

Eating disorders in a multi-ethnic inner-city UK sample: prevalence, comorbidity and service use

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Abstract

Purpose No studies have investigated the prevalence of eating disorders (ED) according to DSM-5 criteria and few have explored their comorbidity and service use in the general population in the UK. We aimed to estimate the prevalence, comorbidity, and service use in individuals with ED in a multi-ethnic inner city sample.

Methods A total of 1698 individuals (age 16/90) were screened for ED in the first phase of the South East London Community Health Study and 145 were followed up with a diagnostic interview. Data was weighed for survey design and Chi Square tests were used to investigate socio-demographic distribution, comorbidity and service use in participants with ED.

Results The point prevalence of ED was 4.4 % (Binge Eating Disorder (BED) 3.6 %; Bulimia Nervosa (BN) 0.8 %) and 7.4 % when including sub-threshold diagnoses (Purging Disorder (PD) 0.6 %; Other Specified Feeding

and Eating Disorders (OSFED) 2.4 %). No cases of AN were identified. Purging Disorder was the ED with the highest proportion of comorbid disorders. A minority of participants with ED had accessed specialist care services. **Conclusions** ED are common, the comorbidity of ED was in line with previous studies and no ethnic differences were identified. Although PD is not a full diagnosis in DSM-5, we found some evidence of high comorbidity with other disorders, that needs to be replicated using larger samples. Service use was low across ED diagnoses, despite high levels of comorbidity.

Keywords Eating disorders · Comorbidity · Prevalence · Health services · SELCoHII

Introduction

Eating disorders (ED) are associated with high levels of physical and psychiatric comorbidity and are the mental disorders with the highest mortality rates, due to both medical complications and suicide [1].

In light of the recognition that the ‘not otherwise specified’ category of ED (EDNOS) was the most common ED diagnosis [2, 3] in the Diagnostic and Statistical Manual for mental disorders 4th Edition-defined (DSM-IV) [4], the DSM-5 introduced several changes to the diagnostic criteria for ED, in the chapter on Feeding and Eating Disorders (FED) [5]. Notably, amenorrhea (i.e., the absence of menstrual periods for a minimum of 3 months) is no longer a criterion for the definition of AN; frequency and duration thresholds for bingeing and compensatory episodes in BN (previously required to occur at least twice a week for at least 6 months) have been lowered to weekly episodes for a period of at least 3 months; and

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BED has been granted a full-threshold diagnosis status if an individual engages in weekly episodes of binge eating for at least 3 months exhibiting high levels of distress. The DSM-IV EDNOS category has been renamed other specified feeding and eating disorders (OSFED) and includes: sub-threshold presentations of AN, BN, and BED; purging disorder (PD) defining individuals who recurrently engage in purging behaviours in the absence of bingeing; and night eating syndrome denoting recurrent episodes of night eating as manifested by eating after awakening from sleep or by excessive food consumption after the evening meal.

Evidence suggests that the shift from DSM-IV to DSM-5 criteria has resulted in an overall increase in the prevalence of full-threshold ED diagnoses and in a decrease in that of sub-threshold ones [6, 7], although evidence on the relative contribution of individual diagnoses to these figures is mixed. Using DSM-IV criteria, large general population surveys have yielded figures of lifetime prevalence of AN, BN, and BED of 0.6, 1.0, and 2.8 %, respectively in the United States [8] and of 0.5, 0.5, and 1.1 % in Europe [9]. Across samples of adults and adolescents, DSM-IV-defined point prevalence of ED has been found to be in the region of <0.5 % for AN, between 0.9 and 1.5 % for BN in females (and 0.1 and 0.5 % in males) [1], and between 2 and 3 % for BED [10]. In line with these figures, an Australian mixed sample study of 6041 adults using DSM-5 criteria found a 3-month prevalence of less than 1 % for AN, and BN (AN = 0.46 %; BN = 0.66 %), but a comparatively higher prevalence of BED (5.58 %) [12]. On the other hand, adolescent studies have shown a higher point prevalence of BN (up to 2 % in females and around 1.3 % in males), but not in that of BED (0.5–0.7 % in females and <0.2 % in males) [7, 11]. In the absence of definite criteria for its definition mixed evidence also exists on the prevalence of PD with studies reporting figures ranging from to 0.5 % [12] and 2.5 % [10]. These results seem to suggest that, on the one hand, there could be differences related to the age distribution of ED, especially in relation to AN and BN compared to that of BED; on the other, that the prevalence of PD, despite not a full-threshold diagnosis, could be comparable to that of AN and BN.

