 (2.73)	91	27	98	1.92 (0.56)	73/14/13
Colombia	483	37.72 (13.83)	24.62 (3.68)	77	64	100	1.91 (0.68)	33/11/57
Costa Rica	225	34.05 (13.16)	24.95 (4.65)	44	81	96	2.09 (0.65)	41/23/36
Croatia	414	33.62 (13.77)	22.81 (3.28)	94	69	89	2.16 (0.59)	55/17/28
Cyprus	284	34.26 (12.21)	23.31 (4.67)	90	78	83	1.89 (0.64)	41/22/37
Egypt	200	34.27 (9.43)	29.07 (6.17)	87	77	99	2.13 (0.70)	52/36/13
Germany	387	27.21 (13.40)	21.97 (3.06)	87	83	74	2.19 (0.65)	54/20/26
Ghana	174	28.18 (9.37)	24.68 (6.87)	43	79	94	2.11 (0.73)	33/16/52
Greece	1888	34.74 (13.15)	23.41 (4.05)	81	64	92	1.93 (0.62)	47/23/30
Hungary	831	28.50 (11.60)	23.52 (4.84)	88	54	82	2.02 (0.64)	51/19/30
India	441	38.54 (9.19)	24.63 (4.26)	43	72	75	1.98 (0.73)	42/40/18
Indonesia	266	28.77 (8.86)	22.66 (3.94)	89	72	85	2.04 (0.59)	51/19/30
Iran	946	33.92 (8.86)	24.71 (4.55)	94	89	98	2.02 (0.63)	34/33/33
Ireland	219	34.11 (16.51)	24.19 (4.59)	71	66	36	1.90 (0.62)	41/34/26
Israel	187	36.65 (13.85)	23.03 (3.43)	82	80	83	2.19 (0.63)	37/27/36
Italy	747	39.34 (13.76)	22.88 (4.24)	87	75	89	1.94 (0.58)	49/23/29
Japan	423	39.86 (17.88)	20.98 (2.77)	82	53	94	2.07 (0.53)	70/20/10
Lebanon	406	34.87 (10.84)	24.45 (4.01)	48	90	98	1.79 (0.62)	56/20/24
Malaysia	720	22.50 (4.81)	22.25 (4.67)	71	79	82	1.75 (0.66)	55/23/22

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Netherlands	512	43.34 (15.21)	25.68 (5.12)	83	65	69	2.00 (0.64)	34/26/40
Norway	254	49.94 (15.05)	25.26 (4.28)	88	82	71	2.27 (0.61)	28/28/44
Pakistan	419	37.68 (14.18)	23.55 (4.60)	79	85	100	2.20 (0.76)	30/49/21
Paraguay	202	37.45 (14.32)	26.15 (4.91)	80	44	83	2.10 (0.70)	31/19/51
Peru	232	31.89 (11.65)	24.00 (3.56)	47	54	100	2.03 (0.69)	51/16/32
Philippines	200	42.29 (21.04)	N/A	77	85	94	1.93 (0.80)	45/22/34
Poland	999	33.33 (13.61)	23.21 (4.00)	90	71	76	1.92 (0.53)	50/22/28
Portugal	203	41.99 (15.23)	24.26 (3.99)	78	63	96	1.93 (0.62)	33/21/45
Romania	428	30.49 (13.64)	22.56 (5.07)	62	39	79	1.95 (0.66)	54/17/29
Serbia	211	34.28 (12.90)	22.55 (3.86)	83	73	95	2.07 (0.70)	50/15/36
Slovenia	343	35.93 (13.23)	23.36 (3.83)	82	85	72	1.94 (0.47)	50/20/31
Spain	712	37.94 (14.12)	23.49 (4.44)	83	70	72	1.98 (0.64)	36/19/45
Thailand	644	29.59 (9.24)	22.56 (4.89)	95	70	90	1.87 (0.59)	60/17/23
Turkey	211	34.13 (11.38)	23.65 (4.54)	71	64	99	1.69 (0.62)	46/26/28
UAE	205	26.71 (9.78)	24.23 (4.84)	75	64	89	2.30 (0.68)	52/28/20
UK	204	36.70 (14.62)	24.01 (2.75)	90	77	94	1.86 (0.73)	56/32/25
USA	699	38.51 (14.85)	24.88 (5.39)	69	82	91	1.96 (0.77)	43/32/25
Total	18541	34.11 (13.39)	23.58 (13.69)	79	69	88	1.97 (0.65)	48/23/30

