# Body dysmorphic disorder and its relationship to sexuality, impulsivity, and addiction

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ABSTRACT

This study sought to examine the prevalence of probable body dysmorphic disorder (BDD) in a university sample and its associated physical and mental health correlates. A 156-item anonymous online survey was distributed via email to a randomly chosen subset of 10,000 university students, at a large public university. The survey queried current use of alcohol and drugs, psychological and physical status, academic performance, sexual behaviors, and questionnaire-based measures of impulsivity and compulsivity.

A total of 3,459 participants (59.1% female) completed the survey and were included in the analysis. The overall prevalence of BDD was 1.7% ($n$ = 59). Compared to students without BDD, those with BDD were significantly more likely to endorse symptoms of compulsive sexual behavior, depression, PTSD, and anxiety. Questionnaire-based measures revealed higher levels of both compulsivity and impulsivity associated with BDD.

BDD appears to be common in young adults, and is associated with specific mental health comorbidities, as well as both impulsive and compulsive traits. Clinicians should be aware of the presentation of BDD and screen for it in primary care and mental health settings.

## 1. Introduction

Body dysmorphic disorder (BDD) is characterized by a preoccupation with perceived defects or flaws in one's own appearance (American Psychiatric Association, 2013). The preoccupation causes significant distress and/or impairment, and BDD is also associated with increased risk of suicide attempts (Weingarden et al., 2016; Phillips and Menard, 2006). Although any body part may be the focus of concern, individuals with BDD are most frequently concerned about features related to their face or head, such as their skin, hair, or nose (Phillips et al., 2014). BDD appears to be a relatively common disorder with population-based studies of adults finding point prevalence rates of approximately 1.7% to 2.4% (Koran et al., 2008; Rief et al., 2006). A systematic review of BDD prevalence rates found a weighted prevalence of BDD in adult community samples of 1.9% and a weighted prevalence for student samples of 3.3% (Veale et al., 2016).

BDD usually has its onset during adolescence or young adulthood (American Psychiatric Association, 2013; Gunstad and Phillips, 2003), and therefore it is important to examine the impact of BDD specifically within young adult populations. A fair amount of research has reported associations between BDD and depression (Cerea et al., 2018; Schneider

et al., 2017) and anxiety (Cerea et al., 2018) in non-clinical samples. BDD has also been linked with worse self-esteem and quality of life in community samples of younger people (Bohne et al., 2002; Cerea et al., 2018; Schneider et al., 2017). BDD is often comorbid with substance use problems, and people with BDD are at several fold increased risk, compared to the general population, of developing substance use disorders (Grant et al., 2005). Some individuals with BDD may turn to using substances as a means of 'escaping' the emotional distress and unhappiness arising from preoccupation with perceived body issues. Impulsivity (a tendency towards premature responses that are risky, leading to undesirable outcomes) may be a contributing candidate mechanism predisposing to both BDD and substance use disorders. The Diagnostic and Statistical Manual Version 5 (DSM-5) placement of BDD in the chapter on Obsessive Compulsive and Related Disorders, however, would suggest that compulsivity rather than impulsivity was a core clinical element of BDD (American Psychiatric Association, 2013). Nonetheless, impulsivity and compulsivity often co-exist in individual cases, and are positively correlated at the latent phenotypic level (Chamberlain et al., 2018). Impulsive aspects of BDD could theoretically be observed at the level of comorbid disorders, personality traits, and/or cognitive functioning.

Initial neurocognitive assessments in BDD have found markedly higher levels of both impulsivity and compulsivity compared to controls (Jefferies-Sewell et al., 2017) thereby suggesting that although BDD has aspects in common with other traditional compulsive disorders such as obsessive compulsive disorder, it may also have important impulsive aspects as well. Understanding the impact of BDD, as well as possible psychological underpinnings of the disorder (such as impulsivity and compulsivity), may help to identify new treatment avenues, as well as fueling greater understanding of its neurobiological overlap with other conditions. This study sought to examine both the prevalence of BDD in a university sample (based on assessment of BDD symptoms using a particular instrument), as well as differences between BDD and controls on demographic, clinical, personality, and functional aspects. Based on the previous literature, we hypothesized that BDD would be associated with poor self-esteem and impairments in academic performance; higher rates of substance problems, depression and anxiety; and elevated questionnaire-measures of both impulsivity and compulsivity.

