

NEW RESEARCH

Epidemiology of Body Dysmorphic Disorder and Appearance Preoccupation in Youth: Prevalence, Comorbidity and Psychosocial Impairment

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Objective: Little is known about how common and impairing body dysmorphic disorder (BDD) is in the general population of youth. We evaluated the prevalence, comorbidity, and psychosocial impairment associated with BDD and more broadly defined appearance preoccupation in young people.

Method: Data were drawn from the 2017 Mental Health of Children and Young People in England survey. BDD and psychiatric comorbidity were assessed in individuals 5 to 19 years of age (N = 7,654) according to *DSM-5* criteria, using a clinician-rated standardized diagnostic assessment. Psychosocial impairment was measured with a quantitative scale and was indexed by reported self-harm and suicide attempts, as well as service use, assessed using structured interviews.

Results: The point prevalence of BDD was 1.0% (95% CI = 0.8%-1.3%). BDD was significantly more common among adolescents than children (1.9 vs 0.1%; OR = 22.5, $p < .001$), and among female than male participants (1.8% vs 0.3%; OR = 7.3, $p < .001$). Approximately 70% of young people with BDD had psychiatric comorbidity, most commonly internalizing disorders. BDD was associated with self- and parent-reported psychosocial impairment, self-harm and suicide attempts, and service utilization. Appearance preoccupation was more common than full-syndrome BDD, but showed similar age and sex effects, patterns of comorbidity, and associated impairment.

Conclusion: BDD and appearance preoccupation are relatively common, especially among adolescent girls, and are associated with substantial co-occurring psychopathology, impairment, and risk. Improved screening is needed to increase detection and diagnosis of BDD, and to facilitate access to evidence-based treatment.

Study preregistration information: The epidemiology of body dysmorphic disorder the youth: prevalence, comorbidity and psychosocial impact; <https://osf.io/g83jy>.

Key words: body dysmorphic disorder; prevalence; epidemiology; childhood; adolescence

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The cardinal feature of body dysmorphic disorder (BDD) is excessive preoccupation with perceived flaws in physical appearance, which leads to time-consuming repetitive behaviors, distress and impairment (see Supplement 1, available online, for illustrative case example).¹ The disorder typically emerges during adolescence,² can be highly disabling,³ and usually persists in the absence of effective treatment.⁴ Despite its morbidity, BDD often goes undetected and untreated in youth.^{5,6} Moreover, BDD has historically been strikingly understudied and many fundamental questions regarding its epidemiology remain unanswered. Comprehensive characterization of the prevalence and psychosocial burden of BDD in young people is crucial to inform service planning and to improve clinical care.

Previous epidemiological studies in adult populations have found BDD point prevalence estimates ranging from 1.7⁷ to 3.2%.⁸ Only a small number of studies have directly investigated BDD prevalence in young people, and most have been conducted in convenience samples of students who may not be representative.⁹⁻¹¹ Only 2 population-based studies of BDD have included young people. One study included too few young people to reliably estimate prevalence (n = 174).⁷ The other recruited participants from a twin registry (15-year-olds: n = 6,968; 18-year-olds: n = 3,738) and classified clinically significant BDD symptoms using a brief self-report measure that did not directly correspond to diagnostic criteria.¹² Further research is required to establish the prevalence of BDD in representative samples of young people, using comprehensive

assessment measures that align with contemporary diagnostic criteria.

There are additional shortcomings of previous research in BDD. First, no study has examined the prevalence in children under 12 years of age, and therefore the early-life burden of BDD remains unknown. Second, we lack crucial insights into sex effects on the prevalence of BDD in youth. Approximately 80% of young people who attend specialist BDD services are female.^{3,13,14} This is at odds with findings from adult studies, showing a modest female preponderance in community and psychiatric outpatient settings (sex ratios of 1.27 and 1.41, respectively).¹⁵ It is unclear whether this discrepancy reflects help-seeking and/or referral biases in young people, or genuine prevalence differences. Third, little is known about the comorbidities of BDD in youth, which could have implications for detection, diagnosis, and treatment. Approximately 70% of young people with BDD who access mental health services have at least 1 psychiatric comorbidity, with mood disorders, social anxiety disorder, and obsessive-compulsive disorder (OCD) being particularly common.³ However, patterns of comorbidity observed in clinical settings are likely to be influenced by selection biases (eg, referral and Berkson bias). Fourth, the psychosocial burden of BDD in young people is unclear. Studies in clinical samples have highlighted strikingly high rates of self-harm, suicide attempts, psychiatric hospitalization, and school dropout.^{3,13,16} These findings demonstrate the potentially grave impact of BDD, but because they are derived from specialist clinical settings, they may reflect more severe or complex cases.

