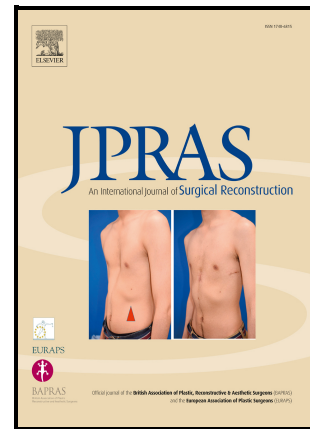


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The Heart of It All: Body Dysmorphic Disorder in Cosmetic Surgery

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SUMMARY

Background: Body Dysmorphic Disorder (BDD) represents a prevalent mental health condition characterized by distress arising from self-perceived physical imperfections. BDD serves as a

contraindication to aesthetic surgery. Recognizing BDD holds paramount importance for plastic surgeons, as it is instrumental in averting the exacerbation of this condition while ensuring appropriate referrals.

Objective: This study aimed to investigate the prevalence of BDD in cosmetic surgery patients and to pinpoint key characteristics associated with BDD. This information aims to provide plastic surgeons with specific factors to consider during pre-operative evaluations.

Methods: We employed TriNetX database to identify patients with BDD who underwent cosmetic surgery identified by Current Procedural Terminology codes. Demographics and patient characteristics were identified using International Classification of Diseases 10 codes. We calculated odds ratios (OR) by using chi-squared tests to assess risk factors among patients with BDD.

Results: Of 226,374 patients who underwent plastic surgery between August 2002 and August 2022, fewer than 0.1% were diagnosed with BDD. Of the BDD patients, 52.1% were diagnosed after cosmetic surgery. When compared to the control group, BDD patients were more likely to undergo rhinoplasty (OR=1.784, P=0.004) and non-localized lipectomy (OR=1.448, P=0.021), and less likely to undergo blepharoplasty (OR=0.451, P=0.002). Findings indicated a strong association between BDD patients undergoing cosmetic procedures and comorbid psychiatric conditions such as depression (OR=4.279, P<0.05), anxiety (OR=5.490, P<0.05), and Attention-Deficit Hyperactivity Disorder (OR=3.993, P<0.05).

Conclusions: These findings underscore the ongoing significance of BDD in the context of cosmetic surgery, potentially indicating a lower surgery rate among BDD patients compared to previous estimates. Nevertheless, avenues for further improvement persist. Our data affirm the noteworthy occurrence of post-surgery BDD development, thereby highlighting the ongoing necessity for psychiatric evaluation in surgical patients.

KEY WORDS: Body Dysmorphia Disorder, Aesthetic, Psychiatry

INTRODUCTION

Body Dysmorphic Disorder (BDD) is an increasingly prevalent mental illness affecting 1-2% of people in the United States.^{1,2} Onset typically occurs at the ages of 12-13 years old.^{3,4} BDD is characterized by significant psychological distress stemming from self-perceived flaws and “defects” of physical appearance.^{1,5,6} Individuals with BDD often fixate on specific facial features including their nose, skin, hair, chin, and ears.⁷

As per DSM-V criteria, BDD diagnosis involves preoccupation with one or more perceived defects in appearance that may not appear significant to others. These preoccupations lead to repetitive behaviors or mental acts in response, causing clinically significant distress or impairing daily function. Current literature emphasizes caution when considering surgery for patients with BDD, as the operative approach may lead to continued dissatisfaction, worsened psychiatric condition, and/or increased risk of complications.

Treatment options approved for BDD patients include psychotherapy and pharmacotherapy, with no emphasis on surgical intervention.^{8,9} Despite recommendations, some BDD patients have contemplated aesthetic surgery as a means to alleviate their distress related to their external appearance. Unfortunately, previous research has shown that cosmetic surgery may exacerbate psychiatric comorbidities in BDD patients.¹⁰ Surgeons who operate on patients with BDD may encounter increased patient dissatisfaction with the surgical outcome, as surgical intervention often fails to effectively address the core issue of BDD.¹⁰ This may result in provision of a service that inadvertently harms the patient population.

As the number of aesthetic surgical procedures continues to rise each year, it is imperative for plastic surgeons to remain vigilant in identifying patients with BDD, to prevent surgical operations that may worsen the condition.¹¹ While previous studies suggest that aesthetic plastic surgeons are somewhat familiar with BDD presentations,¹² the prevalence of BDD in the aesthetic surgery patient population is likely underestimated due to the absence of formal BDD screening in common practice.¹³ Instead of using validated screening measures such as the BDD Questionnaire, surgeons tend to rely on their clinical judgement to identify patients with potential BDD characteristics.¹³ This informal approach may fail to identify individuals with milder forms of BDD.

