Influencing Factors of Social Anxiety Disorder and Body Dysmorphic Disorder in a Nonclinical Brazilian Population

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Abstract

The aims of this study were twofold: (i) to investigate the prevalence of social anxiety disorder and body dysmorphic disorder in a nonclinical, Brazilian population and (ii) to examine the effects of selected factors such as sociodemographic characteristics (sex, age, marital status, workload, education, and income), body mass index, current diet, physical activity, and use of aesthetic treatment. A total of 428 adults (279 women and 149 men) aged 18 to 60 years ($M = 31.51$, $SD = 10.73$) participated in the study. Social anxiety disorder was measured using a Brazilian version of the Social Phobia Inventory (Osório, Crippa, & Loureiro, 2009). Body dysmorphic disorder by

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using a body dysmorphic symptoms scale validated for the Brazilian population (Ramos & Yoshida, 2012). The main results showed that 28.7% of the sample reported symptoms of social anxiety disorder. Body dysmorphic disorder was more prevalent among women, individuals who had sought aesthetic treatment and individuals who were physically inactive. Moreover, lower levels of social anxiety disorder were observed in physically active individuals who had sought aesthetic treatment compared with physically inactive individuals who had sought aesthetic treatment. Social anxiety disorder was negatively correlated with age, daily workload, and income, while body dysmorphic disorder was positively associated with body mass index and negatively with income. These results show that social anxiety disorder and body dysmorphic disorder are differentially influenced by the selected factors investigated in this study.

Keywords
Exercise, beauty, body dysmorphic disorders, social phobia, obsessive-compulsive disorder

Humanity has been demonstrating an aesthetic sense for more than 35,000 years, since the first aesthetic records emerged through visual arts. Early standards of beauty, inherited from Egyptian culture, have since varied according to the age and the culture. Today, modern society attaches great importance to the aesthetics of the body and its appearance, an attachment that has been found to have significant connections to body disorders (Buhlmann, Winter, & Kathmann, 2013).

Among the various body disorders, body dysmorphic disorder (BDD) is a condition characterized by an exaggerated preoccupation with one or more defects or faults in physical appearance that are not observable or appear to be slight to others. Individuals with this disorder devote much of their time to trying to hide or minimize imaginary defects in their aesthetic appearance through repetitive behaviors such as mirror checking, excessive grooming, skin picking, and reassurance seeking (American Psychiatric Association, 2013). This obsession can result in social and functional impairment and lead to other psychological conditions such as depression, anxiety and body dissatisfaction and, consequently, low self-esteem (Dey et al., 2015).

The prevalence of BDD in the general population may differ between countries because of their cultural differences and different healthcare systems. Studies have found a BDD prevalence of .7% in Florence, Italy (Faravelli, Salvatori, Galassi, & Aiazzi, 1997); 1.7% (Rief, Buhlmann, Wilhelm,

Borkenhagen, & Brähler, 2006) and 1.8% in Germany (Buhlmann et al., 2010); 2.4% in the United States (Koran, Abujaoude, Large, & Serpe, 2008); and 2.1% in Swedish women (Brohede, Wingren, Wijma, & Wijma, 2015). In the dermatological patient population, its prevalence is predominantly higher: 8.8% (Uzun et al., 2003) and 8.6% of Turkish patients (Dogruk Kacar et al., 2014); 14.4% of US patients (Phillips, Dufresne, Wilkel, & Vittorio, 2000); 14.0% of Brazilian patients (Conrado et al., 2010); and 4.9% of Swedish patients (Brohede, Wyon, Wingren, Wijma, & Wijma, 2017).

Social anxiety disorder (SAD) has also received increasing scientific and social attention. SAD is characterized by marked fear or anxiety about one or more social situations in which one may be exposed to assessment by other people (American Psychiatric Association, 2013). An individual with SAD has an excessive fear of being negatively assessed on his or her social performance, skills, and even physical appearance. Such individuals often develop appearance disorders, such as BDD, or eating disorders, such as anorexia and bulimia (Gee, Antony, & Koerner, 2013; Pilling et al., 2013; Roberts, Hart, Coroiu, & Heimberg, 2011). Studies have shown that SAD is one of the most persistent and common anxiety disorders, with lifetime prevalence rates in Europe as a whole of 6.7% and in its constituent countries of between 3.9% and 13.7% (Fehm, Pelissolo, Furmark, & Wittchen, 2005) and of between 7% and 12% in Western populations (Fang & Hofmann, 2010).