In the current study, we use data from the large population-based 2017 Mental Health of Children and Young People in England survey to examine the epidemiology of BDD and appearance preoccupation. Appearance preoccupation is particularly important for several reasons: first, it is likely more common than full-syndrome BDD^{7,17}; second, it is plausibly associated with impairment in its own right, and, crucially, is a likely precursor to the development of BDD and potentially a target for early intervention.¹⁸⁻²⁰

The current study had 3 key objectives. First, we aimed to establish the point prevalence of BDD and appearance preoccupation in youth, and to determine age and sex effects. We hypothesized that BDD and appearance preoccupation would be more common among adolescents than children and among female than male participants, given observations in clinical settings.³ We further hypothesized an age by sex interaction, whereby the prevalence of BDD and appearance preoccupation would increase during

adolescence to a greater extent among girls than among boys, in keeping with several other internalizing and body image disorders.²¹⁻²³

Second, we examined patterns of psychiatric comorbidity associated with BDD and appearance preoccupation, and tested the prediction that BDD and appearance preoccupation would be more strongly associated with internalizing disorders (defined as any anxiety-related or depressive disorder) than externalizing disorders (defined as oppositional defiant disorder, conduct disorder, and attention-deficit/hyperactivity disorder).

Finally, we examined the psychosocial impairment associated with BDD and appearance preoccupation, including self- and parent-reported psychosocial impact, self-harm and suicide attempts, and service use. We expected a positive association of BDD and appearance preoccupation with all indices of impairment.

METHOD

Survey Design

The 2017 Mental Health of Children and Young People in England survey involved a stratified probability sample of 9,117 children and young people 2 to 19 years of age who were living in England. Participants were drawn from the NHS Patient Register and identified using random probability sampling within 380 postcode sectors across England (sampling method detailed in Vizard *et al.*²⁴). Parents or legal guardians (hereafter referred to as parents) and children were interviewed face-to-face by a researcher assessing social and demographic factors and mental disorders. For participants 2 to 10 years of age, an interview was conducted with the parent only. For those 11 to 16 years of age, parents were interviewed first, and permission was sought to interview their child. Young people 17 to 19 years of age were interviewed first, and permission was sought to subsequently interview their parent.

The survey was reviewed and approved by the West London & GTAC Research Ethics Committee (16/LO/0155) and the Health Research Authority Confidentiality Advisory Group (16/CAG/0016). Parents of children 2 to 16 years of age provided consent, children and adolescents 11 to 16 years provided assent to be interviewed, and adolescents aged 17-19 provided their own consent.

Current Study Sample

BDD symptoms were assessed in children and young people ≥ 5 years of age. Therefore, the current study sample comprised 7,654 children and young people 5 to 19 years of age. Participant characteristics are shown in Table 1 for the

TABLE 1 Demographic Characteristics of Participants by Body Dysmorphic Disorder (BDD) and Self-Reported Appearance Preoccupation Status

| | Overall sample (N = 7,654) | BDD | | Appearance preoccupation ^a | |
|---|-------------------------------|---------------------|----------------------|---------------------------------------|-----------------------|
| | | Present (n = 63) | Absent (n = 7591) | Present (n = 252) | Absent (n = 3,282) |
| Age, y, mean (SD) | 11.18 (4.12) | 15.84 (2.34) | 11.14 (4.10) | 15.42 (2.22) | 14.59 (2.52) |
| Sex, female, n (%) | 3,803 (49.7) | 3,749 (86.7) | 54 (49.3) | 184 (73.0) | 1,599 (38.7) |
| Ethnicity, n (%) | | | | | |
| Asian /Asian British | 779 (10.2) | <3 | 777 (10.2) | 18 (7.1) | 336 (10.2) |
| Black/African/Caribbean/ Black British | 313 (4.1) | <3 | 312 (4.1) | 8 (3.2) | 132 (4.0) |
| Multi-ethnic | 470 (6.1) | 4 (6.3) | 466 (6.1) | 18 (7.1) | 190 (5.8) |
| White British | 5,809 (75.9) | 54 (85.7) | 5,755 (75.8) | 195 (77.4) | 2,523 (76.9) |
| White other | 281 (3.7) | <3 | 279 (3.7) | 13 (5.2) | 100 (3.0) |
| Housing tenure, n (%) | | | | | |
| Owned | 4,658 (61.5) | 27 (44.3) | 4,631 (61.5) | 143 (58.4) | 2,170 (67.4) |
| Privately rented | 1,366 (18.0) | 13 (21.3) | 1,353 (18.0) | 47 (19.1) | 463 (14.4) |
| Social housing | 1,556 (20.5) | 21 (34.4) | 1,535 (20.4) | 55 (22.4) | 587 (18.2) |
| Benefits ^b | | | | | |
| Parent/s income support | 2,010 (31.0) | 20 (46.5) | 1,990 (30.9) | 55 (29.6) | 686 (27.1) |
| Any welfare benefits | 2,306 (35.6) | 23 (53.5) | 2,283 (35.4) | 63 (33.9) | 813 (32.1) |

Note: Numbers less than 3 have been suppressed.

^aSelf-reported appearance preoccupation. Young people ≥ 11 years of age were asked about appearance preoccupation.

^b"Parents" is used here as a short-hand term and also includes guardians.

overall study sample, as well as those with vs without BDD and self-reported appearance preoccupation.

Measures

Developmental and Well-Being Assessment. The Developmental and Well-Being Assessment (DAWBA) is a standardized diagnostic tool for assessing psychiatric disorders in young people. The original version assessed common *DSM-IV* and *ICD-10* disorders,²⁵ but the DAWBA has since been updated to align with *DSM-5*, including the addition of BDD as a distinct diagnosis. In the MHCYP 2017 survey, the DAWBA was administered as a face-to-face interview by a researcher to parents and to young people ≥ 11 years of age. Teachers also completed a brief version of the DAWBA online or in paper format for participants 5 to 16 years of age, where consent was provided. Within the parent- and child-DAWBA, each diagnostic module begins with at least 1 initial screening item. If endorsed, detailed questions follow that relate directly to the diagnostic criteria for that disorder. If screening items are not endorsed, the interviewer can skip to the next diagnostic category.

