A Register-Based Case-Control Study of Prescription Medication Utilization in Binge-Eating Disorder

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ABSTRACT

Objective: Individuals with binge-eating disorder (BED) experience psychiatric and somatic comorbidities and obesity, but the nature and magnitude of prescription medication utilization is unclear. We investigated utilization using Swedish registry data and a case-control design.

Methods: Cases were identified from Riksät and Stepwise longitudinal registers and were individuals diagnosed with BED per *DSM-IV-TR* criteria between July 1, 2006, and December 31, 2009, at eating disorder clinics (n = 238, 96% female, mean age = 22.8 years). For each case, 10 controls were matched on sex and year, month, and county of birth (n = 2,380). An index date was derived for each control, which was the date of diagnosis of BED in the corresponding case. The association between BED and prescription medication utilization was investigated before and within 12 months after diagnosis.

Results: Before diagnosis, cases were significantly more likely than matched controls to have been prescribed nervous system (odds ratio = 6.4; 95% confidence limit = 4.7, 8.6), tumors and immune disorders (3.5; 1.3, 9.3), cardiovascular (2.2; 1.4, 3.5), digestion and metabolism (2.1; 1.5, 2.9), infectious diseases (1.9; 1.4, 2.6), skin (1.8; 1.3, 2.5), and respiratory system (1.3; 1.0, 1.8) medications. Cases also had higher odds of prescription use than controls across most categories within 12 months after diagnosis. Several associations were significant after accounting for lifetime psychiatric comorbidity and obesity.

Conclusions: Individuals with BED had increased utilization of psychiatric and nonpsychiatric medications compared with matched controls. Findings confirm that the illness burden of BED extends to high medication utilization and underscore the importance of thorough medication reviews when treating individuals with BED.

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Binge-eating disorder (BED), characterized by recurrent binge eating without regular compensatory behaviors, was only recently codified as a psychiatric disorder in the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (*DSM-5*). BED affects 2%–3.5% of individuals over the lifetime and is associated with substantial psychiatric comorbidity, obesity, and disease burden.[1,2] To further study medical and psychiatric morbidity in BED, we investigated prescription medication utilization before and after BED diagnosis using Swedish national register data.

BED is associated with depression, anxiety disorders, substance use disorders, and obesity.[1,2] Evidence suggests elevated rates of hypertension,[2–4] type 2 diabetes,[2,5–7] autoimmune diseases,[7] gastrointestinal disorders,[2,8–11] and respiratory problems[4,11,12] in patients with BED. Knowledge about prescription medication utilization may extend insight into the spectrum of morbidity and aid in gauging the medical and therapeutic needs of this population. Also of interest is the extent to which psychiatric comorbidities and obesity may account for any observed elevations in utilization. Some studies[13,14] on clinical samples have reported the prevalence of prescription medication use; however, they are limited because they only report on antidepressants, rely on particular collection methodologies (ie, self-report), lack controls, and use small, nongeneralizable samples.

Given the dearth of information on a wide range of prescription medications from population-based samples, we linked Swedish national prescription drug and eating disorder register records to characterize medication utilization in individuals with BED. Our focus was intentionally broad and explored all prescribed medications as an index of both health and utilization. We hypothesized increased utilization in BED across both psychiatric (ie, psychotropic) and somatic drug categories before and in the 12 months following diagnosis of BED. This hypothesis was derived from data on psychiatric and obesity comorbidity,[1,2] somatic comorbidity,[2,3,5–10,12] and delayed help-seeking in eating disorders.[15] A secondary objective was to explore the role of psychiatric comorbidities and obesity in any observed association between BED and medication utilization. Results have the potential to provide critical insight for health care beyond what has been reported in prior clinical studies.

METHODS

Study Population

The study sample was derived from a total population cohort of individuals born in Sweden between 1979 and 1993. Using

Clinical Points

- Binge-eating disorder (BED) affects 2%–3.5% of adults and is often associated with other psychiatric and medical comorbidities.
- BED is underdiagnosed by primary care practitioners and often not recognized by the patient, so detection based on risk factors and symptoms is critical to ensure BED is identified and adequately treated.
- Individuals with BED are more likely to be prescribed a range of medications than matched controls before and after being diagnosed with BED, confirming the burden of illness of BED and underscoring the importance of reviewing medication history when diagnosing and treating these individuals.

the unique national personal identification number, we linked data in Sweden's Total Population Register, Riksät[16] and Stepwise[17] eating disorder quality registers, the Swedish Prescribed Drug Register, and other population-based registers. Inclusion in the Swedish population registers does not require informed consent. For Stepwise, research participation is elective via an opt-out procedure (~3% decline participation[18]). The University of North Carolina Biomedical Institutional Review Board and the Regional Ethics Committee of Karolinska Institutet approved this study.

