

# Body dysmorphic disorder, social anxiety and depressive symptoms in Chinese medical students

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## Abstract

**Aim** This cross-sectional study explored the prevalence of body image dissatisfaction, body dysmorphic disorder, social anxiety and depressive symptoms in first-year medical students in China.

**Methods** A self-report survey design was employed, using the Body Shape Questionnaire, Swansea Muscularity Attitudes Questionnaire, Social Interaction Anxiety Scale, Dysmorphic Concern Questionnaire, Self-Rating Depression Scale and the Body Dysmorphic Disorder Questionnaire. A total of 487 first-year medical students participated.

**Results** About one-third of participants (32.5%) indicated that they were very concerned about some aspect of their appearance unrelated to weight, with six female participants (1.3%) screening positive for body dysmorphic disorder (BDD). Those who displayed concern with their appearance (including those who did not screen positive for BDD) had higher levels of depressive and social anxiety symptoms than those who had no appearance concerns.

**Keywords** Body dysmorphic disorder · Body image concern · Social anxiety symptoms · Depressive symptoms

## Introduction

Body dysmorphic disorder (BDD) is a psychiatric illness which affects approximately 1–2% of the general population [1, 2] and is characterised by a preoccupation with an imagined or slight defect in appearance which causes significant distress or impairment in social, occupational, or other important areas of functioning [3] (DSM-IV, 1994). Onset of illness is usually between 16 and 18 years [4] and, unless adequately treated, can be enduring and very disabling. Sufferers engage in time-consuming repetitive and compulsive behaviours, such as mirror checking, excessive grooming, and measuring the perceived defect. Many spend excessive amounts of time disguising or attempting to improve the perceived defect, including through cosmetic, surgical and other procedures [5, 6]. Any part(s) of the body can be the focus of concern, with the facial area (including the nose, skin or hair) being the most common [7, 8].

Body dysmorphic disorder has been reported in numerous countries around the world [9–14]. However, most of the BDD literature to date has focused on Western societies. While body image dissatisfaction may traditionally have been viewed as a western problem, the proliferation of western media in eastern cultures may be contributing to a shift in socio-cultural values in non-Western communities. For example, Yang et al. [15] argue that increased exposure to western advertising may lead to an increase in body dissatisfaction in eastern cultures.

Cross-cultural studies exploring BDD specifically are limited. Bohne et al. reported similar rates of BDD in a

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non-clinical sample of American (4%) [16] and German (5.3%) [17] college students. Other studies have explored body dissatisfaction more broadly in different ethnic groups within the same country. For example, Altabe [18] found that Caucasian and Hispanic-Americans experienced higher rates of body image dissatisfaction than African-Americans and Asian-Americans.

Another set of studies, albeit limited, have specifically investigated body image concern in non-Western settings. For example, Taqui et al. [7] found that 5.8% of a sample of Pakistani students met criteria for BDD. Yang et al. [15] found that Taiwanese men exhibited significantly less body dissatisfaction than their Western counterparts, while Pakistani females expressed less body dissatisfaction than Australian females [19]. In contrast, Jung and Forbes [20] compared college students from China, South Korea and the US and reported greater levels of body dissatisfaction in the Korean students with US students reporting the lowest level. Further studies by Sheffield et al. [21] and Lake et al. [22] found no differences in body dissatisfaction between Hong Kong and Australian women; these findings were echoed in the report of Chen and Swam [23] of Chinese and American students. Thus, the limited cross-cultural study of body image concern has produced very mixed findings, suggesting that further investigation of this topic is required. Specifically, we are aware of no studies that have explored BDD specifically in a Chinese cultural context.

Our study aimed to explore the prevalence of body image dissatisfaction and rates of BDD in a non-clinical sample of first-year medical students in China. Earlier studies have found a high rate of body image concern in medical students [7, 24, 25]. Taqui et al.'s [7] study of Pakistani medical students found that 78.8% were concerned about some aspect of their appearance with 5.8% meeting DSM-IV criteria for BDD. Thus, conducting further research exploring rates of BDD in this particular student group is relevant.