The BDD section of the DAWBA (Table S1, available online) starts with the following screener: "Most people are concerned about how they look. This typically varies from time

to time, eg, being worse if they develop a bad spot or are about to star in the school play. Some people have worries about their appearance that go beyond this, filling their thoughts, taking up a lot of their time and really upsetting them. Does this happen to [you / your child]?" Respondents can answer "No," "A little," or "A lot." Those who answer "A little" or "A lot" are subsequently presented with 27 closed and 7 open questions (Table S1, available online). These questions were developed specifically for the DAWBA and designed to map directly onto the *DSM-5* diagnostic criteria for BDD. Of note, although the BDD screening item focuses on appearance preoccupation, the subsequent questions include multiple items assessing compulsions including comparing, checking, concealing, and reassurance seeking, as well as items assessing distress and impairment (Table S1, available online). A BDD diagnosis was assigned only if all *DSM-5* criteria were met. The online version of the DAWBA has been shown to have a sensitivity of 83.8% and a specificity of 81.5% for the detection of BDD.²⁶

In the 2017 MHCYP survey, if young people screened positive for any psychiatric diagnosis, expert clinical raters (including TF and BC, fully qualified child and adolescent psychiatrists) reviewed data from informants to assign diagnoses. Diagnoses were assigned if the young person fulfilled *DSM-5* diagnostic criteria, as opposed to the

application of rigid scoring rules. Clinical raters also used the verbatim reports to check that respondents had understood the question and to decide whose account to prioritize when there was disagreement between the parent and young person. Neither informant was automatically given greater weighting, and the transcripts were used in conjunction with symptom reports to inform the clinical decision. Differential diagnosis was also informed by the verbatim responses in the BDD section, review of other sections (eg, eating disorders), and review of the brief teacher DAWBA. In cases in which there was uncertainty regarding BDD diagnoses, responses were reviewed by a group of specialist clinicians with expertise in BDD.

In the current study, individual diagnoses were combined to create the following derived variables: any anxiety disorder, any depressive disorder, any eating disorder, any autism spectrum disorder, any internalizing disorder, and any externalizing disorder (further details in Table S2, available online).

Strengths and Difficulties Questionnaire. The Strengths and Difficulties Questionnaire (SDQ) is a 25-item questionnaire with self-report and parent-report versions. Both versions comprise 5 subscales assessing emotional problems, conduct problems, hyperactivity-inattention, peer problems, and prosocial behavior. Each subscale comprises 5 questions rated on a 3-point scale, yielding total subscale scores ranging from 0 to 15. Additional questions assess distress and impairment (in family life, friendships, learning, and leisure activities) and can be summed to create a total impact score, as an index of psychosocial impairment.²⁷ The SDQ has been shown to have robust psychometric properties.^{28,29} In the current sample, internal consistency was good for both the self- and parent-report (Cronbach alpha of 0.82 and 0.87, respectively).

Intentional Self-Harm. Lifetime experience of self-harm and suicide attempts was assessed by asking young people ≥ 11 years of age and parents the following: “Over the whole of [your / your child’s] lifetime, have [you / they] ever tried to harm [yourself / themselves] or kill [yourself / themselves]?” Responses were coded as yes/no, and parent and young person’s responses were analyzed separately.

Service Use. Parents were asked whether they had sought professional help (eg, from their General Practitioner, specialist educational service, or mental health services) for their child within the past year because of concerns about their emotions, behavior, concentration, or difficulties in getting along with people. Responses were coded as yes or no.

Psychotropic medication use was assessed by asking parents whether their child was currently taking any medication from a specified list, which included selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants and stimulants (complete list provided in Table S3, available online). Responses were coded as yes or no.

Statistical Analyses

Planned analyses were pre-registered on Open Science Framework (osf.io/g83jy); minor deviations are reported in Table S4, available online. We analyzed 2 main outcomes: (1) BDD diagnosis, and (2) self-reported appearance concerns. BDD diagnosis was defined according the clinician-rated, multi-informant DAWBA diagnoses, as described above. Self-reported appearance preoccupation was defined according to responses on the DAWBA BDD screening item, with “no” and “a little” coded as negative, and “a lot” coded as positive. We additionally examined parent-reported appearance preoccupation in prevalence analyses, but not subsequent analyses. This was planned *a priori* because (1) parents tend to under-report emotional symptoms in their children, especially during adolescence; and (2) self-report is the main basis for BDD diagnosis in clinical practice.

Weighted prevalence estimates were calculated for BDD, self-reported appearance preoccupation, and parent-reported appearance preoccupation. Logistic regression models were used to test age (encoded as a binary variable) and sex effects, and their interaction, on prevalence. In line with developmental frameworks,³⁰ we defined 2 development periods spanning ages 5 to 11 years and 12 to 19 years (hereafter referred to as childhood and adolescence, respectively).