SAD and BDD are two separate but conceptually overlapping nosological entities (Fang & Hofmann, 2010) that have the body as a common denominator. Both constructs involve concerns with either others' or one's own perceptions of one's body or specific physical features. SAD involves concern about evaluation by others, while BDD involves concern with one's self-perceptions (Coles et al., 2006; Dobersek & Eklund, 2018; Fang & Hofmann, 2010). Several studies have found that both disorders have many demographic and clinical characteristics in common, including etiological and behavioral factors (Jolanta & Tomasz, 2000; Kelly, Dalrymple, Zimmerman, & Phillips, 2013) such as low self-esteem and low self-presentation. Moreover, both BDD and SAD sufferers exercise social avoidance through shame and fear of negative evaluation and rejection (Kelly et al., 2013). Some authors even point to SAD as being a major comorbidity of BDD (Gunstad & Phillips, 2003; Phillips, Menard, Fay, & Weisberg, 2005).

Previous studies have attempted to study the relationship between BDD and potentially related disorders such as eating disorders, obsessive-compulsive disorders, and SAD (Kelly et al., 2013; Madsen, Bohon, & Feusner, 2013). However, other possible influencing factors, such as age, sex, physical activity, and the use of aesthetic treatment, have not received the same empirical attention. For example, the relationship of BDD with age and behavioral differences has been investigated in both sexes but only in clinical patients (Bjornsson et al., 2013). In addition, Lambrou, Veale, and Wilson (2012) investigated the association between appearance and self-image in individuals with BDD in a

nonclinical population. Both studies found an association between major depression and body image. Associations between BDD and clinical anxiety have also been evaluated in both sexes but only in clinical populations and adolescents (Ingles, La Greca, Marzo, Garcia-Lopez, & Garcia-Fernandez, 2010). In relation to SAD, this disorder has previously been related to an individual's self-presentation and narcissism (Akehurst & Thatcher, 2010). On the other hand, physical activity has been investigated as a potential treatment for SAD (Jazaieri, Goldin, Werner, Ziv, & Gross, 2012) even though few studies have examined the association between these two variables as well as in relation to others (e.g., sex and aesthetic treatments). This is highly significant, since the available data and evidence have indicated significant differences between the sexes in terms of health-related physical activity levels (e.g., Azevedo et al., 2007) and cosmetic (surgical and nonsurgical) procedures (The American Society for Aesthetic Plastic Surgery, 2016), suggesting the relevance of further investigating these possible interactions.

There is some evidence to suggest that exercise and regular physical activity can physiologically affect clinical anxiety (Zschucke, Gaudlitz, & Strohle, 2013). However, because of the heterogeneous nature of physical activity, individual mechanisms are insufficient to demonstrate the anxiolytic nature of different types of exercise. Although physical activity produces scientifically proven mental benefits, such as the opioid effect, states of euphoria, pain reduction, and long-term endorphin production, further studies are needed to verify the anxiolytic nature of each type of physical activity as well as its frequency and intensity (Anderson & Shivakumar, 2013). As for aerobic exercises, these have been proved to reduce anxiety and depression. Such improvements in mood are thought to be caused by an exercise-induced increase in blood circulation to the brain and by influencing the hypothalamic-pituitary-adrenal axis and, thus, physiological reactivity to stress. This physiological influence is probably mediated by the hypothalamic-pituitary-adrenal axis and affects several regions of the brain, including the limbic system, which controls motivation and mood; the amygdale, which generates fear in response to stress; and the hippocampus, which plays an important part in memory formation as well as mood and motivation (Sharma, Madaan, & Petty, 2006). In this way, it is known that physical exercise may trigger processes facilitating neuroplasticity, thereby enhancing an individual's capacity to respond to new demands with behavioral adaptations, which is of particular importance for individuals with SAD and/or BDD (Hötting & Röder, 2013). Moreover, recent research has provided preliminary empirical support for the specific beneficial effects of physical activity on SAD (Heenan & Troje, 2014; Jazaieri et al., 2012) brought about by reducing perceptual biases relating to the perception of threat.

As for seeking aesthetic treatment, patients who undergo surgical procedures tend to report higher levels of anxiety than do those who make routine clinical visits (Kamangar et al., 2017). Unsurprisingly, research has shown that facelift

patients generally exhibit higher emotional and social concern about their facial appearance, and consequently higher rates of psychiatric diagnoses, compared with members of the general population (Sarcu & Adamson, 2017). Another study (Ribeiro, 2017) found that a considerable number of plastic surgery (15.04%) and dermatology patients (12.65%) had BDD, calling into question the need for a more appropriate assessment and awareness of this disorder by clinicians.