Contradicting evidence exists with respect to differences in ED presentation and prevalence across ethnic groups. On the one hand, studies have suggested that cultural differences could cause ED to present differently across different ethnicities, as in the case of non-fat phobic AN reported in South Asian communities [13, 14]. On the other, it has been posited that cultural differences could represent either risk or protective factors for ED. For instance, evidence suggests not only that women of Black ethnicity report lower levels of body dissatisfaction [15, 16] but also that

exposure to ‘Western’ beauty ideals could increase the risk for ED across ethnic groups [17–20]. In fact, recent studies found that the prevalence of ED behaviours is comparable across ethnic groups [21]. The fact that fewer individuals from ethnic minorities are referred for ED treatment [22–24] suggests that cultural differences could play a significant role in reporting ED symptoms or seeking help for an ED.

According to the literature around 50 % of individuals with ED are not appropriately referred for treatment [8, 25, 26], with proportions decreasing for BN sufferers [27]. Perceived rarity of ED [28] and frequent lack of ‘visible’ physical symptoms (especially for BN) [27] have been suggested as factors hindering identification and referral.

To date, no studies have investigated the prevalence of ED in the general population in the United Kingdom (UK) using DSM-5 criteria. The aim of this study was therefore to estimate the prevalence of ED and their psychiatric comorbidity in a multi-ethnic sample of adults living in two South London (UK) boroughs. We also investigated access to services amongst participants with ED.

Methods

Study design and setting

We used a two-phase prevalence design and set in the two South East London Boroughs of Lambeth and Southwark. The representativeness of these areas with respect to both Greater London and England has been previously discussed [29].

Study population

Participants were recruited for the South East London Community Health Study (SELCoH) phases I and II through random household sampling stratified by borough, using the small user postcode address file (PAF) as sampling frame excluding households receiving more than 50 items of mail per day as potential business addresses. Individuals aged 16 years and over, living within selected and participating households, were eligible for inclusion in the study [29].

Stage 1: screening questionnaire (SELCoH I)

Between June 2008 and December 2010, trained researchers collected data on a number of physical and socio-demographic indicators, physical and mental health symptoms and health service use using a computer-based questionnaire from 1698 individuals.

Eating disorders screener

As part of this assessment, the SCOFF¹ a five-item screening questionnaire for ED in outpatient settings [30], was employed to screen for ED. A cut-off of ≥ 2 positive answers was used to define screen positive status, which has been previously shown to yield the highest sensitivity to specificity ratio [30].

Body mass index (BMI) and socio-demographic indicators

Information was collected on several physical (BMI) and socio-demographic (i.e., age, ethnicity, education and marital status) indicators.

We derived BMI from objective measurements² of height and weight and grouped continuous values into the four categories of: ‘underweight’ ($<18.5 \text{ kg/m}^2$); ‘normal weight’ ($18.5\text{--}25 \text{ kg/m}^2$); ‘overweight’ ($25\text{--}30 \text{ kg/m}^2$); or ‘obese’ ($>30 \text{ kg/m}^2$), as defined by WHO guidelines. Ethnicity was defined as: White (participants of White British background), Black (participants of either Black African ($N = 234$, 13.8 %) or Black Caribbean ($N = 143$, 8.4 %) ethnicity), Asian (participants of Indian, Pakistani, Bangladeshi, or Chinese ethnicity) or any other ethnic background (participants not identifying themselves with any of the previous groups). Education was used as a categorical variable indicating whether the individual had: ‘no qualifications’; ‘completed General Certificate of Secondary Education (GCSE) and/or A-levels’; or had a ‘higher degree or above’. Finally, marital status indicated whether the participant was ‘single’; ‘married or cohabiting’; ‘divorced or separated’; or ‘widowed’. Age was used as a continuous variable.