In this study, we aimed to investigate the prevalence of BDD in cosmetic surgery patients and to identify specific characteristics of patients with BDD among individuals undergoing cosmetic surgery. Our goal is to provide plastic surgeons with valuable insights that may be incorporated into peri-operative evaluations.

METHODS

Database

We conducted a retrospective study using TriNetX Analytics, a deidentified aggregate database encompassing electronic health records from 59 health care organizations (HCOs) located primarily in the United States and encompassing more than 81 million unique patients. TriNetX provides real-time access to longitudinal clinical data collected between August 2, 2002 and August 2, 2022. Users may navigate the data using both Current Procedural Terminology (CPT) and International Classification of Diseases (ICD) codes. TriNetX is compliant with the Health Insurance Portability and Accountability Act (HIPAA), which protects the privacy and security of healthcare data, as well as adhering to any additional data privacy regulations applicable to the contributing HCO.

Through CPT codes, we identified all patients who underwent plastic surgery between August 2, 2002 and August 2, 2022. This included procedures such as breast augmentation, blepharoplasty, rhinoplasty, and lipectomy/liposuction. Dermabrasion, tattooing, and rhytidectomy were grouped as “other” (Table 1). Within this patient population, we identified patients with a lifetime diagnosis of BDD (experimental group) and those without a BDD diagnosis (control group), based on ICD-10 codes. We analyzed various patient comorbidities, including underweight (Body Mass Index (BMI) <18.5 kg/m²), obesity (BMI >30 kg/m²), depression, anxiety, body dysmorphic disorder, and Attention-Deficit Hyperactivity Disorder ADHD (Table 1).

To effectively capture their peri-operative associations, comorbidities were recorded both before and after surgery. For patients who did not have comorbidities before surgery, we specifically

examined the emergence of depression, anxiety, and BDD post-surgery. We also examined recorded characteristics related to health hazards stemming from socioeconomic and psychosocial circumstances. These “Z-codes” denote important social determinants of health that may adversely impact a patient’s well-being.¹⁴ The Z-codes encompass challenges such as illiteracy, unemployment, housing instability, and lack of food/water access.¹⁴

Statistical Analysis

Statistical analysis was performed using the TriNetX software. An “outcome of interest” was defined as the presence of one of the following characteristics described above: ADHD, Anxiety, Anxiety after surgery only (excluding patients with prior diagnoses), Blepharoplasty, Breast, Depressive Episode, Depressive Episode after surgery only (excluding patients with prior diagnoses), Lipectomy/liposuction, Obese, “Other”, Rhinoplasty, Underweight, and Z-codes Z55-65. To examine the occurrence of demographic characteristics, we compared the prevalence between the two groups using independent t-tests for continuous data and chi-square tests for categorical data. Categorical data were also presented as frequencies and risk percentages. Risk percentages were defined as the prevalence of an outcome divided by the corresponding group, with p-values representing comparisons between risks. Odds ratios (OR) with 95% confidence intervals were also calculated from the given prevalence of each outcome to compare the likelihood of an outcome occurring in patients with BDD versus those without BDD. All tests were two-tailed with significance set at $p < 0.05$. Since this study exclusively utilized deidentified aggregate data, the Colorado Multiple Institutional Review Board (COMIRB) designated it as non-human research, exempting it from COMIRB approval.

RESULTS

A total of 226,564 patients underwent aesthetic plastic surgery in the defined study period. The overwhelming majority, comprising 226,374 individuals (99.12%), did not receive a diagnosis of BDD either before or after their surgery. Conversely, 190 patients (0.08%) did carry a formal BDD diagnosis, either preceding or subsequent to their surgical intervention. Among those with BDD, 91 patients (47.9%) had a diagnosis of BDD prior to surgical intervention. The cohort with a lifetime diagnosis of BDD had a higher proportion of individuals with the following characteristics: White race (76.8% vs. 69.6%, $p = 0.038$), Asian race, (5.3% vs. 1.8%, $p = 0.004$), and Hispanic/Latino ethnicity (10% vs. 6.4%, $p = 0.047$). The cohorts did not differ significantly in sex, Black race, or non-Hispanic/Latino ethnicity. Information on comorbidities and diagnoses are presented in Table 2. Further demographic information is provided in Table 3.