## 2. Methods

### 2.1. Survey design

The Department of Psychiatry and Behavioral Neuroscience at the University of Chicago and Boynton Health at the University of Minnesota jointly developed the *Health and Addictive Behaviors Survey* to assess mental health and well-being in a large sample of university students. The survey included demographic information as well as questions from a number of validated screening tools examining mental health issues. All study procedures were carried out in accordance with the Declaration of Helsinki and were approved by the Institutional Review Board of the University of Minnesota.

### 2.2. Participants and procedures

A sub-sample of 10,000 college and graduate students at a large public university were chosen by random, computer-generated selection, from a total pool of approximately 60,000 students. The survey was distributed over three weeks during fall semester 2016, with invitations being sent via email, and surveys being completed online. Of the 10,000 email invitations, 9449 were successfully received by the recipients who were first required to view the online informed consent page, at which point they could choose to participate or opt out. The survey asserted that all information was both anonymous and confidential. At the conclusion of the survey, respondents were randomly selected via a lottery system to receive tablet computers (3 winners) or gift certificates to an online retailer in the amounts of $250 (4 winners), $500 (2 winners), and $1000 (1 winner). Participants were required to review all survey questions to be eligible for prize drawings (which was monitored by the computer program used for the survey), but were not required to answer all questions, due to the sensitive nature of some of these questions. Of the 9449 students who received the invitation to participate, 3459 (36.6%) completed the survey, a response rate commensurate with other national or university health surveys (Baruch and Holtom, 2008; Cook et al, 2000; Van Horn et al, 2009).

### 2.3. Assessments

The self-report survey consisted of 156 questions and took approximately 30 minutes to complete. Survey questions assessed demographic information, sexual behavior, and self-reported academic achievement. For the above measures we collected categorical responses since allowing online survey participants to enter raw numbers can lead to erroneous responses / typographical errors and also ambiguity of responses. We also included questions about mental health and substance use issues, including measures germane to impulsivity and compulsivity, viz. ADHD symptoms (since ADHD is an archetypal

disorder of impulsivity), as well as trait impulsivity, and a recently developed trans-diagnostic compulsivity questionnaire.

All participants completed the *Body Dysmorphic Disorder Questionnaire* (BDD-Q). The BDD-Q is a brief four-item self-report screening measure for BDD (Phillips, 2005). The BDD-Q asks individuals if they worry about their appearance and wished they worried about it less. Individuals who answered yes to these questions are then asked whether their appearance concerns are primarily due to weight concerns, and whether appearance concerns cause significant distress, interfere with their lives in some domain, or cause them to avoid situations or activities. The BDD-Q also asks individuals how much time they spend thinking about their appearance each day. In order to screen positive for BDD, participants had to indicate that they worried about their appearance, their main concerns were not related to weight, appearance concerns caused either significant distress, interference in social or occupational functioning, or significant avoidance, and the individual thought about appearance concerns for at least one hour each day. The BDD-Q has a sensitivity of 100% in psychiatric inpatient and partial hospital settings, and a specificity of 89–93% (Phillips et al., 1995; Grant et al., 2001).Each participant also completed the following reliable and valid measures: *Minnesota Impulsive Disorders Interview (MIDI)* (screening instrument for impulse control disorders; Grant, 2008; Chamberlain and Grant, 2018a); *Alcohol Use Disorders Identification Test (AUDIT)* (10-item questionnaire used to assess alcohol use behaviors and related problems; Saunders et al, 1993); *Drug Abuse Screening Test (DAST-10)* (10-item, yes/no measure of problematic substance use excluding alcohol; Skinner 1982; Yudko et al, 2007); *Patient Health Questionnaire (PHQ-9)* (9-item measure of depressive symptoms; Kroenke et al, 2001); *Generalized Anxiety Disorder 7 (GAD-7)* (7-item, screen for generalized anxiety disorder; Spitzer et al, 2006); *Primary Care PTSD Screen (PC-PTSD)* (4 questions with a score of $\geq 3$ indicating probable posttraumatic stress disorder (PTSD) (Prins et al., 2003). *Adult ADHD Self-Report Scale Part A (ASRS-v1.1)* (6-item screening tool for attention-deficit/hyperactivity disorder (ADHD); Kessler et al., 2005); *Rosenberg Self-Esteem Scale (RSES)* (10-item scale measuring global feelings of self-worth or self-regard; Rosenberg, 1965); *Barratt Impulsiveness Scale, Version 11 (BIS-11)* (30-item measure designed to assess impulsivity across three dimensions: attentional [inability to concentrate], motor [acting without thinking], and non-planning [lack of future orientation]; Stanford et al, 2009); and the *Cambridge-Chicago Compulsivity Trait Scale (CHI-T)* (15-item measure of trans-diagnostic compulsivity; Chamberlain and Grant, 2018b).