As many previous studies have documented that anxiety and depression frequently co-occur with body image dissatisfaction and BDD, we also investigated the relationship between body image concern, social anxiety and depressive symptoms in our student sample. Most studies have found evidence for high comorbidity with depression, social anxiety and obsessive-compulsive disorder [26–28]. Bohne et al. [17], in their non-clinical sample of American and German college students, reported a significant correlation amongst body image concerns, depressive, anxiety and obsessive-compulsive symptoms. Similar results were reported in Biby's college sample [29]. Gunstad and Phillips' [30] study of 293 BDD patients reported a current rate of depression of 58% and a lifetime rate of 76%. BDD patients with such comorbidities often have a poor quality

of life, low self-esteem, are socially isolated, anxious, depressed and are at increased risk of suicide [31–33]. In our study, we hypothesised that those with body image concerns would report a greater degree of social anxiety and depressive symptoms than those who were not concerned about their appearance.

## Methods

### Design

A cross-sectional, descriptive survey design was used to explore the prevalence of body image dissatisfaction, body dysmorphic disorder, social anxiety and depressive symptoms in first-year medical students in China.

### Participants

All first-year medical students ( $n = 500$ ) from Central South University (Hunan province, Changsha city) in China were invited to participate in the study by completing a questionnaire. Only those students who were in their first year of medical training were eligible to participate. There were no other exclusion criteria. Participation was voluntary and students could withdraw at any time without prejudice or consequence to their studies. Of the 500 students invited to participate, 487 students returned a completed questionnaire including 306 females (62.8%) and 181 males (37.2%). The ages ranged from 16 to 21 years. The participants had a mean ( $\pm$ SD) age of  $18.5 \pm 0.8$  years and a mean BMI of  $20.2 \pm 2.5$  (see Table 1).

### Assessment measures

The self-report questionnaire used in this study consisted of nine sections or measures, namely demographic information, Body Shape Questionnaire (BSQ), Swansea Muscularity Attitudes Questionnaire (SMAQ), Social Interaction Anxiety Scale (SIAS), Dysmorphic Concern Questionnaire (DCQ), Self-Rating Depression Scale (SDS), the Body Dysmorphic

**Table 1** Summary statistics for demographic variables

Variable	<i>N</i>	Min	Max	Range	Mean	SD
Age	484	16	21	5	18.5	0.9
Males	181	17	21	4	18.6	0.8
Females	303	16	21	5	18.4	0.9
BMI	474	15.2	39	23.7	20.2	2.5
Males	180	16.6	30.2	13.6	20.6	2.3
Females	294	15.2	39	23.7	19.9	2.5

Disorder Questionnaire (BDDQ), the Eating Attitudes Test-26 (EAT-26) and the Eating Disorders Assessment Questionnaire (CETCA). The EAT-26 and the CETCA focus on eating attitudes and behaviours and are not presented here. Note that we use the term ‘dysmorphic concern’ to express over-concern with physical appearance sufficient to cause some distress, but not necessarily to the degree that justifies a clinical diagnosis: it is a dimensional construct measured specifically by the DCQ. All questionnaires were translated into Chinese using the back translation method and then pilot tested with four Chinese graduate students proficient in English prior to being used in this study.

#### *Demographic information*

The demographic section collected information on age, gender, weight (kg) and height (m). Body mass index (BMI) was calculated by dividing each individual’s body weight by the square of his or her height ( $\text{kg}/\text{m}^2$ ).

#### *Body Shape Questionnaire (BSQ) [34]*

The BSQ is a 34-item measure assessing body weight and shape concerns in the past 4 weeks (e.g., ‘have you felt ashamed of your body’). Items are scored on a six-point Likert scale ranging from ‘never’ to ‘always’. Scores range between 34 and 204 with a score above 129 suggesting distorted concern with weight and shape. Only female students completed the BSQ in this study. The English form of the BSQ has satisfactory psychometric properties [34]. In this study, the reliability coefficient was 0.94.