Demographic and comorbidity risk factors

Patients identified with BDD were more likely to have a comorbid association with ADHD, anxiety, obesity, depression, being underweight, and negative social determinants of health (Table 2). Patients with BDD demonstrated 5.5 times greater likelihood of presenting with a concurrent diagnosis of anxiety compared to their counterparts without BDD. After excluding individuals with pre-existing anxiety prior to surgery, the OR decreased to 4.8. Similarly, instances of depressive episodes were 4.3 times more likely to manifest in the BDD cohort, with this likelihood reducing to 4.2 times when excluding individuals with pre-existing depressive episodes prior to surgery. Patients with a BMI > 30 kg/m² had the smallest difference, with an OR of 1.6.

Surgical risk factors

When compared to the control group, BDD patients were more likely to undergo rhinoplasty (OR: 1.8) and lipectomy/liposuction (OR: 1.4), and they were less likely to undergo blepharoplasty (OR: 0.45). There were not any statistically significant deviations between the two groups in the distribution for breast procedures or procedures in the “other” category.

Social determinants of health risk factors

The social determinants of health measured by “Z-codes” identified a spectrum of factors that may create additional psychological distress in patients.¹⁵ Complete results with ORs and corresponding confidence intervals are detailed in Table 2. Figure 1 presents a graphic rendition of the ORs.

DISCUSSION

This study represents one of the largest retrospective studies reported in this field to date, examining the presence of BDD within the cohort of patients undergoing cosmetic procedures.^{16,17} Our findings resonate with previous research, underscoring several crucial factors that may facilitate the pre-operative identification of patients who either have undiagnosed BDD or are at an elevated risk of developing BDD. We bring to light novel considerations such as ADHD and social determinants of health, which remain relatively underexplored in the context of BDD. These findings furnish surgeons with valuable insights, prompting a higher index of suspicion when assessing patients for potential BDD.

A prior prospective study identified that 86% of individuals who were diagnosed with BDD and underwent cosmetic surgery retained their BDD diagnosis after cosmetic surgery. Furthermore,

they exhibited elevated levels of psychiatric comorbidities compared to the control group, even when the cosmetic surgery addressed a minor defect in appearance.⁷ Our data supported these observations, with BDD patients exhibiting a higher prevalence of psychiatric comorbidities, including depression, anxiety, and ADHD. This underscores the importance of cautioning against aesthetic facial surgery in BDD patients or those exhibiting BDD-like tendencies. Moreover, a recent meta-analysis, published in 2017, reported a 15.04% prevalence of BDD among plastic surgery patients across 23 distinct studies.¹⁷ This further highlights how critically imperative it is for surgeons to possess a comprehensive understanding of BDD and the ability to identify BDD in patients before any operative interventions.

In our comprehensive study, less than 0.1% of all patients received a formal diagnosis of BDD, which is significantly lower than prior estimates.¹³ This finding may be attributed to various factors. Firstly, it is plausible that BDD often goes underdiagnosed in clinical settings, given the challenges associated with formally identifying this condition. However, a more optimistic interpretation is that plastic surgeons have become increasingly adept at addressing this historically recognized area of concern. Surveys conducted over time have demonstrated an increasing awareness, among surgeons, regarding the complexities of BDD.^{18,19}

One aspect of our data in support of the latter interpretation is that 99 (52.1%) of BDD patients were only diagnosed after cosmetic surgery. This suggests that heightened vigilance and evolving diagnostic practices within the plastic surgery community may be contributing to the timely recognition of BDD in patients. Furthermore, it is essential to consider potential flaws in prior estimates of the BDD prevalence. Many studies relied on clinical interviews to diagnose BDD,

rather than formal psychiatric evaluations.^{20,21} Such studies may have misclassified patients with concerns similar to those in BDD cases, even if they do not strictly adhere to the DSM-V definition.

Nonetheless, as BDD is known to develop over time,²² it is likely that signs were present but not discerned in some patients who received a post-operative BDD diagnosis. Our cohort showed that 91 patients (47.9%) did have a pre-existing formal diagnosis of BDD before undergoing surgery. This raises questions about the decision-making process, as a 2021 survey of plastic surgeons found that only 30% of plastic surgeons consider BDD to be an absolute contraindication to aesthetic procedures.²³ Hence, it's plausible that some surgeons proceeded with operations despite the diagnoses, a decision possibly made due to varying interpretations of its significance. As our data comes from healthcare organization records, it is also plausible that patients formally diagnosed by a psychiatrist did not mention this to their plastic surgeon. Additionally, coding reporting inaccuracies may show a falsely low incidence of BDD diagnosis.