### 2.4. Data analysis

All respondents who participated in the survey completed the BDD-Q and so were included in this analyses ($N = 3459$). Participants were grouped into one of two categories based on their responses to the BDD-Q with respect to the last 12 months: BDD group and No BDD (controls). It should be noted that the BDD group constitutes probable BDD, due to the absence of in-person clinical assessment. Significant main effects of group were identified using likelihood ratios for data collected in categorical format, and analysis of variance for data collected in continuous format. Effect sizes were calculated for all significant differences, which were determined for two-group *ANOVA* tests (equivalent to *t*-tests) using Hedges' *g* (*g* = 0.2 is a small effect size, 0.5 is medium, and 0.8 is large (36) and for $\chi^2$ with φ coefficient (Cramer's V) (V = 0.1 is considered a small effect size, 0.3 is medium, and 0.5 is large). SPSS was used for all statistical analyses (version 24; IBM Corp). Statistical significance was defined as $p \leq 0.01$ to account for multiple comparisons. Missing data were missing completely at random (MCAR) and the analysis was conducted using listwise deletion. By far the most common approach to the missing data is to simply omit those cases with the missing data and analyze the remaining data. This approach is known as the complete case (or available case) analysis or listwise deletion. Listwise deletion is the most frequently used method in handling

missing data. Although this may introduce bias in the estimation of the parameters, if the assumption of MCAR is satisfied, a listwise deletion is known to produce unbiased estimates and conservative results. Also, because this was a large sample, where power was not an issue, the assumption of MCAR was satisfied and listwise deletion seemed reasonable.

## 3. Results

The total sample comprised 3459 participants (63.4% female) of mode age 18–20 years (40.9% of the sample were aged 18–20y, 31.4% were aged 21–24 years, 15.8% were aged 25–29 years, and 11.9% were older). The most common relationship status in the whole sample was being single (44.6%), followed by dating exclusively (33.1%), being married (11.4%), dating but not exclusively (5.6%), and being engaged (3.4%). Educational statuses in the total sample were (in order of decreasing frequency): doctoral/professional degree (18.6%), first-year undergraduate (16.1%), third-year undergraduate (15.7%), second-year undergraduate (15.0%), Master's degree (14.7%), and fourth-year undergraduate (14.5%).

The overall prevalence of BDD was 1.7%. Those who reported symptoms consistent with BDD were significantly more likely to be undergraduates were more likely to identify as trans/genderqueer, and were more likely to be male (Table 1). Also, BDD was associated with higher rates of being single (Table 1).

BDD was significantly associated with higher scores on the DAST-10, suggestive of higher past 12-month problematic substance use (excluding alcohol) in general, but the two groups did not differ significantly for specific categories of substance use with the more restrictive p-value correction (see Table 2). The groups did not differ for problematic alcohol use (AUDIT).

Table 3 presents the mental health of participants. BDD was significantly associated with higher rates of PTSD, depression, ADHD, anxiety, and compulsive sexual behavior. In addition, those with BDD had significantly poorer self-esteem. BDD was not significantly associated with gambling disorder or binge-eating disorder.