χ^2 Tests were used to compare those with and without (1) BDD and (2) self-reported appearance preoccupation, with respect to diagnostic categories (Table S2, available online, lists disorders included in each category). Logistic regression models were then used to test the hypothesis that *DSM-5* internalizing vs externalizing disorders have a greater association with (1) BDD and (2) self-reported appearance preoccupation. In these models, young people with no comorbidity and mixed internalizing and externalizing disorders were excluded. We focused on internalizing vs externalizing disorders because, in addition to being an empirical support framework, this approach allowed us to maximize statistical power. We would likely have been underpowered to undertake an equivalent analysis including comorbidity clusters as set out in *DSM-5* (ie, “neurodevelopmental disorders,” “depressive disorders,” “anxiety disorders,” “obsessive-compulsive and related disorders,”

TABLE 2 Weighted Prevalence of DSM-5 Body Dysmorphic Disorder (BDD) and Appearance Preoccupation

| | Overall sample (N = 7,654) | Age group | | Odds ratio | Sex | | Odds ratio |
|-----------------------------|-------------------------------|-------------------------|----------------------------|----------------------------|---------------------|-----------------------|---------------------------|
| | | Children (n = 4,145) | Adolescents (n = 3,509) | | Male (n = 3,851) | Female (n = 3,803) | |
| BDD | 1.0% (0.8, 1.3) | 0.1% (0.0, 0.2) | 1.9% (1.4, 2.4) | 22.57 (8.18, 62.30) *** | 0.3% (0.1, 0.4) | 1.8% (1.3, 2.3) | 7.03 (3.29, 15.01) *** |
| Appearance preoccupation | | | | | | | |
| Self-report ^a | 7.8% (6.8, 8.8) | 1.4% (0.3, 2.5) | 8.5% (7.4, 9.6) | 6.55 (2.83, 15.19) *** | 4.3% (3.2, 5.3) | 11.4% (9.6, 13.1) | 2.88 (2.11, 3.92) *** |
| Parent-report | 3.5% (3.0, 4.1) | 1.6% (1.2, 2.0) | 5.9% (4.9, 7.0) | 3.88 (2.86, 5.28) *** | 2.4% (1.9, 3.0) | 4.7% (3.8, 5.5) | 1.97 (1.49, 2.62) *** |

Note: Odds ratios were derived using sampling weights.

^aFor self-reported appearance preoccupation, the "children" age group comprised only those individuals who were ≥ 11 years of age because those < 11 years did not provide a self-report.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

"trauma- and stressor-related disorders," "eating disorders," and "disruptive, impulse-control, and conduct disorders").

To further examine comorbidity, a series of linear regression models were used to test the association of (1) BDD and (2) self-reported appearance preoccupation, with the 5 SDQ subscales. Separate models were estimated for self- and parent-reported SDQ data. Since 10 comparisons (ie, 5 parent-report and 5 self-report subscales) were made for each set of analyses, a Bonferroni-corrected alpha level was used for inference (ie, $0.05 / 10 = 0.005$).

To examine impairment, a series of linear and logistic regression models were used to test the association of association of a) BDD and b) self-reported appearance preoccupation with three outcome domains: SDQ impact scores; self-harm or suicide attempts; and service use (encompassing help-seeking, SSRI use, and other psychotropic medication).

In the analyses of comorbidity and impairment described above, to avoid overadjustment bias³¹ we did not adjust for age or sex or for comorbid psychopathology in the case of the impairment analysis.

All analyses were conducted in R. Survey weights were included in the analyses of prevalence and tests of association (regression models), using the SurveyR package. The survey weights were provided in the MHCYP 2017 dataset and adjusted for selection probabilities and non-response to ensure that results are representative of the population of England (further details in Vizard *et al.*²⁴).