Psychiatric comorbidity

Common mental disorders (CMD) were measured using the clinical interview schedule-revised (CIS-R) [31] and coded into a two-level variable indicating ‘no diagnosis’,

and ‘any mood, anxiety and mixed mood and anxiety disorders’. Personality disorders were assessed with the standardised assessment of personality—abbreviated scale (SAPAS) [32] an 8-item questionnaire addressing in each ‘yes/no’ question a personality aspect. A cut-off of four positive answers, previously demonstrated to maximise sensitivity and specificity [32–34], was employed. Post-traumatic stress disorder (PTSD) was assessed with the primary care PTSD scale (PC-PTSD) a 4-item screener designed for use in primary care and other medical settings [35] using a cut-off of three positive answers, as it was shown to have good levels of sensitivity and specificity [35–37]. Suicidality was measured with a binary variable indicating whether the participant had ever thought of or attempted suicide. Alcohol use was measured with the world health organization alcohol use disorders identification test (AUDIT) [38]. From the four original categories of: ‘healthy drinking’; ‘hazardous drinking’; ‘hazardous and harmful drinking’; and ‘alcohol dependence’ we generated a binary variable indicating: “healthy alcohol consumption” and any “hazardous, hazardous and harmful drinking, and alcohol dependence”. We also coded as a binary variable, any use of one or more of the following drugs in the 12 months prior to interview: cannabis, amphetamines, cocaine, ecstasy, LSD, tranquillisers, crack, and heroin. Lifetime smoking was measured with a binary (i.e., yes/no) variable.

Service use

Participants were asked whether they had sought help from a GP or a therapist for a problem with anxiety, depression or any other mental, nervous or emotional problem in the year prior to assessment. Positive answers were followed up with questions on visits to GPs, therapists or counsellors, or a mental health specialist.

Stage 2: diagnostic interview (SELCoH II)

In SELCoHII, participants were invited to undertake a computer-assisted follow up interview assessing several health domains previously investigated in SELCoHI. Additionally, a sub-sample of participants were selected for inclusion in a module comprising of a diagnostic interview for ED.

Participants who had given consent in SELCoHI to be re-contacted for future studies, did not need an interpreter and had completed the SCOFF in SELCoHI were eligible for inclusion in SELCoHII. Of the participants fulfilling these criteria, all those who had screened positive at the SCOFF were eligible for inclusion in the ED module. Participants who had screened negative were eligible if they had not screened positive for any other mental health

¹ SCOFF questions: Do you make yourself table because you feel uncomfortably full?; Do you worry you have lost control over how much you eat?; Have you recently lost more than one stone in a 3 month period?; Do you believe yourself to be *Fat* even when other say you are too thin?; Would you say that *Food* dominates your life?

² The following procedures were employed to measure participants’ height and weight: Height: participants’ height was measured having them standing with their scapula, buttocks and heels resting against a wall, the neck held in a natural non-stretched position, the heels touching each other, the toe tips form a 45° angle and the head held straight with the inferior orbital border in the same horizontal plane as the external auditory conduct (Frankfort’s plane). Weight: a portable scale with a 125 kg maximum capacity and a $\pm 100 \text{ g}$ error margin was used. Individuals were asked to remove shoes and heavy cloths prior to weighing.

conditions. These were subsequently randomly selected based on a one-to-one match on gender with the group who had screened positive. Over the duration of the study, an extra male and three females were selected at random to increase the number interviewed within the screen negative group. All interviews were conducted between August 2011 and March 2013. Approval was obtained by the King's College London Research Ethics Committee (reference PNM/10/11-106).