**Table 1**
Demographics of university students with Body Dysmorphic Disorder (BDD).

| Variable N (%) | BDD (N = 59) | Controls (N = 3400) | Likelihood ratio χ2 | P-value | Effect size |
|---|---|---|---|---|---|
| Gender | | | | | |
| Male | 32 (54.2) | 1234 (36.3) | 32.872 | < 0.001 | 0.127 |
| Female | 20 (33.9) | 2023 (59.5) | df = 3 | | |
| Trans/ GenderQueer | 7 (11.9) | 45 (1.3) | | | |
| No answer | 0 (0.0) | 98 (2.9) | | | |
| Student status | | | | | |
| Undergrad | 51 (86.4) | 2236 (65.8) | 13.136 | 0.001 | 0.057 |
| Graduate | 8 (13.6) | 1145 (33.7) | df = 2 | | |
| Non-degree seeking | 0 (0.0) | 19 (0.6) | | | |
| Race/ethnicity, Caucasian | 42 (71.2) | 2501 (75.7) | 0.629 df = 1 | 0.428 | 0.014 |
| Relationship status | | | | | |
| Single | 36 (61.0) | 1522 (44.8) | 17.059 | 0.001 | 0.065 |
| Dating | 20 (33.9) | 1329 (39.1) | df = 3 | | |
| Engaged/ married | 1 (1.7) | 516 (15.2) | | | |
| Other | 2 (3.4) | 32 (0.9) | | | |
| College grade point average | 0 (0.0) | 7 (0.2) | 10.089 | 0.039 | 0.059 |
| Below 1.50 | 3 (5.2) | 52 (1.5) | df = 4 | | |
| 1.50–2.49 | 3 (5.2) | 290 (8.6) | | | |
| 2.50–2.99 | 28 (48.3) | 114 (33.2) | | | |
| 3.00–3.49 | 24 (41.4) | 1897 (56.5) | | | |
| 3.50–4.00 | | | | | |

All values are *n* (%) unless otherwise stated.

In terms of psychological traits (see Table 4), those with BDD reported significantly greater scores of impulsivity on the attentional and non-planning subscales of the BIS-11 (as well as total scores), plus greater levels of compulsive traits.

Sexual behavior is presented in Table 5. Those with BDD were significantly more like to report same-sex sexual attraction and having had a same-sex sexual partner.

## 4. Discussion

This study examined the prevalence of BDD in a large sample of university students and BDD's association with a range of clinical measures and questionnaires focusing on impulsivity and compulsivity. We found that the point prevalence of BDD was 1.7%, a rate similarly observed in community samples (Enander et al., 2018; Rief et al., 2006), although slightly lower than some other studies (2.4%; Koran et al, 2009), and considerably lower than that found in a small study (*n* = 133) of university students (5.3%) (Bohne et al., 2002; see also Shaffi Ahamed et al., 2016 in female medical students; [4.4%]). Prevalence findings for BDD would be expected to differ between studies, since studies—statistically speaking—constitute samples from underlying populations (and therefore have intrinsic variance); also, this may reflect differences in the nature of the cohorts examined (e.g. relating to age, social status, local cultural norms). In our study, BDD was significantly associated with male gender. Although the percentage of males was greater among those with BDD compared to those without BDD, the actual percentage of males with BDD (54%) is consistent with most studies (Schneider et al., 2017; Buhlmann et al., 2010; Koran et al., 2008; Rief et al., 2006). The relatively high percentage of BDD in this population speaks to the importance of incorporating a brief BDD questionnaire in university screenings of psychopathology.

This study also found that those with BDD were more likely to identify as trans/gender queer compared to those without BDD. In the critically challenging young adulthood developmental phase of college, it is not surprising that bodily concerns are naturally heightened. This may be more accentuated in sexual minority youth who are possibly freely coming out and exploring their sexuality for the first time. The question arises as to whether these body image concerns are possibly just one manifestation of other broader struggles, as the many significant findings of the survey suggest.