Note. Numbers are means and standard deviations (in parentheses), and percentages (rounded to the nearest integer) where indicated otherwise.

Numbers were based on all available data. UAE = United Arab Emirates, UK = United Kingdom, USA = United States of America; % Preference for larger breasts/smaller breasts/satisfied with breast size = percentages of participants with signed breast size dissatisfaction scores > 0 / < 0 / $= 0$.

Breast Size Satisfaction Survey

Table 2. *Current and Ideal Breast Size, Absolute Breast Size Dissatisfaction, and Standardised Mean Factor Scores in Each Nation*

Nation	Breast size		Absolute dissatisfaction	Media exposure	
	Current	Ideal		Western	Local
Australia	6.87 (3.76)	7.18 (2.63)	2.31 (2.06)	0.47 (0.59)	-0.30 (0.53)
Austria	6.12 (3.49)	6.65 (2.49)	2.02 (1.95)	0.20 (0.61)	-0.32 (0.66)
Brazil	6.15 (3.83)	7.26 (2.79)	2.85 (2.54)	-0.36 (0.80)	-0.05 (0.80)
Canada	6.98 (4.05)	7.05 (2.68)	2.46 (2.36)	0.57 (0.55)	-0.47 (0.67)
China	4.84 (2.73)	7.08 (2.76)	2.96 (2.21)	-0.47 (0.95)	0.64 (0.50)
Colombia	7.16 (3.53)	7.88 (3.02)	1.56 (2.29)	-0.16 (1.12)	0.65 (1.08)
Costa Rica	6.85 (3.57)	7.59 (2.72)	2.10 (2.12)	0.39 (1.06)	-0.65 (1.04)
Croatia	5.83 (3.62)	6.82 (2.46)	2.16 (1.98)	0.44 (0.69)	-1.09 (0.81)
Cyprus	7.16 (3.71)	7.74 (2.67)	2.12 (2.18)	-0.04 (0.95)	-0.66 (1.02)
Egypt	7.42 (3.82)	8.01 (3.03)	3.32 (2.69)	-0.21 (1.03)	0.09 (1.31)
Germany	5.67 (3.27)	6.54 (2.41)	2.12 (1.96)	-0.05 (0.62)	0.04 (0.56)
Ghana	6.30 (3.44)	6.97 (3.23)	1.48 (2.17)	0.23 (1.10)	0.42 (1.05)
Greece	6.64 (3.69)	7.29 (2.64)	2.20 (2.12)	-0.03 (0.97)	0.12 (0.90)
Hungary	6.53 (3.76)	7.65 (2.71)	2.51 (2.27)	0.72 (0.76)	0.27 (0.79)
India	8.02 (3.35)	7.92 (3.04)	2.35 (2.04)	-1.08 (0.99)	1.04 (0.87)
Indonesia	6.33 (3.26)	7.43 (2.62)	1.95 (1.94)	-0.48 (0.90)	-0.09 (0.81)
Iran	7.16 (3.67)	7.19 (3.04)	2.13 (2.30)	-1.14 (0.78)	-0.89 (0.58)
Ireland	6.79 (3.77)	6.87 (2.57)	2.52 (2.13)	0.24 (0.68)	-0.63 (0.68)
Israel	7.04 (3.74)	7.19 (2.76)	2.26 (2.30)	0.34 (0.67)	-0.28 (0.67)
Italy	6.13 (3.99)	6.95 (2.78)	2.52 (2.37)	0.61 (0.75)	0.01 (0.89)
Japan	4.68 (3.18)	6.25 (2.14)	2.91 (2.07)	-1.26 (0.77)	0.63 (0.44)
Lebanon	7.23 (3.07)	8.22 (2.74)	2.32 (1.97)	-0.01 (0.77)	-0.26 (0.91)
Malaysia	5.63 (3.07)	6.77 (2.55)	2.29 (2.08)	0.11 (0.90)	-1.05 (1.03)
Netherlands	7.39 (3.79)	7.43 (2.75)	1.98 (2.24)	0.45 (0.83)	0.40 (0.63)
Norway	7.15 (3.66)	7.05 (2.57)	1.96 (2.48)	-0.27 (0.91)	-0.11 (0.38)
Pakistan	8.66 (3.57)	8.00 (2.87)	2.71 (2.39)	-0.10 (1.11)	-0.40 (0.79)