Trained researchers interviewed participants using the ED section of the Structured Clinical Interview for DSM-IV Axis I disorders non-patient edition (SCID-I-NP) [4] to derive the point prevalence of ED. Researchers were instructed to elicit information on type and frequency of any ED behaviours concurrent to the time when the SCOFF was administered, and not to apply 'skip-rules' of the SCID, as evidence suggests that their use could result in underestimating the prevalence of diagnoses [39]. The ED module of the SCID-I questionnaire has been shown to have moderate to good inter-rater reliability [40–42]. FS and NM (expert clinician) diagnosed all interviews independently using DSM-5 criteria prior to the completion of the study and final diagnosis coincided in all instances (100 % agreement). Purging disorder, not a full diagnosis in DSM-5, was kept as a separate diagnosis and defined as: individuals engaging in purging (e.g., self-induced vomiting, misuse of laxatives, diuretics for weight loss) in the absence of binge eating at least twice a week for at least 3 months [43].

Data analyses

The prevalence of ED was calculated using DSM-5 diagnoses and extrapolated from the interviewed sample to the whole initial screened population using sampling weights accounting for: proportion of screen positive and negative participants followed up with the SCID interviews over the whole sample; and proportion of ED diagnoses amongst screen positives and negatives, as recommended in two-phase epidemiological studies [44].

Screen positive participants who agreed to take part in SELCoH II were compared against those who were lost to follow up on a number of socio-demographic indicators as well as BMI in order to investigate whether selective participation occurred.

The socio-demographic composition of the SELCoHI sample has been previously described [29, 45]. Prevalence of ED diagnoses across socio-demographic and BMI, as well as prevalence of psychiatric outcomes across ED diagnoses was calculated using the survey weights described above [44]. Univariate and multivariate (adjusted for age, gender, ethnicity, BMI, education, and marital status) logistic regression models were only employed to explore

the associations between having any ED diagnosis and comorbid psychiatric outcomes due to the otherwise lack of adequate statistical power.

Results

Study sample and sub-group interviewed in SELCoHII

In SELCoHI, 1698 individuals (age 16–90) were administered the SCOFF. Of these, 66 % were female, 25.4 % were of Black (African or Caribbean) or Asian ethnic background, 83.1 % were educated at least to GCSE level, and 51.2 % were in paid employment, as described elsewhere [29, 46].

A total of 1596 participants in SELCoHI agreed to be re-contacted. Of these, 1560 did not need an interpreter and 1538 had completed the SCOFF. All 158 (male = 40; female = 118) participants who had screened positive at the SCOFF were eligible for interview and 599 (43.4 % participants who had screened negative and had not screened positive for any other mental health condition were eligible for inclusion. After random selection and gender matching, the overall numbers selected as controls from the screen negative groups were 164 (males = 42; females = 122). The final sample included 145 participants [44.8 %; $N = 76$ (52.4 %) SCOFF negative, $N = 69$ (47.6 %) SCOFF positive].

The majority of participants to the ED module were single and educated at least to GCSE/A level. None of the participants were underweight and the majority were of normal BMI. The mean age of the sample was 36.4 years [47].

Attrition

A total of 177 (54.9 %) participants eligible for enrolment in the SELCoHII ED module were lost to follow up (SCOFF positive: $N = 89$; SCOFF negative: $N = 88$). Amongst the SCOFF positive participants, those who were underweight were more likely to be lost to follow up (100.0 %) (Table S2). No other observable differences existed between participants retained in the study and those lost to follow up.

Prevalence of ED

Amongst those who were interviewed in SELCoH II, 31 (21.3 %) participants had a 12-month DSM-5 ED diagnosis. The weighted prevalence on the overall sample was 7.4 % (95 % CI 4.1–13.0). The weighted prevalence of individual disorders was 0.8 % (95 % CI 0.4–1.9 %) for

BN, 3.6 % (95 % CI 1.4–9.0 %) for BED, 0.6 % (95 % CI 0.2–1.5 %) for PD, and 2.4 % (95 % CI 0.9–6.7 %) for OSFED. No cases of AN were found in the sample. Prevalence of threshold ED was 0.9 % (95 % CI 0.2–4.1) in men and 6.7 % (95 % CI 3.1–13.6) in women. Prevalence of sub-threshold ED was 3.4 % (95 % CI 1.2–0.3) in women, whereas no man had an OSFED diagnosis. Across age groups, BN was the most prevalent diagnosis in the 16–24 years of age group (1.7 %, 95 % CI 0.5–5.8) whereas BED was more prevalent in the 44–65 age group (10.3 %, 95 % CI 3.5–27.2) (Table S3).