Cases were identified from Riksät and Stepwise longitudinal registers and met *DSM-IV-TR*[19] criteria for BED between July 1, 2006, and December 31, 2009 (in 1994, BED was introduced into the *DSM-IV* as a provisional disorder). The date of BED diagnosis is subsequently referred to as the index date. These registers provide quality assurance for over 35 specialist treatment clinics and capture nearly all individuals receiving inpatient, day patient, or outpatient specialized eating disorder treatment in Sweden. The index BED diagnosis reflected the first diagnosis of BED recorded and could occur at the initial clinic presentation or at an annual follow-up evaluation following initial presentation for another eating disorder. Follow-up assessments occur annually for the duration of the individual's engagement in treatment and are available for ~69% of registrants. To be included in the registers, the following criteria must have been met: (1) medical or self-referral to a participating treatment program, (2) diagnosed with an eating disorder by a medical provider, and (3) intent to treat in the program.

We ascertained 10 controls for each case using the Multi-Generation Register.[20] Controls were matched to cases on sex and year, month, and county of birth. If a case was born outside of Sweden, controls were additionally matched on immigration status and time of migration (controls could not immigrate later than their respective cases), regardless of origin. Controls had to be alive and a resident in Sweden for an equivalent time period: from birth or immigration until the end of study follow-up of their index case. Controls were required not to have received a BED diagnosis in Riksät or Stepwise, but they could have had another eating disorder (which was detected in 1.0% of controls) recorded in Riksät, Stepwise, or the National Patient Register (NPR) (includes all inpatient care since 1987 and hospital-based outpatient visits since 2001).

Measures

Medication prescriptions. Medication prescriptions were obtained from the Swedish Prescribed Drug Register, which contains complete data (>99%) for all medications prescribed and dispensed to the entire Swedish population since July 1, 2005.[21] Prescription records included all those available for each participant from registry inception to up to 12 months after the index date. Medications are classified in the register according to the Anatomic Therapeutic Chemical (ATC) classification system, which classifies drugs based on the anatomic system on which they act and their therapeutic, pharmacologic, or chemical properties.

The first level of the code identifies the anatomic main group and consists of 1 letter. The second level of the code identifies the therapeutic main group and consists of 2 digits, and the third level identifies the therapeutic and pharmacologic subgroup and consists of 1 letter. There are 5 levels altogether. We included overarching categories (digestion and metabolism [ATC code A01, A02, A07, A10], cardiovascular [ATC code C], skin [ATC code D04, D05, D06, D07, D11], sex hormones [ATC code G03], hormones [ATC code H], infectious diseases [ATC code J01, J02, J04, J05], tumors and immune disorders [ATC code L], nervous system [ATC code N], antiparasitic [ATC code P02], respiratory system [ATC code R01, R03, R06, R07], eye [ATC code S01]) and specific nervous system subcategories to capture more detail on psychiatric prescriptions (antiepileptic [ATC code N03], antipsychotic [ATC code N05A], anxiolytic [ATC code N05B], hypnotic [ATC code N05C], antidepressant [ATC code N06A], psychostimulant [ATC code N06B], anticraving [ATC code N07B]). Some categories were unavailable in the Swedish Prescribed Drug Register (Table 1). We included all ATC codes available to us in the data linkage; unfortunately, this linkage does not cover all classes of medication used in Sweden (see Table 1 for information on codes and availability).

Psychiatric comorbidity. Psychiatric comorbidity was coded as the presence versus absence of any lifetime psychiatric disorder or suicide-related or intentional self-harm injury and was used in the secondary analysis as a covariate. Comorbidity was obtained from the NPR and was based on the World Health Organization (WHO) International Classification of *Diseases, Ninth Revision*[22] (*ICD-9*: years 1987–1996) or the *ICD-10*[23] (1997–present). The psychiatric disorders included schizophrenia (*ICD-9*: 295A–295E, 295G, 295W, 295X; *ICD-10*: F20, F20.0–F20.6, F20.8, F20.9), schizoaffective disorder (295H; F23.1, F23.2, F25, F25.0–F25.2, F25.8, F25.9), bipolar disorder (296A, 296C–296H, 296W, 296X; F30, F30.1, F30.2, F30.8, F30.9, F31, F31.0–F31.9, F34.0), major depressive disorder (MDD) (296B, 300E, 311; F32, F32.0–F32.3, F32.8, F32.9, F33, F33.0–F33.4, F33.8, F33.9, F34.1, F34.8, F34.9, F38, F38.0, F38.1, F38.8, F39), anxiety disorder (minus obsessive-compulsive disorder [OCD] and posttraumatic stress disorder [PTSD]

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Table 1. Anatomic Therapeutic Chemical (ATC) Classification Codes