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Paraguay	6.91 (3.64)	7.40 (3.20)	1.89 (2.46)	-0.51 (0.99)	-0.26 (0.74)
Peru	6.04 (3.31)	7.15 (2.51)	2.12 (1.99)	0.64 (0.91)	0.12 (1.19)
Philippines	5.76 (3.32)	6.39 (2.60)	2.21 (2.36)	0.26 (0.87)	-0.07 (0.97)
Poland	6.67 (3.62)	7.45 (2.57)	2.34 (2.18)	-0.11 (0.81)	0.70 (0.87)
Portugal	6.58 (3.80)	6.99 (3.16)	2.29 (2.80)	0.60 (1.03)	0.14 (1.01)
Romania	6.62 (3.75)	7.83 (2.88)	2.22 (2.17)	0.39 (0.81)	0.27 (1.02)
Serbia	6.12 (3.64)	7.20 (2.68)	2.10 (2.11)	0.22 (0.86)	0.16 (0.99)
Slovenia	6.48 (3.80)	7.42 (2.64)	2.38 (2.39)	0.02 (0.76)	-0.80 (0.96)
Spain	6.75 (3.79)	7.25 (2.98)	1.75 (2.16)	0.22 (0.83)	0.38 (0.87)
Thailand	5.20 (3.50)	6.79 (2.73)	2.73 (2.35)	-0.15 (0.96)	-0.02 (0.84)
Turkey	6.84 (3.41)	7.32 (2.52)	2.36 (2.13)	-0.72 (1.03)	0.29 (0.86)
United Arab Emirates	6.75 (2.99)	7.51 (2.73)	2.31 (2.01)	0.20 (0.71)	-1.01 (1.25)
United Kingdom	7.56 (3.70)	8.69 (2.57)	3.60 (2.63)	0.67 (0.26)	-0.89 (0.31)
United States of America	6.92 (3.55)	7.12 (2.83)	2.36 (2.17)	0.89 (0.61)	0.36 (0.88)

Table 3. *Results of the Measurement Invariance Analyses for Media Exposure Items.*

Model	χ^2 (df)	CFI	TLI	SRMR
Western media				
Configural invariance	1079.60 (93)	.975	.942	0.034
Full measurement invariance	11041.73 (702)	.736	.919	0.067
Partial measurement invariance	7678.42 (662)	.821	.942	0.060
Local media				
Configural invariance*	1094.10 (94)	.969	.929	0.037
Full measurement invariance	14264.42 (702)	.583	.872	0.075
Partial measurement invariance	6250.05 (587)	.826	.936	0.056

Note. *Constraining the loadings of Items 1 and 2 in the Turkish data to equality to ensure a

positive definite residual covariance matrix.

Table 4. Results of Multilevel Analyses on Potential Antecedents of Breast Size Dissatisfaction.