#### *Swansea Muscularity Attitudes Questionnaire (SMAQ) [35]*

The SMAQ consists of 20 items, which measures attitudes towards muscularity (e.g., ‘Being muscular gives me confidence’) along a seven-point Likert scale ranging from ‘definitely not’ to ‘definitely’. Scores range between 0 and 60 with higher scores indicating a higher degree of concern regarding muscle shape and size. Only male students completed the SMAQ in this study. The SMAQ has been shown to be a psychometrically sound instrument with satisfactory reliability and validity coefficients [35, 36]. In this study, the reliability coefficient was 0.94.

#### *Social Interaction Anxiety Scale (SIAS) [37]*

The SIAS is a 20-item self-report measure (e.g., ‘I am tense mixing in a group’) designed to assess social interaction anxiety (i.e., anxiety relating to the initiation of social

encounters or maintaining conversations). Items are scored on a Likert scale ranging from 0 (not at all characteristic or true of me) to 4 (extremely characteristic or true of me) with scores ranging between 0 and 80. Higher scores indicate higher levels of social interaction anxiety. The SIAS discriminates between clinical and non-clinical samples and between patients with social anxiety and those with other anxiety disorders [38]. The reliability coefficient in this study was 0.89.

#### *Dysmorphic Concern Questionnaire (DCQ) [39]*

The DCQ is a seven-item questionnaire measuring the extent of concern with physical appearance (e.g., ‘Been very concerned about some aspect of your physical appearance’). Each item is rated from 0 to 3 with a score greater than 11 indicative of probable BDD. The DCQ has shown to be a valid and reliable instrument with good internal consistency [40]. A cut-off score of 11 has been shown to have a sensitivity of 100% and a specificity of 79% in a dermatological outpatient setting [41]. In this study, the reliability coefficient was 0.77.

#### *Self-Rating Depression Scale (SDS) [42]*

The SDS is a 20-item questionnaire assessing mood symptoms over the past week (e.g., ‘I feel downhearted, blue and sad’). Each item is scored on a Likert scale ranging from 1 to 4 with scores greater than 70 suggesting severe depressive symptoms, scores between 60 and 69 indicating moderate to marked depression, 50 and 59 suggesting minimal to mild depression, and scores less than 50 indicating no depressive symptoms. The SDS has been found to be a reliable and valid measure of depression [43–45]. The reliability coefficient for this study was 0.78.

#### *Body Dysmorphic Disorder Questionnaire (BDDQ) [46]*

The BDDQ is a brief ten-item questionnaire, which maps onto the DSM-IV diagnostic criteria for BDD and screens for the DSM-IV defined diagnosis of BDD. It is a widely used self-report measure to screen for BDD by identifying the specific appearance concern and the extent and impact of the preoccupation using a combination of yes/no, Likert scale and open-ended response formats. Using the BDDQ, someone is likely to be suffering from BDD when their appearance concern preoccupies their thoughts for 1 h a day or more, causes them significant distress or interferes in their social, occupational or other areas of functioning. On this basis, the following algorithm was used in this study to screen positive for the diagnosis of BDD:

Screen positive for BDD	A participant expressing significant, preoccupying concern, lasting 1 h a day or more, about the appearance of a body part which causes a moderate or higher level of distress or interferes in an area of functioning.
Subthreshold BDD symptoms	A participant expressing significant, preoccupying concern, lasting less than 1 h a day, about the appearance of a body part which causes mild distress or interferes in an area of functioning.
Screen negative for BDD	A participant who does not fall into the other two categories.

For BDD diagnosis, the BDDQ has been shown to have a sensitivity of 100% and a specificity of 89% in an outpatient psychiatric setting [46] and a sensitivity of 100% and a specificity of 93% in a dermatological setting [47]. An additional question was added to the BDDQ for this study and included a comprehensive list of body parts for the respondent to tick. No psychometric data are available for the Chinese translation of the BDDQ. It should be stressed here that we used a modified version of the BDDQ in that we asked respondents to rate only those appearance concerns not specifically related to weight. This was because we wished to ensure we were not including individuals with primary eating disorders, amongst our ‘cases’ of BDD. This was perhaps over-careful, as in some BDD sufferers, bodily shape and weight concerns can be a major (or even sole) focus of concern [48].