Thus, there is clearly a need for further research on the relationship between SAD, BDD, and these selected factors, especially among nonclinical populations. To the best of our knowledge, no study has yet attempted to investigate these interrelationships in a nonclinical sample. In addition, we consider this research to be of particular importance within the Brazilian context given that this population is known to glorify the body (Goldenberg, 2010), report high scores on body shame (Forbes et al., 2012) and, unsurprisingly, to have one of the highest population-adjusted rates of cosmetic procedures in the world (International Society of Aesthetic Plastic Surgery, 2017). Therefore, this study seeks to fill these gaps in the existing literature by (i) investigating the prevalence of SAD and levels of BDD in a nonclinical, Brazilian adult sample and (ii) analyzing associations between SAD, BDD, and possible influencing factors such as sociodemographic factors (sex, age, marital status, workload, education, and income), body mass index (BMI), dieting behavior, physical activity, and use of aesthetic treatments.

Methods

Participants

A total of 428 adults (279 women and 149 men) aged between 18 and 60 years ($M = 31.51$, $SD = 10.73$) participated in the study. The BMI of the participants ranged from 15.56 to 41.14 kg/m^2 ($M = 25.35$, $SD = 4.64$). There were no sex differences in age ($t_{(426)} = .54$, $p = .587$, Cohen's $d = .06$) or BMI ($t_{(426)} = .69$, $p = .490$, Cohen's $d = .07$).

The sample in this study was randomly selected from the adult population living in Campo Grande, MS, Brazil. The sociodemographic characteristics of the sample are presented in Table 1.

Regarding these characteristics, 65.2% of the participants were female and 48.6% were overweight (i.e., BMI > 25). Of the sample as a whole, 27.8% were on a special diet or nutritional regimen.

The physical activity data revealed that 50.2% of the sample reported regularly practicing moderate to vigorous physical activity. In addition, approximately 4 in every 10 subjects (39.3%) had sought aesthetic treatment.

The data on marital status revealed that 52.3% of the participants were single, 37.9% were married, and a minority (9.8%) were divorced or widowed.

Table 1. Sample distribution according to sociodemographic characteristics.

	n	%
Sex		
Female	279	65.2
Male	149	34.8
Body mass index		
Underweight ($<$18.5 kg/m^2)	18	4.2
Normal (18.5 to 25 kg/m^2)	202	47.2
Overweight (25 to 30 kg/m^2)	140	32.7
Obesity ($>$30 kg/m^2)	68	15.9
Status		
Single	224	52.3
Married	162	37.9
Divorced or widowed	42	9.8
Regular physical activity		
No	213	49.8
Yes	215	50.2
Use of aesthetic treatments		
No	260	60.7
Yes	168	39.3
Currently on a special diet		
No	309	72.2
Yes	119	27.8
Education level		
None	17	4.0
Incomplete elementary school	20	4.7
Complete primary education	58	13.6
Incomplete high school	36	8.4
High school	159	37.1
Incomplete college	93	21.7
College graduate	34	7.9
Postgraduate/master's degree	11	2.6
Income		
Class E ($<$R\$ 1000/month)	58	13.6
Class D (R\$ 1000 to R\$ 2500/month)	191	44.6
Class C (R\$ 2500 to R\$ 5000/month)	124	29.0
Class B (R\$ 5000 to R\$ 10,000/month)	33	7.7
Class A ($>$R\$ 10,000/month)	22	5.1

The education data indicated that the sample was predominantly composed of individuals who had completed high school (37.1%), followed by 21.7% of subjects with an incomplete higher education, and 13.6% of individuals with a complete primary education.

According to the Brazilian Criteria of Economic Classification, the income of the sample was predominantly in Class D, that is, between 1000 and 2500 Reais (1 Brazilian Real equals about .23 Euros) a month (44.6%), followed by Class C, that is, between 2500 and 5000 Reais a month (29%). The other income classes contained very small numbers of subjects, the least populated being Class A (5.1%), that is, having an income of above 10,000 Reais a month (see Table 1).

Instruments

Self-report data were initially collected for anthropometric measurements (BMI), sociodemographic characteristics (age, sex, education, income, marital status, and workload), physical activity, and the use of aesthetic treatment. With respect to physical activity, participants indicated whether or not they regularly performed (yes or no) at least 30 minutes of moderate to vigorous physical activity, most days of the week, during their leisure time. The use of aesthetic treatment was assessed by the question: 'Have you had any aesthetic treatment or procedure in the past?' and was also scored using a yes or no format. For the purpose of clarity, an aesthetic treatment was defined as an intervention or procedure performed for nontherapeutic reasons, that is, not to treat an injury, disease or deformity, with the single aim of enhancing or changing the physical appearance of the individual (World Medical Association, 2014). Participants then completed the study instruments.