RESULTS

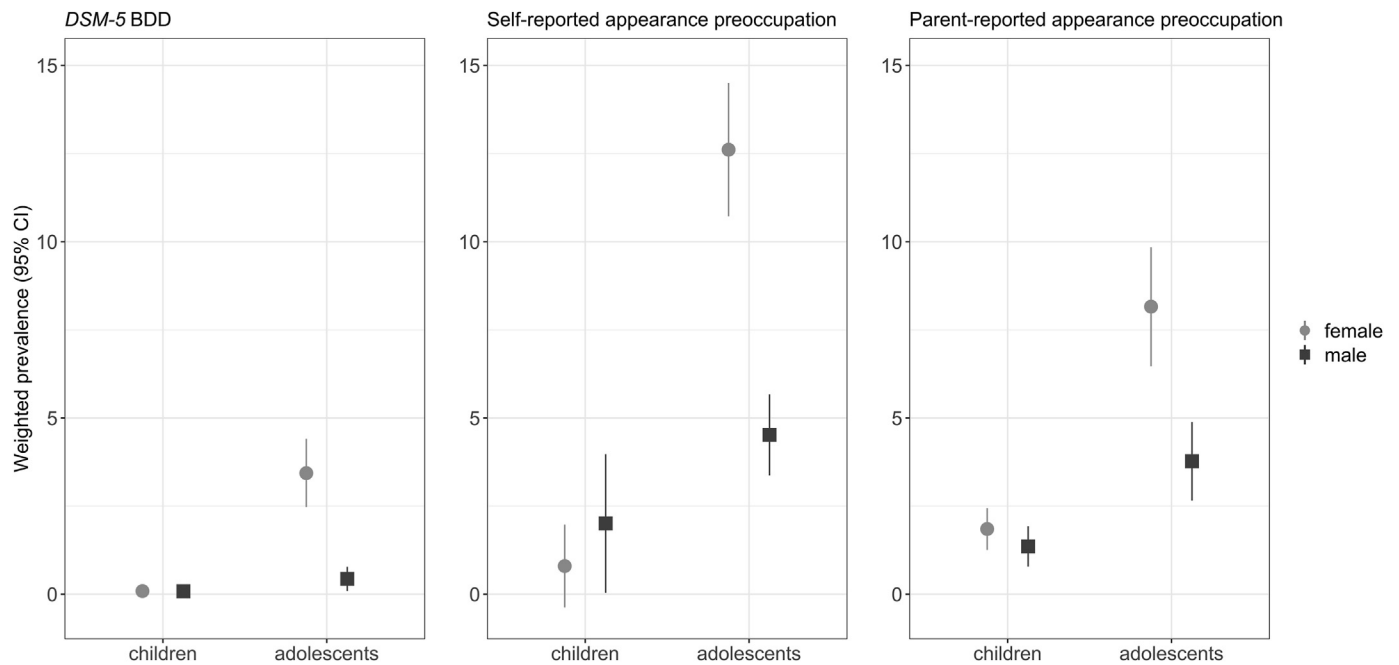
Prevalence Estimates

The weighted point prevalence estimates for DSM-5 BDD and appearance preoccupation are shown in Table 2 and

Figure 1. The prevalence of BDD was 1.0% (95% CI = 0.8%-1.3%) in the overall sample. Stratification by age group indicated that BDD was rare among children (0.1%) and significantly more common among adolescents (1.9%). Similarly, stratification by sex indicated that BDD was significantly less frequent among male (0.3%) than among female (1.8%) participants. A comparable pattern was observed for self- and parent-reported appearance preoccupation, whereby prevalence estimates were higher among adolescents compared to children, and among female compared to male participants.

A series of logistic regression models tested the interaction of the effect of age and sex on the prevalence of BDD, self-reported and parent-reported appearance preoccupation. In the BDD model, the age by sex interaction was substantial but not statistically significant (OR = 7.71, 95% CI = 0.92-64.6, $p = .06$). The confidence intervals are wide, reflecting the relative rarity of BDD in the subgroups that are tested through these interaction models. The main effect of age group was significant (OR = 5.20, 95% CI = 1.05-25.8, $p = .04$), but not the main effect of sex (OR = 1.06, 95% CI = 0.15-7.59, $p = .95$). In the model of self-reported appearance preoccupation, there was a significant age by sex interaction of similar magnitude to that of the BDD model (OR = 7.75, 95% CI = 1.28-47.10, $p = .03$). In the model of parent-reported appearance preoccupation, there was no significant age by sex interaction (OR = 1.65, 95% CI = 0.82-3.30, $p = .16$) or main effect of sex (OR = 1.37, 95% CI = 0.80-2.34, $p = .24$), but there was a main effect of age (OR = 2.8, 95% CI = 1.67-4.91, $p < .001$).

Appearance preoccupation was assessed by self-report for participants 11 to 19 years of age only. Within this age group, the agreement between self- and parent-report

FIGURE 1 Age and Sex Effects on the Prevalence of DSM-5 Body Dysmorphic Disorder (BDD) and Appearance Preoccupation

Note: 95% Confidence intervals were narrow and are therefore unobservable for estimates of BDD in children (panel 1).

was poor (Cohen kappa = 0.19) reflecting the fact that, for example, only 19.8% of those with self-reported preoccupation were recognized as having these concerns by their parents (Table S5, available online).

Characteristics of BDD and Self-Reported Appearance Preoccupation

As shown in Table S6, available online, most young people with BDD reported that they developed appearance preoccupation during adolescence (age 11-19 years). The most common appearance concerns were body size or shape (eg, being too tall or short, too thin or fat), skin condition (eg, spots, scars, or wrinkles), and other facial features (eg, nose or teeth). The most common appearance-related behaviors were comparing their own appearance with that of others, appearance checking (eg, repeatedly looking in a mirror), excessive grooming (eg, self-tanning, styling hair), and attempting to conceal perceived flaws (eg, through make-up, wearing sunglasses or hoods). Similar characteristics were observed for those with self-reported appearance preoccupation (Table S6, available online).

Comorbidity

Comorbid *DSM-5* disorders are shown in Table 3. BDD was associated with a significantly elevated frequency of any other disorder, internalizing disorders, externalizing

disorders, eating disorders, but not autism spectrum disorders. The majority (69.8%, 95% CI = 56.8%-80.4%) of young people with BDD met diagnostic criteria for at least 1 additional psychiatric disorder. The most common comorbidities were anxiety-related disorders and depressive disorders, occurring in 58.7% (95% CI = 45.6%-70.8%) and 31.7% (95% CI = 20.9%-44.8%) of those with BDD, respectively. Externalizing disorders were also common, affecting 20.6% (95% CI = 11.9%-33.0%) of young people with BDD.