## Procedures

Prior to conducting the study, approval was obtained from the Central South University Institutional Review Board. The researchers distributed the questionnaires during the free time between classes and provided students with a

detailed explanation of the objectives of the study and what they needed to do. Students were informed that the questionnaire would take about 20–30 min to complete and that they were free to withdraw at any stage. Issues of confidentiality and anonymity were discussed and consent to participate was implied by the return of a completed and anonymous questionnaire. Students were encouraged to answer the questionnaire independently and to not discuss their answers with their classmates.

## Statistical analysis

Descriptive statistics were used to describe the study population’s characteristics and pooled responses. Group differences were analysed using *t* tests while correlations between variables were explored using the Product Moment correlation coefficients. Multiple regression analyses were conducted for males and females separately to explore significant predictors of dysmorphic concern. An alpha level of 0.05 was regarded as statistically significant. Statistical analysis was performed using STATA 10.0.

## Results

### Body image dissatisfaction

Table 2 shows that aggregate mean scores on the DCQ and BSQ fell within the normal range (non-pathological). However, 3.2% ( $n = 15$ ) of participants scored higher than 11 on the DCQ suggesting elevated dysmorphic concern, while 1.1% of female respondents ( $n = 3$ ) displayed greater than average weight and shape concern (BSQ-34 score  $> 128$ ). On the SMAQ, low aggregate mean scores were reported by the male participants ( $X = 14.6$ ) suggesting minimal concern over muscle size and shape. However, five male participants did score close to the maximum score of 60 on the SMAQ (scores  $\geq 50$ ) suggesting extreme concern with muscle size and shape.

On the BDDQ, participants who responded “NO” to the first question (‘Are you very concerned about the appearance of some part of your body apart from weight-related that you consider especially unattractive?’) were not

**Table 2** Summary statistics for questionnaires

	<i>N</i>	Min	Max	Range	Mean	SD
Dysmorphic Concern Questionnaire	476	0	15	15	4.2	2.9
Body Shape Questionnaire <sup>a</sup>	281	34	158	124	68.3	22.2
Swansea Muscularity Assessment Questionnaire <sup>b</sup>	164	0	60	60	14.6	11.4
Social Interaction Anxiety Scale	455	0	63	63	24.8	9.6
Self-rating Depression Scale	468	22	54	32	37.4	6.7

<sup>a</sup> Females only

<sup>b</sup> Males only

required to complete the remaining items on the BDDQ. One-third (32.5%) of respondents (105 females and 48 males) indicated that they were very concerned about the appearance of some part of their body unrelated to weight. While 22.9% ( $n = 35$ ) of these respondents indicated that these concerns preoccupied their thoughts, the majority spent less than 1 h per day thinking about their appearance concerns. It is important to note that not all those who indicated that they were concerned about some aspect of their appearance screened positive for BDD. Such individuals will be discussed later.

Of those who indicated that they were concerned about the appearance of some part of their body unrelated to weight, when asked to indicate their main area(s) of concern, most indicated several body parts. The most frequently mentioned body parts were the eyes, nose, mouth/lips/teeth, face, hair, waist/stomach, buttocks/hips/thighs, legs and skin (see Table 3). For female students, the most frequently identified body parts were the waist/stomach/legs (too much fat and too big), skin (dark or yellow), hair (quality and colour), chest/breast (too small), shoulders (too big) and too much body hair. For male students, short stature, lightweight and insufficient muscle, quality of their skin, hairstyle, lips, shape of the nose and large stomach were most frequently mentioned. Similar frequencies for

the face (colour, melanotic nevus and acne), eyes (small eyes and single eyelids) and teeth (abnormality and colour) were noted for both male and female students.