SAD was measured using the Brazilian version of the Social Phobia Inventory (SPIN), which was originally developed by Connor et al. (2000) to measure SAD symptoms and subsequently translated and adapted for the Brazilian population by Osório et al. (2009). This questionnaire consists of 17 items (e.g., 'I am afraid of doing things when people might be watching'), to which participants must respond by rating their level of agreement on a five-point Likert-type scale (0 = not at all; 4 = extremely). Because studies on SPIN validation have shown no consensus on the dimensionality of the instrument (e.g., Carleton et al., 2010), we chose to calculate only the total score scale, which can range from 0 to 68. Consequently, a cut-off point of 19 points was applied, as suggested by Connor et al. (2000, p. 382), in order to distinguish between subjects with and without social phobia. In this study, a Cronbach's alpha value of .90 was observed for the general factor.

BDD was measured using a validated scale of body dysmorphic symptoms adapted for the Brazilian population by Ramos and Yoshida (2012). This scale is based on the Body Dysmorphic Disorder Scale (BDDS), which was originally developed by Phillips, Hollander, Rasmussen, and Aronowitz (1997) to assist in the diagnosis of this pathology. The Brazilian scale by Ramos and Yoshida (2012) initially consisted of a questionnaire with 35 items (e.g., 'I know that my concerns about certain parts of my body are greatly exaggerated'), to which participants responded on a four-point Likert-type scale. The results of internal

consistency, reliability, and exploratory factor analyses in the original study supported the unidimensionality of a reduced, 28-item version of the scale, which was administered to our sample. A Cronbach's alpha of .91 was obtained for this study.

Procedures

This research was approved by the National Council of Ethics in Research (CONEP) on October 28, 2013 (CAAE: 21844213.7.0000.0021) and complies with the guidelines of Resolution CNS 466/12.

Questionnaires were administered by trained staff using a "street-intercept survey" method. More specifically, this method allows researchers to approach anyone on the street engaged in activities such as sitting in parks/coffee shops, shopping, walking to or from home, work or other locations, running errands, performing job-related duties, waiting to use public transport, visiting or participating in recreation, or just "hanging out" (see Miller, Wilder, Stillman, & Becker, 1997). All participants signed an informed consent form stating that their participation was voluntary and that they could withdraw from the study at any time. After an initial administration of a total of 850 questionnaires, 505 were returned. Only questionnaires with complete data were used in the subsequent analyses, resulting in 428 valid questionnaires.

Statistical analysis

First, we calculated descriptive statistics (mean, standard deviation, and percentage). Univariate normality was assessed by examining the skewness and kurtosis coefficients of all the scales' items and scores. Cronbach's alpha was used to evaluate the internal consistency of the SPIN and BDDS. The chi-square test was used to assess measures of association between the sociodemographic variables and prevalence estimates.

The SPIN and BDD scores were considered in relation to physical activity and aesthetic treatment and analyzed using a one-way analysis of variance (ANOVA). To calculate the combined effects of physical activity with sex and the prevalence of SAD, a 2×2 factorial ANOVA was used. The SPIN and BDDS scores were correlated with age, BMI, daily workload, and income based on Pearson correlations. Analyses were performed using SPSS 21.0 and a significance level of 5% applied.

Results

A descriptive analysis of the items from the instruments indicated that those with the highest scores were item 11 of the SPIN ("Avoid talking to an audience or giving speeches"; $M = 1.40$, $SD = 1.43$) and item 17 of the BDDS ("Concern about weight gain"; $M = .86$, $SD = .82$). The items with the lowest scores were

item 3 of the SPIN ("Parties and social events frighten me"; $M = .37$, $SD = .75$) and item 25 of the EA-TDC ("Satisfaction with sexual orientation"; $M = .05$, $SD = .30$). The skewness and kurtosis coefficients of the items and the scale scores ranged from -1.05 to 2.67, indicating normal (univariate) data distribution.

In the total sample, SAD showed a prevalence of 28.7%. The estimated prevalence of SAD based on the different sociodemographic variables is presented in Table 2.

The results indicate that SAD was more prevalent among female participants and single people ($p < .05$). There were no significant associations with the remaining variables.

The Pearson correlation coefficients between the BDD and SAD scores and the other variables (age, BMI, daily workload, and income) were calculated, and these results are presented in Table 3.

The results reveal a moderate relationship between high BDD and SAD. BDD was also positively associated with BMI and negatively associated with income. In turn, SAD was negatively correlated with age, daily workload, and income. In addition, age was positively associated with BMI and daily workload.

An ANOVA was used to compare the BDD and SAD scores by physical activity and aesthetic treatment as well as their interaction (physical activity × aesthetic treatments). The mean values and standard deviations are presented in Table 4.