Self-reported appearance preoccupation was also associated with a higher occurrence of any other disorder, internalizing disorders, externalizing disorders, and eating disorders. Many young people (40.4%, 95% CI = 34.4%-46.8%) with self-reported appearance preoccupation met diagnostic criteria for at least 1 disorder, other than BDD. Again, anxiety-related and depressive disorders were the most common comorbidities, affecting 30.6% (95% CI = 25.0%-36.7%) and 18.3% (95% CI = 13.8%-23.7%) of those with self-reported appearance preoccupation, respectively. Externalizing disorders occurred in 10.7% (95% CI 7.3%-15.4%) of young people with self-reported appearance preoccupation.

A logistic regression model was used to test differential strength of association of internalizing vs externalizing disorders with BDD and self-reported appearance preoccupation. Those with comorbid internalizing disorders only,

TABLE 3 Comorbid DSM-5 Diagnoses Among Those With Versus Without Body Dysmorphic Disorder (BDD) and Appearance Preoccupation

| | BDD, n (%) | | χ^2 | Appearance preoccupation, n (%) | | χ^2 |
|--|------------------|-------------------|-----------|---------------------------------|--------------------|-----------|
| | Present (n = 63) | Absent (n = 7591) | | Present (n = 252) | Absent (n = 3,282) | |
| Any disorder | 44 (69.8) | 782 (10.3) | 230.07*** | 102 (40.4) | 309 (9.4) | 219.70*** |
| Any internalizing disorder | 41 (65.1) | 440 (5.8) | 372.86*** | 87 (34.5) | 205 (6.2) | 246.89*** |
| Any depressive disorder | 20 (31.7) | 150 (2.0) | 254.98*** | 46 (18.3) | 77 (2.3) | 176.30*** |
| Any anxiety-related disorder | 37 (58.7) | 356 (4.7) | 374.61*** | 77 (30.6) | 157 (4.8) | 251.40*** |
| Social anxiety disorder | 11 (17.5) | 83 (1.1) | | 27 (10.7) | 44 (1.3) | |
| Generalized anxiety disorder | 22 (34.9) | 97 (1.3) | | 40 (15.9) | 38 (1.1) | |
| Panic disorder | 4 (6.3) | 44 (0.6) | | 16 (6.3) | 27 (0.8) | |
| Post-traumatic stress disorder | 8 (12.7) | 32 (0.4) | | 11 (4.4) | 17 (0.5) | |
| Obsessive-compulsive disorder | 5 (7.9) | 30 (0.4) | | 7 (2.8) | 17 (0.5) | |
| Separation anxiety disorder | 3 (4.7) | 89 (1.2) | | 7 (2.8) | 18 (0.5) | |
| Agoraphobia | 3 (4.7) | 29 (0.4) | | 13 (5.2) | 16 (0.5) | |
| Any externalizing disorder | 13 (20.6) | 459 (6.0) | 22.98*** | 27 (10.7) | 143 (4.4) | 20.65*** |
| Oppositional defiant disorder | 5 (7.9) | 204 (2.7) | | | | |
| Conduct disorder | 7 (11.1) | 97 (1.2) | | | | |
| Attention-deficit/hyperactivity disorder | <3 | 237 (3.1) | | 7 (2.8) | 72 (2.2) | |
| Any eating disorder | 5 (7.9) | 19 (0.3) | 118.09*** | 10 (4.0) | 6 (0.2) | 74.41*** |
| Autism spectrum disorder | <3 | 93 (1.3) | 0.07 | <3 | 25 (0.8) | 0.43 |

Note: Young people ≥ 11 years of age were asked about appearance preoccupation. BDD = body dysmorphic disorder. Numbers less than 3 have been suppressed.

^a Self-reported appearance preoccupation.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

compared to externalizing disorders only, were significantly more likely to have BDD (OR = 15.29, 95% CI = 4.52-51.7, $p < .001$) and self-reported appearance preoccupation (OR = 4.08, 95% CI = 2.17-7.67, $p < .001$).

BDD was significantly and positively associated with self- and parent-reported emotional symptoms, conduct symptoms, and peer problems (Table S7, available online), as well as self-reported hyperactivity. BDD showed a weak negative association with parent-reported, but not self-reported, prosocial behavior. Self-reported appearance preoccupation was associated with all self- and parent-reported SDQ symptom subscales with the exception of prosocial behavior.

Impairment

Psychosocial impairment (as measured by the SDQ impact scale), self-harm/suicide attempts, and service use are shown in Table 4. Young people with BDD had higher self- and parent-reported SDQ impact scores than those without BDD. Similarly, young people with self-reported

appearance preoccupation scored higher on the SDQ impact scale compared to those without, according to both self- and parent-report.

Self-harm or suicide attempts were common among those with BDD (46.3% according to self-report; 35.0% according to parent-report), and were more frequent in those with vs without BDD (OR = 8.57 and 14.75 for self- and parent-report, respectively). Self-reported appearance preoccupation was associated with an elevated occurrence of self- and parent-reported self-harm or suicide attempts.

BDD participants were more likely than those without BDD to have sought professional help (59.7 vs 20.8%, OR = 5.11) and to be currently taking an SSRI (7.9 vs 0.6%, OR = 13.52) or other psychotropic medication (15.9 vs 3.2%, OR = 5.35), compared to those without BDD (Table 4). Self-reported appearance preoccupation was also associated with higher rates of seeking professional help, use of SSRIs, and use of other psychotropic medication.