The current study found that university students with BDD were significantly more likely to screen positive for some level of problematic substance use (besides alcohol) compared to those without BDD, based on the DAST-10 total score. In fact approximately 24% screened positive for problematic substance use, a rate higher than seen in some other studies of BDD (17%; Grant et al., 2005), but lower than observed in inpatients with BDD (37.5%; Veale et al., 2015). Again, as for prevalence of BDD itself, differences between studies on substance use could be impacted by natural variation and different cohort characteristics. Interestingly, BDD was not associated with elevated rates of using specific drugs, although use of hallucinogens and cannabis were numerically higher, but not statistically greater, in terms of the percentage of users. The elevated DAST-10 scores associated here with BDD, in the absence of statistically significant group differences for specific classes of substance use, could be due to several reasons. One possibility is that survey participants were willing to report substance use in general but under-reported use of specific named substances due to concern about possible consequences of doing so, despite the survey being described at the outset as being anonymous. Another possibility is that those endorsing DAST-10 items were using substances other than those that were screened for. Lastly, the DAST-10 encompasses any substance use (excluding alcohol) so may have yielded greater statistical power to detect group differences compared to asking about a single class of substance.

In terms of other mental health problems, BDD was significantly associated with symptoms of post-traumatic stress disorder (PTSD),

**Table 2**
Drug and alcohol use of university students with Body Dysmorphic Disorder (BDD).

| Variable N (%) | BDD (N = 59) | Controls (N = 3400) | Likelihood ratio χ2 | P-value | Effect size |
|---|---|---|---|---|---|
| Illicit drug use (lifetime) | 31 (52.5) | 1341 (39.5) | 4.014 df = 1 | 0.045 | 0.035 |
| Nicotine (lifetime) | 25 (42.4) | 1362 (40.1) | 0.129 df = 1 | 0.720 | 0.006 |
| E-cigarettes (lifetime) | 14 (23.7) | 612 (18.0) | 1.196 df = 1 | 0.274 | 00.019 |
| Drug use (past 12 months) | | | | | |
| Amphetamines | 1 (1.7) | 32 (0.9) | 0.296 df = 1 | 0.586 | 0.010 |
| Cocaine | 1 (1.7) | 106 (3.1) | 0.449 df = 1 | 0.503 | 0.011 |
| Heroin | 1 (1.7) | 13 (0.4) | 1.414 df = 1 | 0.234 | 0.027 |
| Hallucinogens | 7 (12.1) | 158 (4.7) | 4.940 df = 1 | 0.026 | 0.045 |
| Marijuana or hashish | 23 (39.0) | 955 (28.1) | 3.164 df = 1 | 0.075 | 0.031 |
| Prescription pain medication | 2 (3.5) | 70 (2.1) | 0.474 df = 1 | 0.491 | 0.013 |
| Sedatives | 1 (1.7) | 71 (2.1) | 0.041 df = 1 | 0.839 | 0.003 |
| Alcohol and drug screening questionnaires | | | | | |
| AUDIT score ≥8 (%) | 18 (30.5) | 842 (24.8) | 0.964 df = 1 | 0.326 | 0.017 |
| DAST-10 score ≥3 (%) | 14 (23.7) | 271 (8.0) | 13.282 df = 1 | <0.0001 | 0.074 |

All values are *n* (%) unless otherwise stated. AUDIT= Alcohol Use Disorders Identification Test; DAST-10= Drug Abuse Screening Test

depression, ADHD, generalized anxiety and social anxiety disorders, and compulsive sexual behavior. The link between BDD and anxiety was particularly strong (in terms of effect size). This is in keeping with prior data, which suggested that around 38% of patients with BDD have a lifetime history of social phobia, which may in many cases predate BDD itself (e.g. Mufaddel et al., 2013). Most of these findings have been previously reported (Phillips et al., 2014; Schneider et al., 2017), including in other contexts such as inpatient settings (e.g. Veale et al., 2015), but the finding of elevated rates of co-occurring compulsive sexual behavior has not been previously reported.

Overall, people in the study with BDD had higher likelihood of being single, but did not have significantly higher or lower numbers of past-year sexual partners than controls. Due to body shame associated with BDD, some affected individuals may shun intimate relationships and sexual acts; whereas the finding of elevated likelihood of compulsive sexual behavior suggests this is not the case for all BDD cases. There may be multiple, non-mutually exclusive explanations for this finding of increased rates of compulsive sexual behavior occurrence in BDD, at least in some people. Compulsive sexual behavior may be a response to BDD. The person hates a particular body part, feels inadequate because of it (also reflected by significantly lower scores on the RSE), and uses sex to at least momentarily focus on something other than the particular body part and/or build self-confidence, which then ironically leads to feeling more inadequate and perpetuates a vicious cycle. Another hypothesis might be that BDD may lead to problematic drug use behavior (previous research showed that substance use disorders usually resulted from BDD as opposed to the other direction; Grant et al., 2005) which then is associated with problematic sexual behavior. Alternatively, the impulsivity reported by those with BDD (higher scores on the BIS-11 and higher rates of ADHD) may underlie the sexual behavior as well as core aspects of the BDD.