The ANOVA results indicate significant main effects of physical activity on BDD ($F_{(1.424)} = 9.54$, $p < .001$, $\eta^2 = .02$) and SAD ($F_{(1.424)} = 6.88$, $p = .009$, $\eta^2 = .02$) scores, with physically active participants reporting lower scores on both dimensions.

Seeking aesthetic treatment had a significant effect on BDD scores ($F_{(1.424)} = 8.37$, $p = .004$, $\eta^2 = .02$) but not on SAD scores ($F_{(1.424)} = .09$, $p = .766$, $\eta^2 = .00$), with comparison results indicating that participants who had undergone aesthetic treatment showed higher levels of BDD.

The 2×2 factorial ANOVA indicated a significant interaction effect between physical activity factors and aesthetic treatment ($F_{(1.424)} = 3.97$, $p < .05$, $\eta^2 = .01$) only for SAD scores, suggesting that the negative effect of having sought aesthetic treatment on levels of SAD was lower in physically active individuals ($M = 10.64$, $SD = 1.19$) than in inactive participants ($M = 15.92$, $SD = 1.34$).

The combined effects of physical activity with sex and the prevalence of SAD were also investigated by two independent 2×2 factorial ANOVAs. No significant interaction effects were observed ($p > .05$).

The interaction effect between sex and prevalence of SAD in participants with BDD was also investigated. A factorial ANOVA revealed a significant interaction effect ($F_{(1.424)} = 4.00$, $p = .035$, $\eta^2 = .01$) as well as significant

Table 2. Estimates of the prevalence of social anxiety according to sociodemographic characteristics.

	%	χ^2	p
Sex			
Female	32.3	4.85	.03
Male	22.1		
Body mass index			
Underweight ($<$18.5 kg/m^2)	38.9	1.34	.72
Normal (18.5 to 25 kg/m^2)	29.7		
Overweight (25 to 30 kg/m^2)	27.1		
Obesity ($>$30 kg/m^2)	26.5		
Marital status			
Single	33.9	6.20	.04
Married	2.8		
Divorced/widowed	23.8		
Regular physical activity			
No	32.9	3.52	.07
Yes	24.7		
Use of aesthetic treatments			
No	29.6	0.25	.62
Yes	27.4		
Currently on a special diet			
No	27.2	1.31	.25
Yes	32.8		
Education level			
None	47.1	12.89	.12
Incomplete elementary school	20.0		
Complete primary education	27.6		
Incomplete high school	25.0		
High school	34.0		
Incomplete college	29.0		
College graduate	11.8		
Postgraduate/master's degree	11.1		
Income			
Class E ($<$R\$ 1000/month)	37.9	6.68	.15
Class D (R\$ 1000 to R\$ 2500/month)	29.3		
Class C (R\$ 2500 to R\$ 5000/ month)	29.0		
Class B (R\$ 5000 to R\$ 10,000/ month)	18.2		
Class A ($>$R\$ 10,000/mouth)	13.6		

individual effects of sex ($F_{(1.424)} = 45.43$, $p < .001$, $\eta^2 = .10$) and the prevalence of SAD ($F_{(1.424)} = 40.14$, $p < .001$, $\eta^2 = .09$) on BDD scores. The presence of symptoms that were compatible with a diagnosis of SAD in women tended to be associated with a higher prevalence of this disorder ($M = 19.76$, $SD = .92$)

Table 3. Pearson's correlation coefficients for BDD, SAD, age, BMI, daily workload, and income.

	2	3	4	5	6
1. BDD	0.48**	−0.05	0.21**	−0.07	−0.10*
2. SAD	–	−0.14**	0.05	−0.14**	−0.13**
3. Age		–	0.15**	0.14**	0.09
4. BMI			–	0.00	−0.01
5. Daily workload				–	0.06
6. Income					–

Note: BDD: body dysmorphic disorder; SAD: social anxiety disorder; BMI: body mass index.
*$p < .05$; **$p < .01$.

Table 4. Mean and standard deviation of the BDD and SAD scores by physical activity and aesthetic treatments.

	BDD		SAD	
	M	*SD*	*M*	*SD*
Regular physical activity				
No	13.45	.70	14.97	.84
Yes	10.47	.67	11.94	.80
Use of aesthetic treatments				
No	10.56	.60	13.62	.72
Yes	13.35	.75	13.28	.90

Note: BDD: body dysmorphic disorder; SAD: social anxiety disorder.

compared with that in men diagnosed with SAD ($M = 10.70$, $SD = 1.51$) or men not diagnosed with SAD ($M = 6.39$, $SD = .81$).