First Level	Second Level
A Digestive system and metabolism	A01: Stomatological preparations A02: Drugs for acid-related disorders A07: Antidiarrheals, intestinal anti-inflammatory/anti-infective agents A10: Drugs used in diabetes A03–A06, A08–A09, A11–A14, A16[a] A15[b]
B Blood and blood-forming organs	B01–B03, B05, B06[a]
C Cardiovascular system	C01: Cardiac therapy C02: Antihypertensives C03: Diuretics C04: Peripheral vasodilators C05: Vasoprotectives C07: β-blocking agents C08: Calcium channel blockers C09: Agents acting on the renin-agiotensin system C10: Lipid-modifying agents
D Dermatologicals	D04: Antipruritics, including antihistamines, anesthetics D05: Antipsoriatics D06: Antibiotics and chemotherapeutics for dermatologic use D07: Corticosteroids, dermatologic preparations D11: Other dermatologic preparations D01–D03, D08–D10[a]
G Genitourinary system and sex hormones	G03: Sex hormones and modulators of the genital system G01–G02, G03A, G03G, G04[a]
H Systemic hormonal preparations, excluding sex hormones and insulins	H01: Pituitary and hypothalamic hormones and analogs H02: Corticosteroids for systemic use H03: Thyroid therapy H04: Pancreatic hormones H05: Calcium homeostasis
J Anti-infectives for systemic use	J01: Antibacterials for systemic use J02: Antimycotics for systemic use J04: Antimycobacterials J05: Antivirals for systemic use J06–J07[a]
L Antineoplastic and immunomodulating agents	L01: Antineoplastic agents L02: Endocrine therapy L03: Immunostimulants L04: Immunosuppressants
M Musculoskeletal system	M01–M05, M09[a]
N Nervous system	N01: Anesthetics N02: Analgesics N03: Antiepileptics N04: Antiparkinson drugs N05: Psycholeptics N06: Psychoanaleptics N07: Other nervous system drugs
P Antiparasitic products, insecticides, and repellents	P02: Anthelmintics P01, P03[a]
R Respiratory system	R01: Nasal preparations R03: Drugs for obstructive airway diseases R06: Antihistamines for systemic use R07: Other respiratory system products R02, R05[a]
S Sensory organs	S01: Ophthalmologicals S02–S03[a]
V Various	V01,V03,V04,V06–V10[a] V20[b]

[a]Codes that were not available in the linkage dataset.
[b]Codes for medication not used in Sweden.

[300A, 300C; F40, F40.0–F40.2, F40.8, F40.9, F41, F41.0–F41.3, F41.8, F41.9]), OCD (300D; F42, F42.0–F42.2, F42.8, F42.9), PTSD (308, 309A, 309B, 309W, 309X; F43, F43.0–F43.2, F43.8, F43.9), attention-deficit/hyperactivity disorder (ADHD) (314J, 314W, 314X; F90, F90.0, F90.1, F90.8), autism (299A; F84.0, F84.1, F84.5), alcohol use disorder (303, 303A, 303X, 305A; F10, F10.0–F10.9), illicit drug use disorder (304, 304A–304H, 304W, 304X, 305X; F11, F11.0–F11.9, F12, F12.0–F12.9, F13, F13.0–F13.9, F14, F14.0–F14.9, F15, F15.0–F15.9, F16, F16.0–F16.9, F18, F18.0–F18.9, F19, F19.0–F19.9), and suicide attempts/intentional self-harm (E95A–E95H, E95W, E95X; X60–X84).

Obesity. Obesity (body mass index [BMI] ≥ 30 kg/m^2) for cases only was derived from height and weight in Riksät/Stepwise at the time of diagnosis. As height and weight are not regularly recorded in the patient and population registers, BMI was unavailable for matched controls.

Parental education and income. Education and income were obtained from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA: Longitudinell Ingegrationsdatabas för Sjukförsäkrings- och Arbetsmarknadsstudier) for the year of the index date. Parental education was measured as the highest attained level of either parent (categorized as primary school [≤ 9 years], secondary school, or tertiary education). Income was measured as the individual share of disposable family income, obtained by calculating the sum of family members' disposable income multiplied by individual consumption weights (0.96 for adults), then divided by the total family consumption weight. This calculation gives net values in Swedish kronor, which were categorized into quartiles for analysis.

Statistical Analysis

Analyses were conducted with R 3.1.1. Given the exploratory nature of the study, we did not perform familywise error rate correction.[24] All analyses included parental education and income as covariates and used exact likelihood methods. First, we examined the association between BED status and prescription medication utilization prior to the index date using conditional logistic regression models. Second, we examined these associations in the 12 months after the index date using conditional logistic regression models. Third, we examined the extent to which psychiatric comorbidity explained the association between BED and prescription medication utilization within 12 months after the index date by adding lifetime psychiatric comorbidity as a covariate to the conditional logistic regression models. Finally, we investigated the role of obesity in 3 related analyses: (1) cases with comorbid obesity were compared with matched controls using conditional logistic regression (case OB+/control), (2) cases without comorbid obesity were compared with matched controls using conditional logistic regression (case OB–/control), and (3) cases with comorbid obesity were compared with cases without comorbid obesity using logistic regression (case OB+/case OB–). These comparisons were conducted

because BMI data were unavailable for controls and could not be added as a covariate to the models.