TABLE 4 Association of Body Dysmorphic Disorder (BDD) and Self-Reported Appearance Preoccupation With Psychosocial Impairment, Self-Harm/Suicide Attempts, and Service Use

| | BDD | | β | Appearance preoccupation | | β |
|--------------------------------------|-------------|-------------|----------------------------|--------------------------|-------------|----------------------------|
| | Present | Absent | | Present | Absent | |
| SDQ impact, mean (SD) | | | | | | |
| Self-report | 2.98 (2.51) | 0.46 (1.27) | 2.10*** | 1.85 (2.31) | 0.39 (1.16) | 1.23*** |
| Parent-report | 3.25 (3.18) | 0.68 (1.75) | 1.23*** | 1.62 (2.36) | 0.60 (1.61) | 0.49*** |
| | | | Odds ratio (95% CI) | | | Odds ratio (95% CI) |
| Self-harm or suicide attempts, n (%) | | | | | | |
| Self-report | 25 (46.3) | 29 (8.0) | 8.57*** (4.67, 15.8) | 80 (31.7) | 223 (6.8) | 6.01*** (4.36, 8.30) |
| Parent-report | 16 (35.0) | 31 (3.5) | 14.75*** (7.5, 29.12) | 40 (19.9) | 119 (4.2) | 5.67*** (3.66, 8.78) |
| Sought professional help, n (%) | 37 (59.7) | 1568 (20.8) | 5.11*** (2.90, 8.98) | 112 (44.4) | 581 (17.8) | 3.65*** (2.72, 4.89) |
| SSRI, n (%) | 5 (7.9) | 49 (0.6) | 13.52*** (4.94, 37.01) | 11 (4.4) | 33 (1.0) | 4.74*** (2.28, 9.88) |
| Any psychotropic medication, n (%) | 10 (15.9) | 241 (3.2) | 5.35*** (2.53, 11.31) | 17 (6.8) | 128 (3.9) | 2.10** (1.21, 3.67) |

Note: β = standardized beta coefficient. Odds ratios are given with 95% CIs in parentheses. Odds ratios and standardized β coefficients were derived using sampling weights. "Sought professional help" refers to within the last 12 months. "SSRI" and "Any psychotropic medication" refer to current use. SDQ = Strengths and Difficulties Questionnaire. SSRI = selective serotonin reuptake inhibitor.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

DISCUSSION

To our knowledge, this is the first study to examine the prevalence and clinical correlates of *DSM-5* BDD and appearance preoccupation using a representative sample of young people drawn from the general population. The point prevalence of BDD was 1.0% (95% CI = 0.8%-1.3%), and we observed important age and sex effects. We found that BDD was nearly 20 times as common among adolescents than among children (prevalence of 1.9% vs 0.1%), consistent with research showing that the majority of adults with BDD report onset during early to mid-adolescence.² The fact that BDD is rare in childhood may indicate that developmental processes linked to adolescence (eg, pubertal hormones and body changes, developing self-concept) serve as risk factors or catalysts for BDD onset. Our adolescent prevalence estimate is at the lower end of the range obtained in adult epidemiological studies, which vary from 1.7%⁷ to 3.2%.⁸ Thus, although adolescent-onset may be the norm, it is probable that some individuals develop BDD during adulthood.² We also found BDD to be strikingly more common among girls than among boys (prevalence of 1.8% vs 0.3%), in line with findings of appearance anxiety in school samples³² and the previous observations that most young people who access specialist BDD services are female.^{3,13,14} Overall, our results suggest that the prevalence of BDD increases sharply from childhood to adolescence, particularly among girls, although in our analyses this interaction effect did not

reach statistical significance. Nevertheless, findings highlight that adolescent girls are at the highest risk for experiencing BDD, with an estimated prevalence of 3.4%. Interestingly, these findings contrast with OCD, a closely related condition, which often develops in late childhood^{33,34} and is equally common in girls and boys.³⁵ Our finding that BDD disproportionately affects adolescent girls is in keeping with findings from social anxiety disorder, depression, and eating disorders, which could have implications for its conceptualization.³⁶

In relation to our second aim, we found that approximately 70% of participants met *DSM-5* diagnostic criteria for at least 1 additional disorder. The most frequent comorbidities were depressive disorders and anxiety-related disorders, consistent with observations in clinical studies.^{3,13,14} Notably, the prevalence of these disorders in young people also appears to be rising.³⁷ As expected, internalizing disorders were more strongly associated with BDD than externalizing disorders. Similarly, continuously measured emotional symptoms showed a stronger association with BDD than other symptom domains. Albeit less common, it is notable that approximately 1 in 5 young people with BDD also met diagnostic criteria for an externalizing disorder.