The majority of respondents who expressed concern about the appearance of some part of their body on the BDDQ indicated that their appearance concerns caused them mild distress or emotional pain and felt that it interfered somewhat with their daily lives (e.g., too much time spent checking in the mirror, dieting, feeling depressed/anxious/poor self-esteem). Although 58.2% said that their appearance concern made them avoid some things, only a small number of participants avoided social situations ( $n = 17$ ; 1.1%) (e.g., swimming, talking to others) and felt that their concerns significantly interfered with their work or studies ( $n = 9$ ; 0.6%).

#### Prevalence of BDD symptoms

Based on the results of the BDDQ, six (1.3%) female students screened positive for the diagnosis of body dysmorphic disorder (see Table 4). No male students screened positive for BDD.

#### Social anxiety and depressive symptoms and relationship to body image dissatisfaction

While aggregate mean scores on the SDS fell within the normal range, 26 participants (5.6%) obtained scores between 50 and 59 on the SDS, indicative of mild depression. On the SIAS, low aggregate mean scores ( $X = 24.8$ ) were observed suggesting low levels of social interaction anxiety. However, four participants obtained SIAS scores (scores  $\geq 50$ ) considerably higher than the sample mean suggesting higher social anxiety symptoms in these participants.

The relationship between body image concern, social anxiety and depressive symptoms was explored using *t* tests, product moment correlation coefficients and multiple regression analyses. Irrespective of whether the participant screened positive for BDD or not (see Table 5), those who indicated concern about the appearance of some part of their body unrelated to weight (as measured by the BDDQ) obtained significantly higher scores on the SIAS ( $P < 0.001$ ), SDS ( $P < 0.05$ ), BSQ ( $P < 0.01$ ), SMAQ ( $P < 0.001$ ) and DCQ ( $P < 0.001$ ) compared to those who were not concerned

**Table 3** Most frequently identified body parts of concern

Body parts	Freq <sup>a</sup> (%)
Eyes	46 (30.1)
Skin	46 (30.1)
Mouth/lips/teeth	42 (27.5)
Face (in general)	41 (26.8)
Legs	36 (23.5)
Nose	35 (22.9)
Buttocks/hips/thighs	35 (22.9)
Waist/stomach	29 (19)
Hair	28 (18.3)
Hands/fingers	19 (12.4)
Chest/breasts	15 (9.8)
Arms	14 (9.2)
Back	12 (7.8)
Muscle tone	11 (7.2)
Body hair	11 (7.2)
Genitals	9 (5.9)
Jaw	8 (5.2)
Shoulders	7 (4.6)
Facial hair	6 (3.9)
Ears	5 (3.3)
Feet	4 (2.6)
Other	4 (2.6)

<sup>a</sup> Participants could select multiple body parts

**Table 4** Percentage of participants who screened positive for BDD

BDD	Freq (%)
No case	445 (94.5)
Sub-threshold case	20 (4.2)
BDD case	6 (1.3)

**Table 5** Significant differences in body image, anxiety and depression scores between those with appearance concerns and those without

Measure	BDDQ	<i>n</i>	Mean ± SD	<i>T</i>	<i>P</i>	<i>df</i>
Social Interaction Anxiety Scale (SIAS)	No <sup>a</sup>	298	23.5 ± 9.5	−4.2	0.001***	440
	Yes <sup>b</sup>	144	27.5 ± 9.4			
Self-Rating Depression Scale (SDS)	No	307	36.9 ± 6.6	−2.3	0.022*	453
	Yes	148	38.4 ± 6.9			
Body Shape Questionnaire (BSQ)	No	180	64.7 ± 19.9	−3	0.003**	268
	Yes	90	73.1 ± 24.9			
Swansea Muscularity Assessment Questionnaire (SMAQ)	No	115	12.6 ± 10.2	−4.1	0.001***	157
	Yes	44	20.5 ± 12.9			
Dysmorphic Concern Questionnaire (DCQ)	No	314	3.6 ± 2.7	−5.3	0.001***	459
	Yes	147	5.1 ± 3			
BMI	No	309	20.3 ± 2.5	1.3	0.201	457
	Yes	150	19.9 ± 2.4			

\*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$

<sup>a</sup> No: no concern with appearance unrelated to weight

<sup>b</sup> Yes: concern about the appearance of some body part unrelated to weight (including those who screened positive for BDD and those who did not)

about their appearance. BMI was not statistically different between the two groups ( $P = 0.201$ ).