Discussion

The main objectives of this study were to investigate the prevalence of SAD and the highest scores of BDD in terms of age, sex, physical activity level, and use of beauty treatments and to analyze the relationships among SAD, BDD, and possible influencing factors (i.e., age, BMI, workload, education, and income). This study was guided by the need to characterize and understand these constructs in the population within the context of physical activity and aesthetics, thereby bridging an empirical gap in the literature. We observed a SAD prevalence of 28.7% in the sample. This percentage, which is considerable for a nonclinical population, was associated predominantly with single women who exhibited significant differences from other groups in the prevalence of SAD.

SAD has been shown to be one of the most persistent and common anxiety disorders, with lifetime prevalence rates across Europe of 6.7% and of between 3.9% and 13.7% in its constituent countries (Fehm et al., 2005). Another study also found SAD to be one of the most common psychiatric conditions, with prevalence rates in Western countries ranging between 7% and 12% of the population (Kessler, Chiu, Demler, & Walters, 2005). Regardless of the fact that this study had a predominantly female population sample (65.2%), women scored higher on BDD and SAD levels. This tendency has been verified by large epidemiology studies, such as the National Comorbidity Survey and Epidemiologic Catchment Area, which have demonstrated that SAD is somewhat more prevalent among women than among men (Fang & Hofmann, 2010). Similar findings have been found for BDD. For example, a recent study surveying over 2500 adults in the United States found a point prevalence of BDD of 2.5% for women and 2.2% for men, demonstrating a slight preponderance of BDD among women (Koran et al., 2008). This finding corroborates a previous study that found BDD to be slightly more common among women as indicated by a female-male ratio ranging from 1:1 to 3:2 (Phillips & Hollander, 2008). Overall, studies tend to show either a fairly equal gender ratio or a slightly greater prevalence of SAD and BDD among women (Fang & Hofmann, 2010).

With respect to BDD, in this study, higher levels were also observed in individuals who had sought aesthetic treatment and in physically inactive individuals. Moreover, BDD levels were higher in women than in men regardless of whether they had SAD. Taking into consideration the wide range of physical and psychological benefits derived from exercise and physical activity, some evidence suggests that such involvement can have negative effects for some individuals with SAD and muscle dysmorphia (a type of BDD). Individuals with heightened levels of SAD may be motivated to engage in exercise as a consequence of their desire to lose weight and/or improve their appearance. On the other hand, exercise settings can also become laden with the risk of evaluative judgements, which can encourage exercise avoidance—at least in settings perceived to be threatening. In fact, exercising to improve one's appearance has been positively related to SAD (Dobersek & Eklund, 2018). Conversely, physical activity intervention studies have been found to attenuate the extent of SAD experienced by participants. Williams and Cash (2001), for example, presented evidence indicating that involvement in even a relatively short, that is, six-week, circuit weight training program can result not only in improved body strength but also decreased SAD, more positive self-appraisals of appearance, greater body satisfaction, and enhanced physical self-efficacy in college students compared with matched control-group participants. Similar findings have been reported in other studies showing physical activity exercise intervention to result in even greater decreases in SAD compared with levels exhibited by control and exercise-only groups (Scott, Joyner, Czech, Munkasy, & Todd, 2009).

Another recent study showed that of the 90% of BDD patients with compulsive behaviors in its sample, 80% practiced mirror checking, some even losing 11 hours a day doing this or repeating it more than 80 times a day (Silver & Farrants, 2016). In addition, two recent studies of Swedish females showed differences in the prevalence of BDD among on one hand a population sample, with a 2.1% prevalence (Brohede et al., 2015), and on the other a clinical sample, with a 4.9% prevalence (Brohede et al., 2017). That is, BDD was twice as common in a clinical population than in a related, nonclinical sample. These data are difficult to compare with this study because of cultural and evaluation methods differences. Nevertheless, it is important to observe that the Brohede et al. (2015) study also found a higher prevalence of BDD in a female population sample that had sought aesthetic and dermatological treatments, as did this study.

In addition, BDD is estimated to be more common among women in psychiatric settings, although this has not been widely reported (Veale, Gledhill, Christodoulou, & Hodsoll, 2016). Some studies have estimated that up to a third of dermatology patients have underlying psychiatric comorbidity, the psychiatric illness being either the cause or the consequence of the dermatologic disease (Brown, Malakouti, Sorenson, Gupta, & Koo, 2015). In another study, 70% of BDD patients had sought nonpsychiatric treatment, most commonly from dermatologists (Crerand, Phillips, Menard, & Fay, 2005). In addition, recent studies have indicated that the prevalence of self-reported BDD may be more than twice as high in dermatology patients as in the general population of women, and therefore, it is especially important for dermatologists to consider the symptoms of BDD in their clinical practice (Brohede et al., 2015, 2017). It is important to note that despite higher scores for BDD reported by individuals who have had aesthetic treatment, some studies have suggested that appearance-enhancing treatments should not be used or performed because they may exacerbate the psychological symptoms of BDD. Some patients may resist psychotherapeutic or psychiatric referral because they continue to believe that their problems are physical rather than psychological, while only a minority of suicidal individuals seek psychotherapeutic or psychiatric care (Bewley, 2017; Picardi, Lega, & Tarolla, 2013). Consequently, the study by Picardi et al. (2013) went on to conclude that both increasing dermatologists' awareness of the risk of suicide and developing mental health consultation-liaison services in dermatology settings could help to prevent suicide in this population.