RESULTS

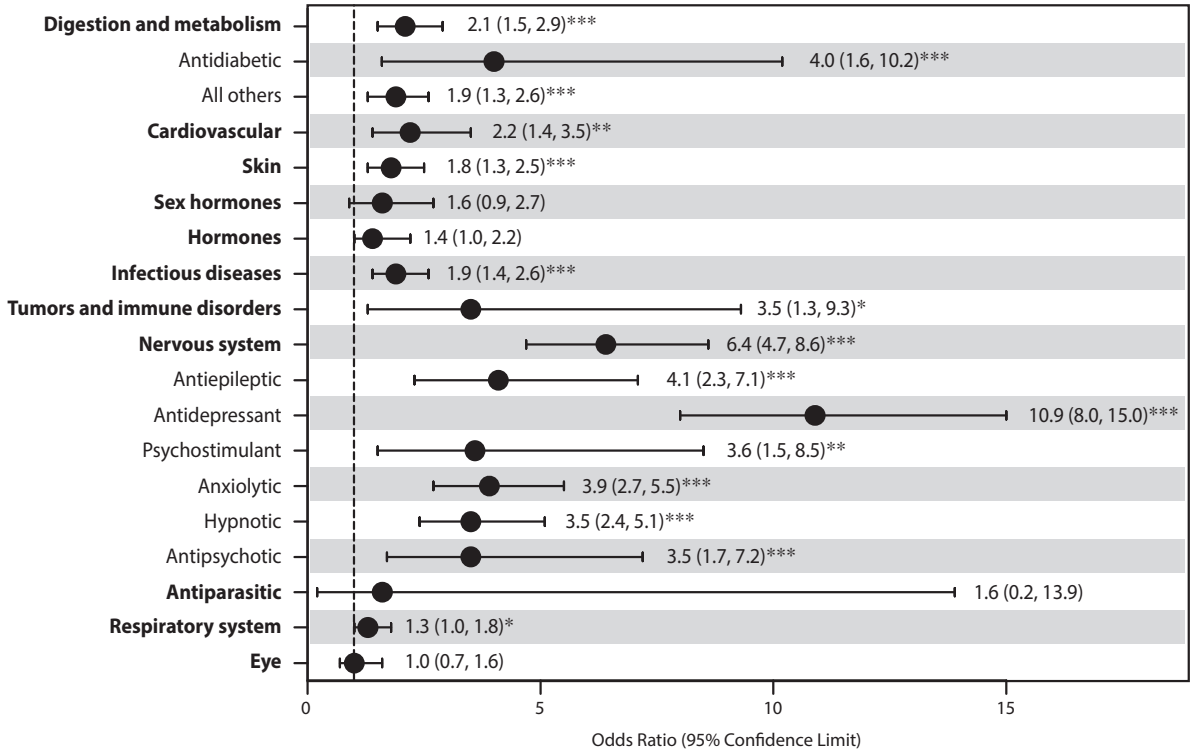
A total of 238 cases (96% female) were identified. The mean age at the time of BED diagnosis was 22.8 years (SD = 3.6, range, 14.9–29.7). Approximately 73.5% of BED cases were identified at initial assessment and 26.5% at an annual follow-up (13.9% had bulimia nervosa at initial assessment, 7.1% had anorexia nervosa, 5.5% had eating disorder not otherwise specified). Of cases, 71.8% had a comorbid lifetime psychiatric disorder compared with 12.8% of controls. Specifically, the prevalence estimates for cases versus controls were schizophrenia (0.4% vs 0.1%), schizoaffective disorder (0% vs < 0.01%), bipolar disorder (4.2% vs 0.7%), MDD (23.5% vs 4.2%), anxiety disorder (19.3% vs 3.9%), OCD (1.3% vs 0.5%), PTSD (6.3% vs 2.2%), ADHD (1.3% vs 0.8%),

Table 2. Prevalence of Prescription Medication Utilization Among Cases With Binge-Eating Disorder (BED) (N = 238) and Matched Controls (N = 2,380)[a]