The product moment correlation coefficients (Table 6) found highest correlations between scores on the BSQ, SIAS and BMI and between the DCQ, BSQ and SIAS. On the basis of the correlations reported in Table 6, significant correlates of dysmorphic concern were explored using standard multiple regression analyses with the DCQ as the dependent variable and the BSQ, SMAQ, SDS, SIAS and BMI as independent variables. As only males completed the SMAQ and only females completed the BSQ, separate multiple regression models were computed per gender. The most significant correlates of dysmorphic concern for males (see Table 7) were scores on the SIAS (anxiety) ( $P < 0.001$ ) and SDS (depression) ( $P < 0.01$ ). For females (Table 8), the most significant correlates of dysmorphic concern were scores on the BSQ (body shape) ( $P < 0.001$ ), SDS ( $P < 0.001$ ) and SIAS ( $P < 0.05$ ).

## Discussion

Our results support those studies that have found that Western cultures display greater body dissatisfaction than non-Western cultures [15, 18, 19]. One-third of our sample was concerned about some aspect of their physical appearance (as measured by the BDDQ) which is markedly lower than rates reported in other studies, although the inclusion of weight-related concerns in other studies (excluded in our study) might have inflated this difference. 1.3% of those concerned with their appearance screened positive for BDD in our study. This is considerably lower than rates of BDD reported in other westernised university/

**Table 6** Correlation matrix: body image concern, social anxiety, depression, age and BMI

	DCQ	BSQ	SMAQ	SDS	SIAS	Age	BMI
DCQ	–						
BSQ	0.402***	–					
SMAQ	0.149	–	–				
SDS	0.387***	0.270***	0.031	–			
SIAS	0.434***	0.476***	0.147	0.385***	–		
Age	−0.012	0.061	−0.067	0.066	0.048	–	
BMI	0.069	0.549***	−0.034	−0.017	0.106	0.070	–

\*\*\*  $P < 0.001$

college samples ranging from 4% [16] to 5.3% [17] with rates as high as 13% reported by Biby [29]. Differences in cultural values may explain the comparatively lower rates of body image dissatisfaction and BDD reported in this study compared to other studies conducted in western countries. While it is undeniable that there has been an increase in western media and advertising of idealised images in non-western cultures, including China, it appears that the negative effects of this in a Chinese cultural context are not as far reaching as in western cultures. A possible explanation could be that more value is placed on other attributes, like intellectual ability and the person as a whole and thus there is less sociocultural pressure to look a certain way. Moreover, eastern cultures place a high value on respecting and looking after your family and one's elders and regard this as an important individual quality, whereas western youth culture could be viewed as more focussed on the individual and judging others by appearance. According to Bohne et al. [16], one would expect that cultures that place a greater value on physical

**Table 7** Significant correlates of dysmorphic concern: males

DCQ	Coef.	SE err.	<i>t</i>	<i>P</i> > <i>t</i>	95% Conf interval
Social Interaction Anxiety Scale (SIAS)	0.125	0.026	4.78	0.001***	0.073 to 0.177
Self-Rating Depression Scale (SDS)	0.121	0.038	3.19	0.002**	0.046 to 0.196
Swansea Muscularity Assessment Questionnaire (SMAQ)	0.024	0.021	1.12	0.266	−0.018 to 0.066
BMI	0.168	0.102	1.65	0.102	−0.034 to 0.369
_cons	−7.088	2.439	−2.91	0.004	−11.909 to −2.268