An intriguing aspect of our study is the distribution of procedures among BDD patients compared to those without a BDD diagnosis. While breast procedures were common in both groups—accounting for more than half of all procedures—no statistically significant difference in risk emerged between the groups. In contrast, lipectomy and liposuction procedures exhibited a higher likelihood among the BDD cohort. This disparity is complex, given that lipectomy and liposuction may involve various body locations and are sometimes components of other surgical interventions. However, the notable change in body presentation that can accompany such procedures may exacerbate BDD severity, potentially leading to heightened distress or even violent outbursts.⁸ There could also be differences based on the anatomical location of where the liposuction

procedure is completed, as patients with BDD are most likely to persevere on facial features.⁷ Unfortunately, prior research on liposuction among patients with comorbid BDD has lacked the statistical power to detect significant changes in BDD severity following liposuction.²⁴ This highlights the need for future studies to elucidate the nuanced interactions between liposuction and BDD.

Our data also showed that rhinoplasty procedures were more common among patients diagnosed with BDD. Interestingly, some studies have examined the outcomes of cosmetics in patients with only mild, localized symptoms of BDD. These studies have reported symptomatic improvement in patients with BDD after rhinoplasty surgery, although these findings have sparked considerable debate and discussion within the medical community.^{4,25,26} Furthermore, our data aligns with previous observations that have identified rhinoplasty as a common procedure in BDD patients. This recognition has led to the development of screening criteria such as SIMON, SYLVIA, or EARS, which all serve as valuable tools to assist plastic surgeons in preventing unintended operations on patients with prior BDD diagnosis.²⁷

Our findings suggest there are opportunities to enhance the care provided to BDD patients. One such opportunity lies in improving the pre-operative identification of individuals at risk and advocating for increased psychiatric support for those diagnosed with BDD. Our data show strong associations between BDD and multiple psychiatric conditions, including depression, anxiety, and ADHD among patients undergoing cosmetic procedures. The relationships identified between BDD and depression, as well as between BDD and anxiety, align with prior research, offering a promising avenue for pre-operative identification.⁷ Moreover, our finding regarding the

association between BDD and ADHD represents a novel contribution to the field. This connection could be explained by the heightened baseline risk for developing anxiety and depression among individuals with ADHD, further increasing the patient's susceptibility to BDD development.²⁸

Incorporating anxiety assessment in both pre-operative evaluation and post-operative monitoring may be a valuable addition. Our data reveal that patients with BDD were approximately 5.5 times more likely to have anxiety, with a 4.8-fold increase in the likelihood of developing new-onset anxiety following surgery. These findings may suggest the utility of assessing anxiety in the pre-operative phase to aid in patient selection and to guide appropriate post-operative management.

Furthermore, our findings confirm prior research and suggest that the development of BDD may be exacerbated by other psychiatric conditions, such as depression.²⁹ To adopt a comprehensive approach, surgeons may consider implementing simple tools like the Patient Health Questionnaire-9 (PHQ-9) or the Generalized Anxiety Disorder-7 (GAD-7) during initial consultations and follow-up appointments. These tools may complement current validated screening instruments for BDD, such as the BDD Questionnaire (BDDQ) or the Dysmorphic Concern Questionnaire (DCQ).^{30,31} It is prudent to engage in open discussions with patients about the availability of psychiatric support, ensuring they have appropriate access to a psychiatrist or other mental health provider. This holistic approach not only enhances patient care, but also serves as a safeguard against the potential exacerbation of BDD in cosmetic surgery patients.