	Prior to BED Diagnosis[b]		Within 12 Months After Diagnosis	
Drug Category	Cases	Matched Controls	Cases	Matched Controls
Digestion and metabolism	59 (24.8)	336 (14.1)	31 (13.0)	184 (7.7)
Antidiabetic	7 (2.9)	19 (0.8)	7 (2.9)	11 (0.5)
All others	52 (21.8)	320 (13.4)	24 (10.1)	173 (7.3)
Cardiovascular	24 (10.1)	117 (4.9)	9 (3.8)	48 (2.0)
Skin	54 (22.7)	340 (14.3)	31 (13.0)	179 (7.5)
Sex hormones	17 (7.1)	116 (4.9)	8 (3.4)	61 (2.6)
Hormones	32 (13.4)	225 (9.5)	19 (8.0)	104 (4.4)
Infectious diseases	156 (65.5)	1,223 (51.4)	99 (41.6)	690 (29.0)
Tumors and immune disorders	6 (2.5)	24 (1.0)	5 (2.1)	11 (0.5)
Nervous system	158 (66.4)	606 (25.5)	107 (45.0)	337 (14.2)
Antiepileptic	23 (9.7)	53 (2.2)	13 (5.5)	30 (1.3)
Antidepressant	123 (51.7)	226 (9.5)	86 (36.1)	128 (5.4)
Psychostimulant	8 (3.4)	22 (0.9)	2 (0.8)	10 (0.4)
Anticraving	0 (0)	18 (0.8)	0 (0)	3 (0.1)
Anxiolytic	55 (23.1)	167 (7.0)	35 (14.7)	63 (2.6)
Hypnotic	44 (18.5)	150 (6.3)	26 (10.9)	65 (2.7)
Antipsychotic	12 (5.0)	36 (1.5)	8 (3.4)	21 (0.9)
Antiparasitic	1 (0.4)	7 (0.3)	0 (0)	4 (0.2)
Respiratory system	80 (33.6)	648 (27.2)	63 (26.5)	341 (14.3)
Eye	25 (10.5)	234 (9.8)	12 (5.0)	132 (5.5)

[a]Data are presented as n (%).
[b]Approximately 2.8 years before the index date, which is the date of diagnosis of the BED case, to the beginning date of the Swedish Prescribed Drug Register.

Figure 1. Odds Ratios Comparing Prevalence of Prescription Medication Utilization Between Binge-Eating Disorder (BED) Cases and Matched Controls Before Index Date or BED Diagnosis (~2.8 Years to the Beginning Date of the Swedish Prescribed Drug Register)[a]



[a]Vertical dashed line indicates an odds ratio of 1 (no difference between BED cases and matched controls); values > 1 indicate increased prevalence in BED cases relative to matched controls. Odds ratios are adjusted for parental education and income. Ns were too small to calculate odds ratios for anticraving drugs.
*$P < .05$. **$P < .01$. ***$P < .001$.

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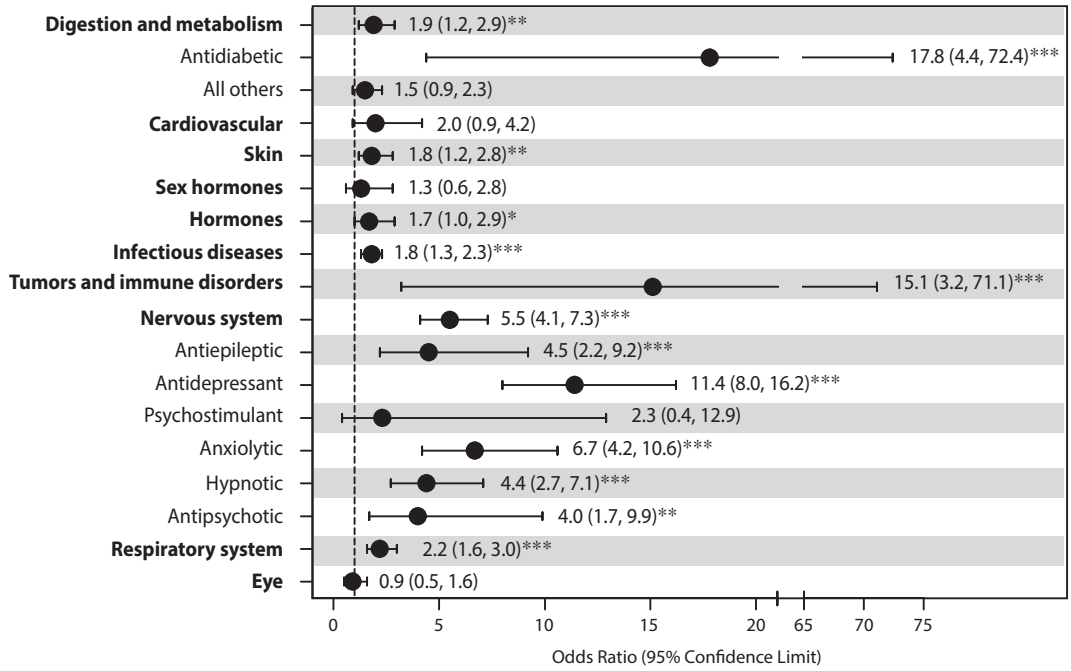
Figure 2. Odds Ratios Comparing Prevalence of Prescription Medication Utilization Between Binge-Eating Disorder (BED) Cases and Matched Controls Within 12 Months After Date of BED Diagnosis



[a]Vertical dashed line indicates an odds ratio of 1 (no difference between BED cases and matched controls); values > 1 indicate increased prevalence in BED cases relative to matched controls. Odds ratios are adjusted for parental education and income. Ns were too small to calculate odds ratios for anticraving and antiparasitic drugs.
*$P < .05$. **$P < .01$. ***$P < .001$.

autism (0% vs < 0.01%), alcohol use disorder (1.7% vs 2.1%), illicit drug use disorder (0.4% vs 0.8%), suicide attempts/intentional self-harm (6.7% vs 2.3%), and non-BED eating disorder (54.2% vs 1.4%).