$R^2 = 0.291$

\*\* $P < 0.01$ , \*\*\* $P < 0.001$

**Table 8** Significant correlates of dysmorphic concern: females

DCQ	Coef.	SD err.	<i>t</i>	<i>P</i> > <i>t</i>	95% Conf interval
Social Interaction Anxiety Scale (SIAS)	0.041	0.019	2.2	0.029*	0.004 to 0.078
Self-Rating Depression Scale (SDS)	0.102	0.024	4.37	0.001***	0.055 to 0.149
Body Shape Questionnaire (BSQ)	0.031	0.009	3.62	0.001***	0.014 to 0.048
BMI	−0.089	0.075	−1.2	0.233	−0.237 to 0.058
_cons	−1.195	1.602	−0.75	0.457	−4.352 to 1.962

$R^2 = 0.278$

\* $P < 0.05$ , \*\*\* $P < 0.001$

attractiveness would have a higher rate of people experiencing body image concerns. While this appears to be true for our study, it is important to also consider that the conservative cultural context might have made some individuals reluctant to reveal that body image concerns are problematic for them, thus concealing the true number of those concerned about their appearance. Moreover, the modified version of the BDDQ used in this study (i.e., exclusion of weight-related concerns) might have led to an underestimation of appearance concern and BDD prevalence in this sample.

As reported in many other studies, this study also found a positive relationship between overall body image concern (as measured by the BSQ, SMAQ and DCQ) and symptoms of social anxiety and depression. Social anxiety and depression were significant correlates of dysmorphic concern for both genders, while concern with weight and shape was also found to significantly correlate with dysmorphic concern in females. The positive relationship between body image concern and concern with weight and shape (as measured by the BSQ) in female participants may be partly attributed to westernised mass media promoting ‘thinness’ as beautiful, healthy and sexy; a body shape that was traditionally associated with malnutrition, poverty and infectious disease. For males, increased body image concern was associated with increased scores on the Swansea Muscularity Attitudes Questionnaire. It has become very apparent over the past decade that the number of male magazines and advertisements focusing on men’s appearance has increased dramatically [49], which according to

Leit et al. [50] and Adams et al. [51] has had a significant influence on men’s perception of muscularity and the increased rates of male body image dissatisfaction.

It is important to note that directly comparing our results with rates reported in other studies might be confounded by methodological differences rather than population differences, as we did not aim to directly compare Chinese students with students in other countries. Despite the apparent higher rates of body image dissatisfaction and BDD reported in other westernised countries, in our study even when excluding weight concerns (on the BDDQ) a considerable proportion of Chinese students were experiencing substantial appearance concerns. As suggested by Sano et al. [52] and also reported in our study, body image dissatisfaction is increasingly becoming a matter of concern in non-western communities and should be addressed before it reaches the high levels reported in western countries.

### Strengths and limitations

This study has several strengths. First, to our knowledge, this is the first study examining the prevalence of body image dissatisfaction, body dysmorphic disorder, social anxiety and depressive symptoms in Chinese university students. A comprehensive battery of validated measures were used and a suitably large sample was collected which enabled robust data analysis. However, the results of this study must be interpreted within the context of several

limitations. Only first-year medical students from one university participated in this study, which may limit its generalisability to other groups. In addition, since all data were collected using self-report measures, we cannot unequivocally state that the prevalence of BDD symptoms reported in our study were over- or under- exaggerated. In addition, the fact that we used a modified form of the BDDQ (as described in “[Methods](#)”) might have excluded some BDD cases and led to an underestimation of appearance concern and BDD prevalence. Moreover, we did not use diagnostic BDD measures such as the Body Dysmorphic Disorder Examination and the Structured Clinical interview for DMS-IV (SCID), which could have further strengthened our study. The SMAQ and BSQ were only administered to males and females, respectively, in our study. Future studies would benefit from administering the BSQ to both genders and selecting a measure like the Drive for Muscularity Scale which has been validated for use with males and females. The measures used in our study have not been validated in a Chinese student population, which represents another limitation. Finally, the anonymity of the surveys precluded following up those students who were experiencing significant body image concern or displayed symptoms of body dysmorphic disorder. Notwithstanding the above limitations, the present findings still contribute to furthering our understanding of body image concerns and body dysmorphic disorder in a Chinese cultural context.

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