Health hazards related to socioeconomic circumstances were also significantly associated with the presence of BDD. This association suggests that a confluence of increased psychological distress

and environmental stressors, coupled with an elevated predisposition for BDD, could contribute to the development of this disorder through a diathesis-stress interaction.³² Plastic surgeons may consider incorporating inquiries about a patient's perspective on their current living conditions and, when necessary, provide additional support or exercise caution when consulting patients experiencing stress relating to their physical environment, housing situation, or employment status. Importantly, the integration of standard screening questionnaires concerning social determinants of health is becoming increasingly common within the realm of plastic surgery.^{33,34}

Our study has several limitations that must be acknowledged when interpreting the results. The use of deidentified, aggregate data prevents our ability to analyze specific patient details, such as the motivation behind seeking plastic surgery or the extent of the procedures performed. Similarly, variables relating to the surgeon, facility type, length of post-operative stay, readmission rates, or patients' insurance status could not be examined with this data set. Additionally, the reliance on CD-10 and CPT codes may underestimate the true prevalence of BDD in cosmetic surgery patients, particularly if providers do not explicitly designate the diagnosis within these coding systems. While coding errors are also possible, it is important to note that ICD codes have demonstrated validity as a reliable estimate of prevalence.³⁵ The use of codes and deidentified data also restricted our ability to discern the severity of symptoms, both in the acute and longitudinal contexts. Therefore, we are unable to track changes in BDD symptomatology by following procedures.

CONCLUSIONS

In conclusion, body dysmorphic disorder continues to be an important consideration within the domain of cosmetic surgery. Our study indicates fewer patients with BDD may be obtaining

surgery than previously estimated. Notably, a substantial proportion of patients develop BDD post-surgery, underscoring the ongoing necessity for psychiatric considerations in the care of surgical patients. These insights serve as a reminder of the complex interplay between psychological well-being, socioeconomic factors, and the pursuit of aesthetic procedures, urging continued research and a holistic approach to patient care within the field of plastic and reconstructive surgery.

ETHICAL APPROVAL

None required.

CONFLICTS OF INTERESTS AND DISCLOSURES

The authors did not receive any funding for this study. The authors have no financial interests in any of the products mentioned and have received no external support related to this study.

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Figure 1

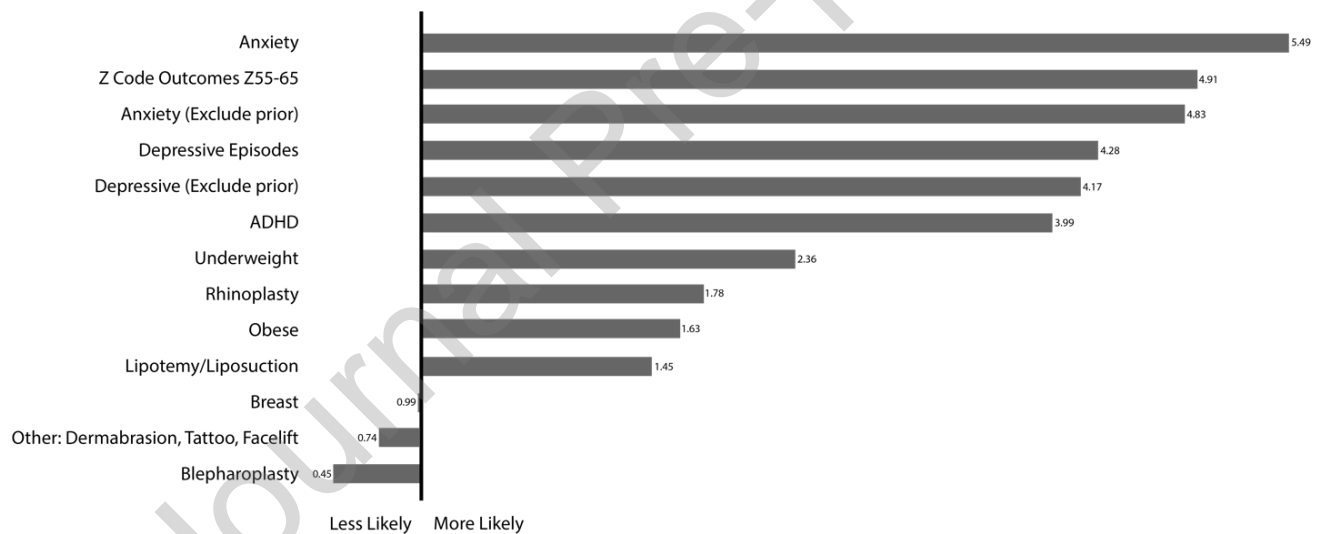


Table 1

Procedure or Diagnosis	Code
Breast Reconstruction	CPT: 1003654
Blepharoplasty	CPT: 1014047, 1014048
Rhinoplasty	CPT: 100571, 1007525
Lipectomy/Liposuction	CPT: 15847, 1003529, 1014745
Other: Dermabrasion, Tattoo, Facelift	CPT: 1003289, 1003504, 1003529
ADHD	ICD: F90