Level-1 predictor	Absolute breast size dissatisfaction		Signed breast size dissatisfaction			
			Participants preferring larger breasts		Participants preferring smaller breasts	
	(N = 18,541)		(n = 8,698)		(n = 4,254)	
	Initial model	Final model	Initial model	Final model	Initial model	Final model
Age	-0.010 (0.001)***	-0.010 (0.001)***	-0.001 (0.002)		-0.018 (0.003)***	-0.018 (0.002)***
Urbanicity	0.007 (0.016)		0.037 (0.018)*	0.038 (0.017)*	0.003 (0.026)	
Financial security	-0.161 (0.027)***	-0.165 (0.026)***	-0.128 (0.033)***	-0.126 (0.033)***	0.096 (0.050)	0.110 (0.050)*
Openness to Experience	-0.014 (0.020)		0.035 (0.025)		0.029 (0.036)	
Conscientiousness	-0.122 (0.020)***	-0.128 (0.018)***	-0.080 (0.025)**	-0.064 (0.023)**	0.061 (0.037)	0.076 (0.036)*
Extraversion	-0.034 (0.018)		-0.001 (0.023)		0.012 (0.033)	
Agreeableness	0.032 (0.021)		0.028 (0.027)		-0.093 (0.041)*	-0.083 (0.038)*
Neuroticism	0.089 (0.014)***	0.092 (0.014)***	0.068 (0.018)***	0.067 (0.017)***	-0.049 (0.026)	
Western media exposure	-0.061 (0.028)*	-0.062 (0.019)***	-0.067 (0.028)*	-0.051 (0.024)*	0.001 (0.039)	
Local media exposure	0.097 (0.040)*	0.086 (0.019)***	0.036 (0.041)		-0.033 (0.045)	
<i>Random effects</i>						
Intercept of breast size dissatisfaction	0.111 (0.029)***	0.121 (0.031)***	0.077 (0.026)**	0.080 (0.024)**	0.068 (0.028)*	0.083 (0.030)**
Slope of Western media exposure	0.005 (0.005)		0.006 (0.007)		0.005 (0.009)	
Slope of local media exposure	0.013 (0.032)		0.013 (0.025)		0.020 (0.018)	
<i>Explained variance</i>						
	1.5% / 25.0%	1.3% / 18.2%	1.0% / 11.5%	0.6% / 8.0%	1.8% / 48.5%	1.2% / 36.4%

Note. Numbers are fixed effects (standard errors in parentheses) for level-1 predictors, and variance estimates (standard errors in parentheses) for random effects. All level-1 predictors were grand mean-centred prior to analysis. Among participants preferring larger (smaller) breasts, signed breast size dissatisfaction could only take on positive (negative) values; higher (lower) values denoted higher levels of breast size dissatisfaction.

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'Explained variance' presents pseudo- R^2 values (using the formulae by Bryk & Raudenbush, 1992), which approximately quantify the amount of outcome variance explained by the models on levels 1 and 2 (R_1^2 and R_2^2), respectively, compared to a baseline model, which included only random intercepts. $*p < .05$, $**p < .01$, $***p < .001$.

Table 5. Results of Multilevel Analyses on the Mediating Effect of Breast Size Dissatisfaction on Potential Outcomes

Outcome	Absolute breast size dissatisfaction		Signed breast size dissatisfaction			
			Participants preferring larger breasts		Participants preferring smaller breasts	
	(N = 18,541)		(n = 8,698)		(n = 4,254)	
	Slope coefficient	Variance estimate	Slope coefficient	Variance estimate	Slope coefficient	Variance estimate
Breast self-examination frequency	-0.011 (0.003)**	0.055 (0.013)***	-0.012 (0.005)*	0.060 (0.015)***	-0.010 (0.007)	0.055 (0.015)***
Confidence in noticing change in breasts	-0.020 (0.003)***	0.075 (0.017)***	-0.019 (0.005)***	0.068 (0.016)***	-0.003 (0.006)	0.073 (0.019)***
Time delay in contacting doctor	0.007 (0.004)	0.201 (0.046)***	-0.005 (0.008)	0.209 (0.049)***	0.014 (0.010)	0.193 (0.048)***
Appearance dissatisfaction	0.109 (0.004)***	0.196 (0.045)***	0.079 (0.007)***	0.141 (0.034)***	-0.103 (0.011)***	0.095 (0.028)**
Weight dissatisfaction	0.086 (0.006)***	0.130 (0.031)***	0.032 (0.009)***	0.102 (0.026)***	-0.105 (0.012)***	0.093 (0.028)**
Happiness	-0.017 (0.002)***	0.050 (0.011)***	-0.012 (0.003)***	0.046 (0.011)***	0.012 (0.004)**	0.045 (0.011)***
Self-esteem	-0.067 (0.005)***	0.210 (0.048)***	-0.046 (0.008)***	0.215 (0.051)***	0.025 (0.011)*	0.186 (0.047)***