Prescription Medication Use Prior to BED Diagnosis

Prescription medication utilization was observed for a mean of 2.8 years (SD = 1.0) before the index date or BED diagnosis (ie, the maximum availability of the Swedish Prescribed Drug Register records). Table 2 shows the prevalence of medication use and Figure 1 shows the case-control comparisons. As shown in Figure 1, cases were significantly more likely to be prescribed digestion and metabolism (reported as odds ratio [OR]; 95% confidence limit [CL]) (2.1; 1.5, 2.9) including antidiabetic medications (4.0; 1.6, 10.2) and all others (1.9; 1.3, 2.6), cardiovascular (2.2; 1.4, 3.5), skin (1.8; 1.3, 2.5), infectious diseases (1.9; 1.4, 2.6), tumors and immune disorders (3.5; 1.3, 9.3), nervous system (6.4; 4.7, 8.6) including all psychotropic classes medications examined, and respiratory system (1.3; 1.0, 1.8) medications.

Prescription Medication Use Within 12 Months After BED Diagnosis

Table 2 shows the prevalence of medication use among the 2 groups within 12 months after the index date of BED diagnosis, and Figure 2 presents the associations between BED and prescription medication utilization for this timeframe. Cases generally had higher odds of prescription medication utilization compared with controls, especially for psychotropic medications. Cases were also more likely than controls to be prescribed various nonpsychotropics, including digestion and metabolism (1.9; 1.2, 2.9), skin (1.8; 1.2, 2.8), hormones (1.7; 1.0, 2.9), infectious diseases (1.8; 1.3, 2.3), tumors and immune disorders (15.1; 3.2, 71.1), and respiratory system (2.2; 1.6, 3.0) medications.

The Impact of Psychiatric Comorbidity

The associations between BED and prescription medication status were evaluated using lifetime psychiatric comorbidity as a covariate to partial out the variance in prescription medication utilization due to lifetime psychiatric comorbidity (Table 3). Similar patterns were observed in analyses both prior to BED diagnoses and within 12 months after BED diagnosis. The association between BED and antidiabetic medication strengthened. The associations between BED and skin, infectious diseases, nervous system overall (and antidepressant medication specifically), and respiratory system medications remained statistically significant: with the exception of skin medications, these ORs decreased (Table 3). The associations between BED and digestion and metabolism medications besides antidiabetics, and several specific nervous system medications, including antiepileptics, hypnotics, and antipsychotics, decreased and became statistically nonsignificant.

Table 3. Odds Ratios Comparing the Prevalence of Prescription Medication Utilization Between Cases With Binge-Eating Disorder (BED) and Matched Controls After Adjusting for Lifetime Psychiatric Comorbidity

Drug Category	Prior to BED Diagnosis AOR (95% CL)[a,b]	Within 12 Months After BED Diagnosis AOR (95% CL)[b]
Digestion and metabolism	1.2 (0.8, 1.8)	1.3 (0.8, 2.1)
Antidiabetic	4.4 (1.4, 13.9)*	62.4 (7.6, 515.3)***
All others	1.0 (0.7, 1.5)	0.9 (0.5, 1.5)
Cardiovascular	1.8 (1.1, 3.1)*	1.2 (0.5, 2.8)
Skin	1.9 (1.3, 2.8)**	2.0 (1.2, 3.2)**
Sex hormones	1.3 (0.7, 2.4)	1.0 (0.4, 2.3)
Hormones	1.0 (0.6, 1.6)	1.4 (0.8, 2.6)
Infectious diseases	1.5 (1.1, 2.1)*	1.4 (1.0, 1.9)*
Tumors and immune disorders	2.6 (0.8, 8.7)	…[c]
Nervous system	2.7 (1.9, 3.8)***	2.1 (1.4, 3.0)***
Antiepileptic	0.7 (0.3, 1.5)	0.4 (0.1, 1.5)
Antidepressant	3.9 (2.6, 5.7)***	4.0 (2.6, 6.2)***
Psychostimulant	0.5 (0.1, 1.9)	0.2 (0.0, 2.8)
Anticraving	…[c]	…[c]
Anxiolytic	1.3 (0.8, 2.0)	1.9 (1.0, 3.6)*
Hypnotic	1.0 (0.6, 1.6)	0.7 (0.3, 1.5)
Antipsychotic	0.4 (0.1, 1.4)	0.2 (0.0, 1.4)
Antiparasitic	1.5 (0.2, 14.1)	…[c]
Respiratory system	0.9 (0.6, 1.2)	1.5 (1.1, 2.2)*
Eye	1.0 (0.6, 1.6)	0.8 (0.4, 1.5)