Questionnaire-based measures of impulsivity and compulsivity revealed evidence that impulsivity (BIS-11) and compulsivity (CHI-T questionnaire) were both significantly associated with BDD. The finding of elevated compulsivity scores on the CHI-T questionnaire is in keeping with BDD's clinical presentation of obsessive preoccupation with appearance and the repetitive behaviors to reduce anxiety (e.g., checking mirrors) as well as its frequent co-occurrence with OCD (Phillips et al., 2014). The association between BDD and elevated impulsiveness scores on the BIS-11 is only partially expected, however, based on previous research (Jefferies-Sewell et al., 2017), although this finding of elevated impulsivity may explain in part the relatively high suicide rates in BDD (Phillips and Menard, 2006), which are not found to the same degree in the other obsessive compulsive and related disorders.

This study of BDD in non-treatment seeking students has the advantage of being relatively large and having used multiple scales with sound psychometric properties. Nonetheless, there are several limitations. The assessment of BDD was based on the BDD-Q, which screens for but does not diagnose BDD, that would require an interview of the participant. In the absence of detailed in-person clinical assessments, it was not feasible to rule out potential cases of BDD that may have been better conceptualized as being secondary to other mental health issues; nor of course was it possible to evaluate for actual physical bodily defects. The study was cross-sectional and therefore no causality of effects can be determined. Online surveys have inherent limitations such as less accurate diagnostic assessment, compared to in-person assessments by a trained clinician. Group differences were generally of small effect size, which may be partly due to higher variance of instruments anticipated when using online surveys as compared to gold standard 'in-person' assessments. We did not conduct statistical modeling such as hierarchical regression due to the relatively small number of cases of BDD in the sample, versus the number of variables of interest. Our aim was to describe how people with BDD differed from controls, in an educational setting, rather than to assess interplay between variables.

**Table 3**
Mental health problems of university students with Body Dysmorphic Disorder (BDD).

| Variable N (%) | BDD (N=59) | Controls (N = 3400) | Likelihood ratio χ2 | P-value | Effect size |
|---|---|---|---|---|---|
| PHQ-9 score ≥10 (%) | 10 (17.2) | 145 (4.4) | 13.235 df = 1 | <0.0001 | 0.080 |
| PC-PTSD score ≥3 (%) | 22 (37.3) | 471 (14.0) | 19.258 df = 1 | <0.0001 | 0.086 |
| GAD-7 score ≥10 (%) | 26 (44.1) | 570 (17.2) | 22.433 df = 1 | <0.0001 | 0.092 |
| Compulsive sexual behavior | 8 (14.0) | 116 (3.5) | 10.486 df = 1 | 0.001 | 0.072 |
| Gambling disorder | 0 (0.0) | 14 (0.4) | 0.488 df = 1 | 0.485 | 0.008 |
| Binge eating disorder | 1 (1.7) | 82 (2.4) | 0.153 df = 1 | 0.696 | 0.006 |
| Social Anxiety disorder | 22 (37.3) | 311 (9.2) | 33.147 df = 1 | <0.0001 | 0.123 |
| ADHD | 19 (32.8) | 573 (17.2) | 8.025 df = 1 | 0.005 | 0.053 |
| Rosenberg Self Esteem, below 15 score (%) | 26 (45.6) | 467 (14.3) | 31.465 df = 1 | <0.0001 | 0.115 |

All values are *n* (%) unless otherwise stated. PHQ-9, patient health questionnaire; GAD, generalized anxiety disorder; PC-PTSD, Primary Care PTSD Screen (PC-PTSD).