Associations of ED diagnoses with socio-demographic characteristics

All ED diagnoses were more prevalent in women than men; with BED being the only ED diagnosis seen in men, although the p value from χ^2 test only trended towards significance, possibly due to the small group sizes. Mean age was highest for BED (Mean 47.8; SE 2.1; range 22–68, median 50) and lowest for PD (mean 29.3, SE 4.7, range 20–45, median 26) (Table 1). There was an indication that prevalence of BED was highest in overweight and obese individuals compared to other diagnoses; however, the low power of these analyses could account for non-significant p values and, hence, type II error (Table 1).

Associations with comorbid psychopathology, alcohol and substance use

High proportions of individuals with ED and, in particular, those with purging-type ED (i.e., BN, PD) reported comorbid alcohol and substance use, and psychiatric diagnoses (Table 2). Participants with PD had the highest proportions of comorbid hazardous/hazardous and harmful alcohol consumption, suicidality, personality disorders screen positive status (75 %), and any drug use (50 %). Post-traumatic stress disorder (PTSD) and mood and anxiety disorders were more common in individuals with BN (50 and 66.7 %, respectively). Although χ^2 test p values for inter-group differences were not statistically significant, there was indication that current smoking was more prevalent in individuals with PD (75 %).

When grouping all ED diagnoses together, individuals with ED had higher proportions and odds (in univariate and multivariate models) of engaging in hazardous and harmful levels of drinking, mood and anxiety disorders and positive screening status to personality and PTSD compared to those without an ED. In multivariate models, individuals with ED also had higher odds of reporting suicidal thoughts or attempts than those without an ED (Table 3).

Health service use

Only 30 % of the participants with an ED had sought help from a medical professional for problems with their mental health in the year prior to assessment (Table 4), 22 % consulted a general practitioner (GP), and 15 % saw a therapist. Of the 15 participants with ED who sought help either in primary or secondary care, 7 only saw a GP, 3 only a specialist and 5 both.

Discussion

To our knowledge this is the first study to investigate the prevalence and comorbidity of ED, using DSM-5 criteria, in the UK. We found a prevalence of 7.5 % for ED in adults. Despite the small numbers of participants included in our sample, we believe our findings are an important first step in identifying the burden of ED in the English general population, especially in light of the representativeness of our sample and potential generalizability of our results.

Prevalence

Differences in study design, populations, and diagnostic criteria mean comparisons of prevalence across studies arduous to undertake. However, the prevalence estimates found in this study were generally in line with others previously reported using DSM-5 diagnostic criteria [6, 7, 11, 12].

In line with the 0.8 % figure reported in our study, previous studies using mixed adult samples have yielded point prevalence for DSM-5 defined BN of around 0.7 %. BED was only recently confirmed as a full-threshold diagnosis and we found a prevalence of 3.6 % for the condition, which is lower, but comparable to that reported in a recent large study on an Australian sample of adults (5.6 %) [12]. A lower prevalence of the condition has been reported among adolescents [7, 11] confirming hypotheses suggesting a higher age of onset [8] and stability of BED diagnosis [48]. Studies investigating the prevalence of PD are, to date, rare. Mixed general population samples of adolescents show a prevalence of the disorders of up to 2.5 % [10], whereas figures from adult samples (0.6 %) [12] are in line with our findings (0.5 %). Several studies suggest that PD and purging behaviours could be more prevalent in adolescence [49] and, given the low prevalence of PD in this sample, our results seem in line with this hypothesis.