Note. Numbers are fixed effects (standard errors in parentheses) for the slope coefficients of breast size dissatisfaction on outcomes, and variance estimates (standard errors in parentheses) for the intercepts of potential outcomes. The models incorporated also all antecedents of the final models in Table 2; all outcomes were allowed to intercorrelate. Among participants preferring larger (smaller) breasts, signed breast size dissatisfaction could only take on positive (negative) values; higher (lower) values denoted higher levels of breast size dissatisfaction. * $p < .05$, ** $p < .01$, *** $p < .001$.

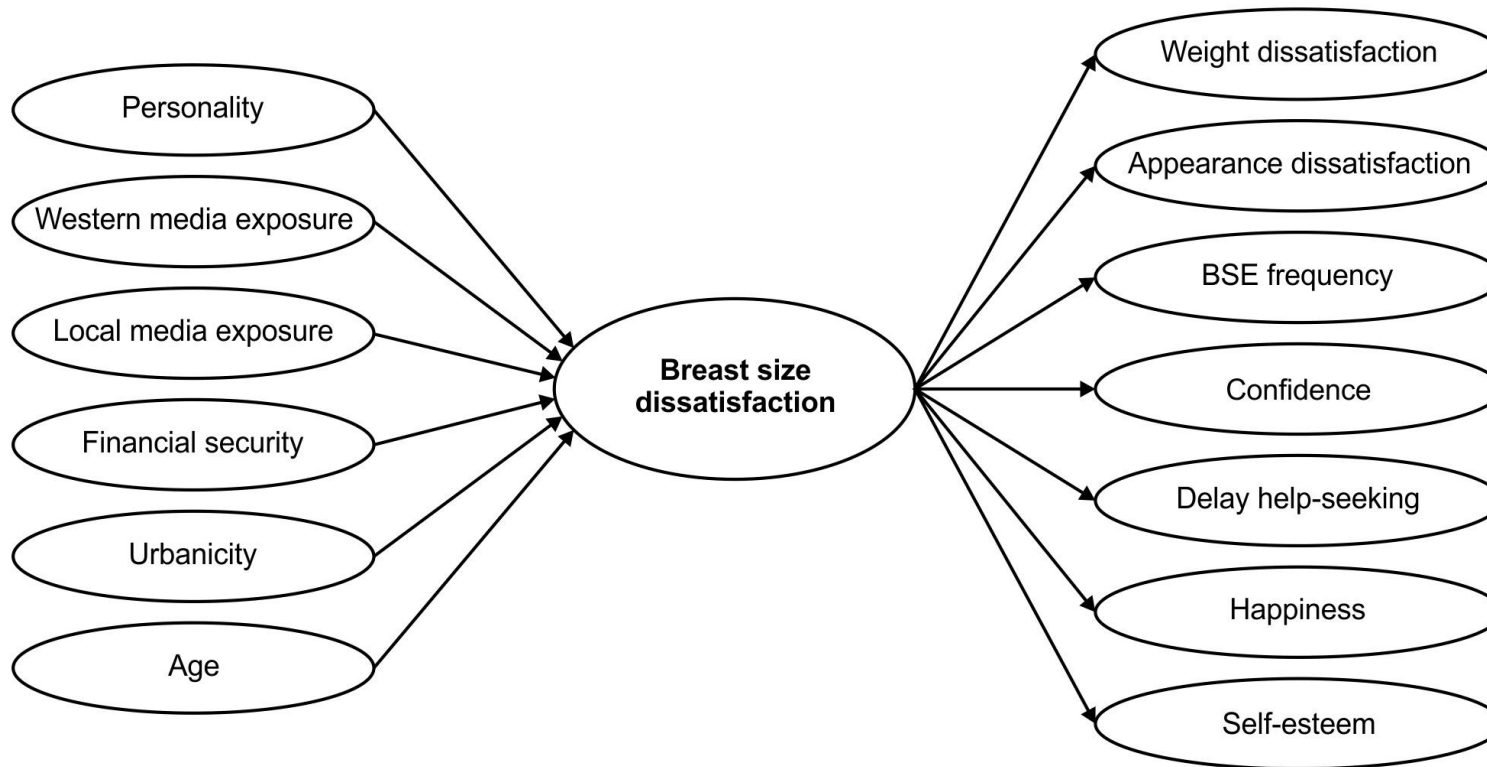


Figure 1. Schematic Representation of the Hypothesised Associations between Antecedents and Outcomes of Breast Size Dissatisfaction. Note:

Personality = Openness to Experience, Conscientiousness, Agreeableness, Extraversion, and Neuroticism; BSE = Breast Self-Examination;

Confidence = Confidence in Noticing Breast Change.

Supplementary Materials

Locale and Sample Sizes of the Individual Research Sites in the Breast Size Satisfaction Survey

Nation	Research site	Sample size	Questionnaire language
Australia	Adelaide	201	English
Austria	Vienna	229	German
Brazil	Barbacena	219	Brazilian Portuguese
	Juiz de Fora	231	Brazilian Portuguese
	Rio de Janeiro	372	Brazilian Portuguese
Canada	Toronto	239	English
	Saint-Jérôme	224	French
China	Chongqing	398	Mandarin
	Hong Kong	280	Cantonese
	Macau	219	Mandarin