[a]Approximately 2.8 years before the index date, which is the date of diagnosis of the BED case, to the beginning date of the Swedish Prescribed Drug Register.
[b]ORs are adjusted for parental education and income. Psychiatric comorbidity refers to any lifetime psychiatric disorder or suicide-related behavior recorded in the National Patient Register. Controls were matched to cases on sex and year, month, and county of birth.
[c]Ns were too small for comparison.
*$P < .05$.
**$P < .01$.
***$P < .001$.
Abbreviations: AOR = adjusted odds ratio, CL = confidence limit.

The Role of Comorbid Obesity in Prescription Medication Utilization

The association between BED and prescription medication utilization within 12 months after diagnosis was investigated with respect to comorbid obesity (Table 4). Given the caveat that we did not have BMI measures in controls, we performed group comparisons. Overall, cases with and without comorbid obesity had higher odds of prescription medication utilization for both psychotropic and nonpsychotropic medication than matched controls. When we directly compared utilization in BED cases with and without comorbid obesity, those with comorbid obesity were significantly more likely to be prescribed anxiolytics (2.5; 1.2, 5.3) and skin agents (2.3; 1.0, 5.1).

DISCUSSION

We compared treatment-seeking individuals with BED identified in national eating disorders quality registers across Sweden to matched controls and found striking differences in prescription medication utilization, before and in the 12 months following BED diagnosis. Differences were not limited to psychotropic medication but also spanned somatic medication categories including digestion and metabolism, cardiovascular, skin, hormones, infectious diseases, tumors and immune disorders, and respiratory system drugs.

The elevated medication utilization in cases supports and augments previous findings that BED is associated with high disease burden, such as depression, anxiety disorders, and somatic conditions including cardiovascular, type 2 diabetes, and respiratory problems.[1–12] This study expands previous research by demonstrating that burden extends to prescription medication utilization, both before and after diagnosis of BED, and possibly skin, infectious disease, hormone, and immune-related comorbidity. These findings are consistent with the general observations of role impairment in people with BED.[25,26]

The overall finding of higher prescription medication utilization before BED diagnosis is relevant because stigma, poor self-recognition of problem eating, shame, and embarrassment impede help-seeking for BED.[27,28] Further, primary care physicians rarely screen for binge eating and often fail to recognize BED,[29] which contributes to low detection and treatment rates (< 10%).[2] Individuals with BED often come to the attention of providers by seeking treatment for physical and other mental health conditions (ie, depression) or for weight loss.[2,15] Primary health care professionals including psychiatrists can contribute to earlier detection and treatment of BED by inquiring about eating behaviors and disordered eating when treating patients with a risk profile for BED (ie, higher current BMI, childhood obesity, lifetime mood disorders, seeking weight loss, elevated psychiatric and nonpsychiatric prescription medication utilization).[2,30] Accurate, timely diagnosis and treatment may lead to a reduced rate of onset of associated somatic and psychiatric problems and better long-term outcomes.

Our results show that BED was associated with higher utilization regardless of the presence of lifetime psychiatric comorbidity and obesity; however, both increased the odds of utilization. Similar to present findings, in a nationally representative survey of US adults,[2] the association between chronic physical conditions and BED tempered when adjusting for preexisting psychiatric disorders. Compared with controls, prescription medication utilization for somatic problems was most elevated among cases with comorbid obesity, which may be attributable to the health consequences associated with obesity.[11] Nevertheless, BED may confer risk of increased medication utilization independent of psychiatric history and obesity.

Several limitations to this study must be considered. First, we are unable to determine if any of the medications were prescribed to treat the symptoms of BED. Although evidence exists for the short-term efficacy of selective serotonin reuptake inhibitors (SSRIs), antiepileptics, and, more recently, lisdexamfetamine dimesylate (Vyvanse), the first medication approved for adults with BED by the US Food and Drug Administration,[31–34] as in many other countries, there are no approved medications for the treatment of BED in Sweden. We know strikingly little about utilization of pharmacologic treatments for BED in the wider community. Second, the absence of BMI data for controls limited the extent to which we could evaluate obesity as a confounder. Third, although

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Table 4. Association Between Binge-Eating Disorder, Obesity, and Prescription Drug Utilization Within 12 Months After the Date of Diagnosis of the Case