With regard to our third aim, as hypothesized we found BDD to be associated with substantial functional impairment across several indices. More specifically, the presence of BDD was positively associated with both parent- and self-reported psychosocial impairment, parent- and self-

reported self-harm or suicide attempts, and parent-reported service use. It is notable that, 46% (95% CI = 33.3%-59.8%) of young people with BDD reported a lifetime history of self-harm or suicide attempts, compared to 8% (95% CI = 7.2%-9.0%) of those without BDD, underscoring the high level of clinical risk in this population.^{38,39}

The frequency of self-harm or suicide attempts among those with major depressive disorder in our sample was 60% (95% CI = 49.1%-70.0%), indicating that BDD confers a comparable level of risk. In our analyses, the frequency of self-harm or suicide attempts was slightly lower according to parent-report, consistent with previous research indicating that parents typically underestimate suicidal behaviors in their children.⁴⁰ We found that approximately 60% of the BDD group had sought professional help over the previous 12 months because of emotional or behavioral symptoms, compared to 20% of those without BDD. Furthermore, approximately 16% of those with BDD were currently taking a psychotropic medication and 8% were taking an SRI specifically, compared to 3% and 0.6% of those without BDD, respectively. Although these findings demonstrate the clinical need associated with BDD, they also highlight that a large proportion of young people with BDD do not access services and evidence-based treatments, namely cognitive-behavioral therapy and SRI medication.⁴¹

We found that a strikingly similar pattern of results was obtained when examining appearance preoccupation compared to full-syndrome BDD, consistent with the notion that body dysmorphic symptoms are dimensional in nature, with BDD representing 1 extreme end of the continuum.⁴² The estimated prevalence of self-reported appearance preoccupation was 7.8%; however, as with BDD, appearance preoccupation was significantly more common among adolescents than children and among girls than boys. Similar age and sex effects were observed for parent-reported appearance preoccupation, although overall parents reported appearance preoccupation less frequently than young people themselves. Self-reported appearance preoccupation was associated with high levels of psychopathology (eg, 40% met *DSM-5* criteria for at least 1 diagnosis other than BDD) as well as with substantial impairment across all indices and across informants. For example, young people with appearance preoccupation vs those without had approximately a 6-fold increased odds of both self- and parent-reported self-harm or suicide attempts. These findings underscore the clinical significance of appearance preoccupation.

The current findings have several important theoretical and clinical implications. First, we found that BDD was strikingly more common among girls than among boys, in contrast to previous findings in adult populations in which

the sex ratio is roughly equal. This suggests that the developmental trajectory for BDD may differ according to sex, with a later onset in those who are male as previously suggested.¹² Second, we found that parents under-reported appearance concerns relative to young people themselves, which emphasizes the importance of anchoring a BDD assessment in the young person's own account. Because young people with BDD tend not to spontaneously disclose their symptoms unless directly asked, it is crucial that clinicians use BDD screening tools and ask young people directly about appearance concerns.²⁶ Third, the high levels of psychiatric comorbidity observed in the current study could have implications for diagnosis and treatment. Screening for BDD in young people with anxiety disorders and depression, the most common comorbidities, is likely to improve detection. Further research is needed to establish optimal approaches to treating BDD in the context of comorbidity. Previous research suggests that some co-occurring symptoms, such as depressive symptoms, resolve with effective BDD treatment,⁴³ but also that body dysmorphic symptoms could improve following psychological treatment of other conditions, such as social anxiety,⁴⁴ which may reflect common underlying mechanisms.^{45,46} Fourth, we replicated findings that self-harm and suicide attempts are common in BDD.^{3,13,38} By demonstrating this association in a representative community sample in young people, we show that the relationship is not only a product of study selection bias or clinical referral bias, and we highlight the importance of comprehensive risk assessment in young people with BDD.

Strengths of this study include the large and representative population-based sample, multi-informant measurement, and use of a comprehensive and clinician-rated diagnostic assessment of BDD. Limitations should also be considered. BDD and appearance preoccupation in children less than 12 years of age were assessed via parent-report only, which could have led to underestimates, although adults with BDD typically report an onset in adolescence,² and, in the largest clinical study of BDD in youth to date, only 1 of 172 patients was less than 12 years of age.³ In addition, 63 cases of BDD were identified in total, meaning that some analyses may have lacked statistical power, and also precluding the possibility of examining relationships with ethnicity and socio-economic status. A further limitation is that self-harm and suicide attempts were assessed with a single question, meaning that the 2 phenomena could not be differentiated. In addition, the cross-sectional design precludes the possibility of examining the directionality of the relationship of BDD and appearance concerns with other forms of psychopathology. Common risk

factors, including shared genetic liability, could partially explain these associations,^{39,47,48} but there may also be causal pathways between disorders. Finally, we lack information on the proportion of young people who sought help for BDD specifically and received a diagnosis of BDD and treatment for BDD. Underdiagnosis and undertreatment of BDD is a major concern and likely to reflect a range of barriers, including reluctance to seek help but also limited awareness of BDD among mental health professionals.^{5,49,50} Increasing knowledge of BDD among clinicians is therefore an important clinical priority.

In conclusion, BDD is a relatively common mental disorder, especially among adolescent girls, and is associated with high levels of comorbid psychopathology, risk, and psychosocial impairment. Moreover, appearance preoccupation is a significant clinical phenomenon in its own right, linked with substantial morbidity. Efforts are needed to raise awareness of BDD, to improve screening practices, and to reduce barriers to evidence-based treatment.

CRedit authorship contribution statement

Georgina Krebs: Writing – original draft, Formal analysis, Conceptualization. **Bruce R. Clark:** Writing – review & editing, Methodology. **Tamsin J. Ford:** Writing – review & editing, Methodology, Investigation, Conceptualization.

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