Anxiety	ICD: F41
BDD	ICD: F45.22
Depression	ICD: F32
Z Code Outcomes	ICD: Z55, Z56, Z57, Z58, Z59, Z60, Z61, Z62, Z63, Z64, Z65

Table 2

ICD10/CPT Event	Group	Outcome/Population	Risk (%)	OR (95% CI)	P-value
ADHD	BDD	16/190	8.42	3.993 (2.391, 6.668)	<0.001
	Control	5,096/226,374	2.25		
Anxiety	BDD	113/190	59.47	5.490 (4.109, 7.335)	<0.001
	Control	47,749/226,374	21.09		
Anxiety (Exclude prior)	BDD	41/96	42.71	4.830 (3.223, 7.239)	<0.001
	Control	25,683/192,084	13.37		
Blepharoplasty	BDD	15/190	7.89	0.451 (0.266, 0.764)	0.002
	Control	36,180/226,374	15.98		
Breast	BDD	104/190	57.74	0.985 (0.741, 1.312)	0.920
	Control	124,729/226,374	55.10		
Depressive Episodes	BDD	92/190	48.42	4.279 (3.219, 5.689)	<0.001
	Control	40,717/226,374	17.99		
Depressive Episodes (Exclude prior)	BDD	35/106	33.02	4.166 (2.778, 6.246)	<0.001
	Control	20,548/194,185	10.58		
Lipectomy or Liposuction	BDD	53/190	27.89	1.448 (1.054, 1.989)	0.021
	Control	47,725/226,374	21.08		
Obese	BDD	59/190	31.05	1.627 (1.196, 2.212)	0.002
	Control	49,087/226,374	21.68		
Dermabrasion, Tattoo, Facelift	BDD	10/190	5.26	0.745 (0.394, 1.408)	0.363
	Control	15,711/226,374	6.94		
Rhinoplasty	BDD	29/190	15.26	1.784 (1.201, 2.65)	0.004
	Control	20,759/226,374	9.17		
Underweight	BDD	10/190	5.26	2.355 (1.245, 4.455)	0.007
	Control	5,217/226,374	2.30		
Z Code Outcomes	BDD	34/190	17.89	4.914 (3.389, 7.125)	<0.001
	Control	9,614/226,374	4.25		

Table 3

Demographics	BDD	Control	P-value
Total Population (#)	190	266,374	-
Current Age (mean ± SD)	48.0 ± 17	39.7 ± 17	0.855

Prior BDD Diagnosis (% [n])		47.9% (91)	0.0% (0)	<0.001
Sex (% [n])	Female	86.3% (164)	85.3% (193,126)	0.810
	Male	14.2% (27)	14.7% (33,348)	0.820
Race (% [n])	Asian	5.3% (10)	1.8% (4,120)	0.004
	Black	8.9% (17)	11.5% (26,047)	0.261
	White	76.8% (146)	69.6% (157,547)	0.039
	Unknown Race	8.9% (17)	17.1% (38,660)	0.176
Ethnicity (% [n])	Hispanic/Latino	10.0% (19)	6.4% (14,547)	0.047
	Not Hispanic/Latino	73.2% (139)	68.8% (155,689)	0.227
	Unknown Ethnicity	16.8% (32)	24.8% (56,138)	0.103

Figure Legends

Figure 1. Odds Ratios for Procedures and Characteristics identified, organized by calculated odds ratio.

ADHD = Attention-Deficit Hyperactivity Disorder, BDD = body dysmorphia disorder.

Table 1. ICD and CPT codes used to identify procedures and psychiatric diagnoses. *ADHD = Attention-Deficit Hyperactivity Disorder, BDD = body dysmorphia disorder, CPT = current procedural terminology, ICD = international classification of diseases.*

Table 2. Procedure and characteristic cohort size, event risk, odds ratios with 95% CI, and p-value.

Bolded values indicate statistical significance of $p < 0.05$. *ADHD = Attention-Deficit Hyperactivity Disorder, BDD = body dysmorphia disorder, CI = confidence interval, OR = odds ratio.*

Table 3. Characteristics of the two cohorts of patients with and without lifetime diagnosis of BDD. Bolded values indicate statistical significance of $p < 0.05$. *BDD = body dysmorphia disorder, SD = standard deviation, # = number of patients, % = percent.*