Drug Category	Cases With Comorbid Obesity (n = 57) vs Matched Controls (n = 570) OR (95% CL)[a]	Cases Without Comorbid Obesity (n = 181) vs Matched Controls (n = 1,810) OR (95% CL)[a]	Cases With Comorbid Obesity (n = 57) vs Cases Without Comorbid Obesity (n = 181) OR (95% CL)[a]
Digestion and metabolism	2.7 (1.2, 6.1)*	1.7 (1.0, 2.7)*	1.4 (0.6, 3.1)
Antidiabetic	23.4 (1.2, 448.4)*	17.2 (3.2, 93.5)**	1.2 (0.2, 5.7)
All others	2.2 (0.9, 5.5)	1.3 (0.8, 2.2)	1.4 (0.5, 3.5)
Cardiovascular	1.7 (0.5, 6.4)	2.1 (0.8, 5.3)	1.6 (0.3, 6.1)
Skin	2.6 (1.2, 5.3)*	1.6 (0.9, 2.6)	2.3 (1.0, 5.1)*
Sex hormones	2.0 (0.5, 7.5)	1.1 (0.4, 3.0)	1.8 (0.3, 7.5)
Hormones	3.1 (1.1, 8.7)*	1.3 (0.7, 2.5)	1.4 (0.5, 3.7)
Infectious diseases	2.2 (1.2, 3.9)**	1.6 (1.2, 2.2)**	1.5 (0.8, 2.8)
Tumors and immune disorders	…[b]	…[b]	…[b]
Nervous system	6.7 (3.7, 12.2)***	5.1 (3.6, 7.2)***	1.9 (1.1, 3.6)*
Anticraving	…[b]	…[b]	…[b]
Antidepressant	10.6 (5.6, 20.3)***	11.9 (7.7, 18.3)***	1.8 (0.9, 3.3)
Antiepileptic	4.8 (1.5, 16.0)*	4.2 (1.5, 11.7)**	3.0 (0.9, 9.3)
Psychostimulant	4.0 (0.2, 85.5)	2.2 (0.2, 25.5)	3.6 (0.1, 92.8)
Anxiolytic	8.3 (3.6, 19.2)***	5.7 (3.2, 10.2)***	2.5 (1.2, 5.3)*
Hypnotic	3.4 (1.4, 8.0)**	5.0 (2.8, 9.1)***	1.5 (0.6, 3.6)
Antipsychotic	6.7 (1.3, 35.0)*	3.9 (1.2, 13.1)*	3.0 (0.7, 13.4)
Antiparasitic	…[b]	…[b]	…[b]
Respiratory system	2.7 (1.5, 5.0)**	2.0 (1.4, 2.9)***	1.4 (0.7, 2.6)
Eye	1.5 (0.5, 4.0)	0.7 (0.3, 1.5)	2.5 (0.7, 8.2)

[a]Controls were matched to cases on sex and year, month, and county of birth. ORs are adjusted for parental education and income.
[b]Ns were too small for comparison.
*$P < .05$.
**$P < .01$.
***$P < .001$.
Abbreviations: CL = confidence limit, OR = odds ratio.

the medication register lists all medications prescribed and dispensed, it cannot verify that patients took the medications as prescribed. Fourth, the data linkage available to us did not include all ATC codes so we could not explore utilization as exhaustively as would be optimal or compare utilization in some ATC classes of interest, such as antiobesity. Fifth, given typical delays in treatment seeking, the time of first diagnosis of BED is unlikely to reflect age at onset. Sixth, selection bias is likely. BED is a diagnosis that is often either not elicited by the practitioner or volunteered by the patient, making its detection dependent on factors other than the presence of the disorder itself. Moreover, individuals with more severe presentations or circumstances favoring access to treatment may be more likely to access specialist services. Finally, our results cannot determine direction of causality. BED may be more likely to emerge in individuals with multiple medical and psychiatric conditions. Alternatively, BED may itself confer risk for developing comorbidities. Another possibility is that an unmeasured variable may exist that increases risk for both BED and multiple somatic and psychiatric problems leading to the observed pattern of increased medication utilization.

BED was associated with elevated prescription medication utilization before and after diagnosis, confirming that the psychiatric and somatic needs of individuals with BED are substantial. These findings have implications for identifying and treating BED earlier and understanding and preventing burden. The failure to screen for and detect BED, and perhaps the reluctance of patients to discuss BED with their providers,[27,35] could lead to pharmacologic management of an array of symptoms that could be avoided were an accurate diagnosis and disposition for BED treatment made. BED is significantly underrecognized and underdiagnosed in clinical practice. Primary care and mental health providers should be alert for a constellation of risks and correlates of BED (obesity, fluctuating weight, depression, anxiety, childhood obesity, high medication utilization) and screen for BED accordingly. Rapid screening is possible[36,37] and can facilitate accurate diagnosis and treatment referral. Further, mental health professionals should remain vigilant for somatic conditions in their BED patients and encourage thorough medical review and medication monitoring.

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