In line with these previous studies, this study found higher scores for BDD in individuals who had received aesthetic treatment, suggesting that poor body image is a common feature of both. A recent study suggests that patients with BDD often seek surgery and aesthetic treatment and typically consequently consider the results to be a failure (Veale & Bewley, 2015). In this circumstance, this perceived failure is directly associated with dissatisfaction with one's own self-image. Another study found that patients with BDD often sought cosmetic

treatment and that 13.1% of patients undergoing cosmetic surgery and 1.8% of those undergoing reconstructive surgery had BDD (Dey et al., 2015). In the studies of the Swedish women, 42% of women in the general population and 46% of female dermatology patients were found to be very concerned about some part of their body that they considered especially unattractive. Furthermore, 29% of women in the general population and 33% of female dermatology patients acknowledged being preoccupied with these concerns (Brohede et al., 2015, 2017). Finally, a recent study of patients with psoriasis—an illness that inflicts aesthetic damage—concluded that patients with more severe psoriasis experienced a greater reduction in quality of life and work productivity (Korman, Zhao, Pike, & Roberts, 2016).

Among the significant associations with BDD demonstrated in this study was the correlation with BMI, suggesting that for these participants, body image concerns increase in line with weight gain. Moreover, in this study, the item "Concern about weight gain" was the item with the highest scores (most agreed with) in the questionnaire. In BDD, any part of the body can contribute to body dissatisfaction, while a large part of the world's population is concerned about weight. We can interpret this result in two ways: individuals' self-image may be disconnected from reality if they imagine themselves as carrying more weight than they actually possess; or they may be dissatisfied with their bodies in ways that are not only (but also) related to weight. This finding was expected because people with BDD have low ratings of themselves, often viewing themselves as much less attractive or much larger than they actually are and thus exhibiting higher levels of delusion about their physical appearance (Reese, McNally, & Wilhelm, 2011). Excessive attention to detail may contribute to the development of appearance disorders because paying attention to details that are imperceptible to most people can become an obsessive source of dissatisfaction for individuals with more highly attuned visual perception (Madsen et al., 2013). Such irrational preoccupations may include dissatisfaction with imagined or slight "flaws," typically of the face or head (e.g., acne, scars, wrinkles, and excessive facial hair) or certain body regions (e.g., genitals, breasts, buttocks, abdomen, upper and lower extremities, overall body size, body build, or muscularity) (American Psychiatric Association, 2013). Such concerns with body shape and/or weight are somewhat common in patients with BDD and are usually associated with greater symptom severity and psychopathology in terms of body image disturbance, depressive symptoms, comorbidity, suicide attempts, and poorer social functioning (Kittler, Menard, & Phillips, 2007).

Conversely, significantly lower levels of SAD were found in physically active individuals who had sought aesthetic treatment compared with individuals who had sought aesthetic treatment and were physically inactive. This finding reveals a combined (and somehow protective) effect of physical activity and cosmetic treatment to reduce SAD; this suggests that physical activity may buffer some SAD symptoms and consequently BDD, since physical activity showed a

positive main effect on both dimensions and the two were moderately to highly correlated in this study ($r = .48$). Since most physically active individuals tend to "worship" their physical self, one might suggest that positive self-appreciation could help to explain the lower levels of SAD and BDD among the physically active individuals in this study. In addition, physical activity has been recommended as an adjunct psychiatric treatment for anxiety, depression, and other mental disorders, which suggests the potential of physical activity to prevent, treat, or minimize these conditions (Callaghan, 2004; Wolff et al., 2011; Zschucke et al., 2013), most of which are comorbid with BDD (Gunstad & Phillips, 2003).