Colombia	Ibagué	202	Spanish
	Bogotá	281	Spanish
Costa Rica	San José	225	Costa Rican Spanish
Croatia	Rijeka	199	Croatian
	Zadar	215	Croatian
Cyprus	Paphos	284	Greek
Egypt	Alexandria	200	Egyptian Arabic
Germany	Online	387	German
Ghana	Koforidua	174	English
Greece	Athens	1888	Greek
Hungary	Online	622	Hungarian
	Pécs	209	Hungarian
India	Muzaffarnagar	240	Hindi
	Puducherry	201	Tamil
Indonesia	Yogyakarta	266	Indonesian
Iran	Tehran	547	Farsi
	Tabriz	399	Farsi
Ireland	Dublin	219	English

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Israel	Tel Aviv-Yaffo	187	Hebrew
Italy	Florence	269	Italian
	Rome	478	Italian
Japan	Osaka	195	Japanese
	Tokyo	228	Japanese
Lebanon	Beirut	406	Arabic
Malaysia	Kota Bharu	500	Malaysian Malay
	Kuala Lumpur	220	Malaysian Malay
Netherlands	Groningen	210	Dutch
	Online	302	Dutch
Norway	Oslo	254	Norwegian
Pakistan	Islamabad	210	Urdu
	Karachi	219	Urdu
Paraguay	Asunción	202	Spanish
Peru	Online	232	Spanish
Philippines	Manila	200	Tagalog
Poland	Lublin	271	Polish
	Poznań	728	Polish
	Porto	203	Portuguese
Portugal	Porto	203	Portuguese
Romania	Timișoara	428	Romanian
Serbia	Belgrade	211	Serbian
Slovenia	Koper	343	Slovene
Spain	Almería	200	Spanish
	Valencia	512	Spanish
Thailand	Bangkok	201	Thai
	Chiang Mai	235	Thai
	Kohn Kaen	208	Thai
Turkey	İzmir	211	Turkish
United Arab Emirates	Al Ain	205	Arabic
United Kingdom	Edinburgh	204	English
United States of America	Marion	266	English
	Orange	231	English
	Scottsdale	202	English