**Table 4**

Impulsivity and compulsivity of university students with Body Dysmorphic Disorder (BDD).

| Variable mean (sd) | BDD (N = 59) | Controls (N = 3400) | Statistic | P-value | Effect size |
| --- | --- | --- | --- | --- | --- |
| Cambridge-Chicago Compulsivity Trait Scale | 27.12 (5.4) | 25.16 (5.7) | $F(1,3381) = 6.667$ | 0.010 | 0.018 |
| Barratt Impulsiveness Scale (BIS-11) | 65.53 (9.7) | 59.33 (10.2) | $F(1,3198) = 21.227$ | <0.0001 | 0.0176 |
| Attentional impulsiveness | 18.79 (3.6) | 16.16 (3.9) | $F(1,3291) = 25.054$ | <0.0001 | 0.0176 |
| Non-planning impulsiveness | 25.19 (4.5) | 22.89 (4.8) | $F(1,3285) = 13.49$ | <0.0001 | 0.0173 |
| Motor impulsiveness | 21.46 (4.4) | 20.31 (3.9) | $F(1,3300) = 4.889$ | 0.027 | 0.0173 |

All values are *n* (%) unless otherwise stated.

**Table 5**

Sexual behavior of university students with Body Dysmorphic Disorder (BDD).

| Variable N (%) | BDD (N = 59) | Controls (N = 3400) | Likelihood ratio χ2 | P-value | Effect size |
| --- | --- | --- | --- | --- | --- |
| Sexual attraction within the past year | | | | | |
|   Other sex | 41 (70.7) | 2951 (88.9) | 15.768 | 0.001 | 0.083 |
|   Both sexes | 4 (6.9) | 138 (4.2) | df = 3 | | |
|   Same sex | 11 (19.0) | 179 (5.4) | | | |
|   Not applicable | 2 (3.4) | 50 (1.5) | | | |
| Age when first sexually active | | | | | |
|   11 years of age or younger | 0 (0.0) | 20 (0.8) | 7.324 | 0.120 | 0.049 |
|   12–14 years | 3 (8.1) | 153 (6.2) | df = 4 | | |
|   15–17 years | 13 (35.1) | 1038 (41.7) | | | |
|   18–20 years | 20 (54.1) | 964 (38.8) | | | |
|   Over 21 years | 1 (2.7) | 312 (12.5) | | | |
| Number of sexual partners, last 12 months | | | | | |
| Not applicable | 3 (8.1) | 182 (7.3) | 4.176 | 0.653 | 0.045 |
| 1 | 20 (54.1) | 1580 (63.4) | df = 6 | | |
| 2 | 4 (10.8) | 318 (12.8) | | | |
| 3 | 5 (13.5) | 183 (7.3) | | | |
| 4 | 3 (8.1) | 83 (3.3) | | | |
| 5 | 1 (2.7) | 49 (2.0) | | | |
| 6 or more people | 1 (2.7) | 96 (3.9) | | | |
| Sexual partners within the past year | | | | | |
|   Other sex | 26 (72.2) | 2139 (88.8) | 12.829 | 0.005 | 0.092 |
|   Both sexes | 0 (0.0) | 30 (1.2) | df = 3 | | |
|   Same sex | 8 (22.2) | 125 (5.2) | | | |
| Not applicable | 2 (5.6) | 114 (4.7) | | | |

Assessment of causality requires longitudinal research and larger samples. We did not record number of hours each person spent engaging in BDD behaviors, nor did we assess history of suicidality. We assessed prevalence within the sample but of course this may not generalize to the prevalence in the general student population, due to recruitment bias (e.g. self-selection). Finally, findings from a fairly homogeneous population of students may not generalize to the larger community of people with BDD.

In summary, this study found that BDD occurred in 1.7% of university students and was associated with occurrence of certain types of psychopathology (PTSD, depression, ADHD, anxiety, and compulsive sexual behavior). Additionally, BDD was associated with higher scores on both impulsive and compulsive questionnaire-based instruments, and with higher endorsement of problematic substance use in general as measured by the DAST-10, which asks about any substance use excluding alcohol without naming a particular category of drug. We suggest that brief screening for BDD in student settings including universities merits more attention given these demonstrable associations with various other forms of psychopathology, as well as the likely untoward impact of untreated BDD itself.

### Disclosures

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.01.036.

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