As mentioned above, this study also found a moderate to high correlation between BDD and SAD. This finding corroborates that of Dey et al. (2015), who concluded that depression and anxiety scores were highly correlated in patients with BDD compared with those who did not have BDD. In addition, Pinto and Phillips (2005) examined 81 BDD patients whose SAD symptoms were treated with pharmacotherapy and concluded that SAD was significantly correlated with BDD severity. Wilhelm, Otto, Zucker, and Pollack (1997) also showed a high prevalence of BDD (12%) among patients with a primary diagnosis of SAD. Moreover, Coles et al. (2006) reported on a study in which 39.3% of 178 individuals with current BDD had comorbid lifetime SAD and 34.3% had current SAD and concluded that SAD onset typically occurred before BDD. Taken together, these comorbidity studies point to an overlap between BDD and other conditions in which SAD is a prominent feature. Furthermore, studies have reported a high lifetime prevalence of comorbid SAD in BDD, for example, 37% (Gunstad & Phillips, 2003), while BDD has been found to be the fourth most common comorbid disorder in patients with SAD (Coles et al., 2006). Several studies have also found that both these diseases have many demographic and clinical characteristics in common, including etiological and behavioral factors (Jolanta & Tomasz, 2000; Kelly et al., 2013) such as low self-esteem and low self-presentation. Moreover, both BDD and SAD sufferers exercise social avoidance through shame and fear of negative evaluation and rejection (Kelly et al., 2013). Finally, Fang and Hofmann (2010) have also indicated that these two disorders have a similar age of onset, share a chronic trajectory, and show similar cognitive biases toward interpreting ambiguous social information in a negative manner.

This study also found a negative association between BDD and income. That is, individuals with lower socioeconomic status tended to report higher levels of BDD, possibly because these individuals do not possess sufficient financial resources to invest in their physical appearance. Brohede et al.'s (2015) study confirmed that BDD patients can suffer social handicap, experience disrupted studies or employment, and even become housebound. In such cases, financial problems caused by unemployment may aggravate the symptoms of BDD. Moreover, BDD sufferers are unemployed or on sick leave to a higher degree than non-BDD individuals are (Phillips, 2009) and are more likely to

report lifetime suicidal ideation (Coles et al., 2006). The studies of Swedish women showed too that daily activities and personal relationships are highly affected in BDD individuals compared with non-BDD individuals (Brohede et al., 2015, 2017). In this same vein, other authors have concluded that the BDD respondents are more likely to be unpartnered (single, separated, or divorced), associating this tendency with social isolation and impaired functioning (Koran et al., 2008; Phillips, 2009).

   SAD was also found to be negatively correlated with age, daily workload, and income in this study. This finding suggests that as an individual ages, SAD levels tend to decrease, which corroborates existing evidence regarding the usual age of SAD onset and duration (Grant et al., 2005). Conversely, review studies (Fang & Hofmann, 2010; Hofmann, Asnaani, & Hinton, 2010) indicate that individuals with lower daily workloads and lower incomes are more likely to develop symptoms of SAD or, alternatively, that SAD sufferers are incapable of spending more than a few hours in their workplace and therefore receive less income. A previous study in a Brazilian community (Vorcaro, Rocha, Uchoa, & Lima-Costa, 2004) also demonstrated a strong association between socioeconomic status and social phobia, suggesting the need to consider this as a probable risk factor in the etiology of SAD, especially in developing nations. With respect to other sociodemographic variables, Fang and Hofmann (2010) found that individuals with SAD were less well educated, had a lower income level, and were less likely to be married compared with individuals who did not have SAD. These findings corroborate those of Pilling et al. (2013), who concluded that SAD could severely impair a person's daily functioning by impeding the formation of relationships, reducing quality of life, and negatively affecting performance at work. Although both explanations are plausible, as is a potentially reciprocal relationship between the two, more research is required to clarify the direction of this association.

   This study has some strengths and limitations that should be acknowledged. The strengths are the large sample size, the use of a nonclinical sample, and the identification of important sociodemographic and behavioral factors influencing SAD and BDD. The limitations of this study are: (i) the cross-sectional nature of the study and the use of self-report data only; (ii) the lack of further information regarding physical activity levels and types of aesthetic treatment, which could contribute to a more comprehensive understanding of the observed combined effects; and (iii) the geographical region covered in our study, which makes our sample unrepresentative of the study population. Consequently, the present findings should be interpreted with the necessary caution.

Conclusions

This study found that 28.7% of the sample reported symptoms of SAD. BDD was found at higher levels in individuals who had sought aesthetic treatment and

those who were physically inactive. Moreover, significantly lower levels of SAD were observed in physically active individuals who had sought aesthetic treatment compared with individuals who had sought aesthetic treatment but were physically inactive. This finding reveals a combined protective effect of physical activity and beauty treatments against SAD. SAD was negatively correlated with age, daily workload, and income, whereas BDD was positively associated with BMI and negatively with income.

In sum, these results show that SAD and BDD are differentially influenced by the selected factors investigated in this study. Thus, further studies are needed among different populations and situations in order to determine whether the relationship between these two disorders and other potentially influencing factors changes according to different contexts.

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