The recent changes in diagnostic criteria introduced by DSM-5 mean that a category, OSFED, has been introduced to replace EDNOS, previously the most prevalent ED diagnosis among adolescents [2] and adults [3]. It is

Table 1 Weighted distribution of socio-demographic characteristics across ED diagnoses ($N = 145$)

Socio-demographic	N	No ED		BN		BED		PD		OSFED		P (χ^2)
		n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	
Gender												
Male	36	34	31.2 (22.1–42.1)	0	0 (0)	2	7.6 (1.4–31.9)	0	0 (0)	0	0 (0)	0.1
Female	109	80	68.8 (57.8–77.9)	6	100 (100)	9	92.4 (68.1–98.6)	4	100 (100)	10	100 (100)	
Marital status												
Single	58	47	34.3 (24.9–45.2)	4	66.7 (26.4–91.8)	2	7.6 (1.4–31.9)	1	25.0 (3.3–76.7)	4	22.7 (5.4–60.1)	0.2
Married/cohabiting	65	51	50.8 (40.1–61.5)	1	16.7 (2.2–63.7)	5	48.1 (12.2–86.1)	2	50.0 (12.1–87.9)	6	77.3 (39.9–94.6)	
Divorced/widowed	22	16	14.9 (8.6–24.5)	1	16.7 (2.2–63.7)	4	44.3 (10.3–84.6)	1	25.0 (3.3–76.7)	0	0 (0)	
Ethnicity												
White	83	62	55.8 (44.9–66.3)	4	66.7 (26.4–91.8)	9	92.4 (68.1–98.6)	2	50.0 (68.1–98.6)	6	77.3 (39.9–94.6)	0.3
Black	42	36	29.3 (20.4–40.0)	2	33.3 (8.2–73.6)	2	7.6 (1.4–31.9)	0	0 (0)	2	11.4 (2.1–43.9)	
Asian	4	3	1.6 (0.3–7.7)	0	0 (0)	0	0 (0)	1	25.0 (3.3–76.7)	0	0 (0)	
Other	16	13	13.3 (7.4–22.7)	0	0 (0)	0	0 (0)	1	25.0 (3.3–76.7)	2	11.4 (2.1–43.9)	
Education												
No qualifications	15	11	7.3 (3.4–15.18)	1	16.7 (2.2–63.7)	3	11.5 (2.6–38.1)	0	0 (0)	0	0 (0)	0.1
GCSE/A levels	74	53	43.2 (32.8–54.1)	4	66.7 (26.4–91.8)	8	88.5 (61.8–97.4)	3	75.0 (23.3–96.7)	6	77.3 (39.9–95.6)	
University degree	56	50	49.5 (38.8–60.3)	1	16.7 (2.2–63.7)	0	0 (0)	1	25.0 (3.3–76.7)	4	22.7 (5.4–60.1)	
BMI ($n = 1501$)												
Underweight	2	2	2.6 (0.7–10.1)	0	0 (0)	0	0 (0)	0	0 (0)	0	0 (0)	0.08
Normal	63	53	45.5 (34.9–56.6)	3	50.0 (16.5–83.5)	0	0 (0)	1	25.0 (3.3–76.7)	6	77.3 (39.9–94.6)	
Overweight	36	36	32.4 (22.9–43.5)	1	16.7 (2.2–63.7)	5	19.1 (5.2–50.3)	3	75.0 (23.2–96.7)	1	5.7 (0.6–36.6)	
Obese	20	20	19.4 (12.1–29.8)	2	33.3 (8.2–73.6)	6	80.9 (48.7–94.8)	0	0 (0)	3	17.1 (3.7–52.2)	
Age												
			No ED		BN		BED		PD		OSFED	
			Mean (SE)		Mean (SE)		Mean (SE)		Mean (SE)		Mean (SE)	
			37.7 (1.7)		36.1 (7.1)		47.8 (2.1)		29.3 (4.7)		36.8 (3.7)	0.0007

ED eating disorders, BN bulimia nervosa, BED binge eating disorder, PD purging disorder, OSFED other specified feeding and eating disorders, BMI body mass index

Table 2 Weighted Prevalence (and 95 % CI) of psychiatric comorbidity across ED diagnoses

Outcome	N	No ED		BN		BED		PD		OSFED		P (χ^2)
		n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	n	% (95 % CIs)	
Drinking												
Regular	125	102	97.2 (92.8–98.9)	4	66.7 (26.4–91.8)	10	96.2 (73.3–99.6)	1	25.0 (3.2–76.7)	8	88.0 (56.1–97.9)	<0.0001
Hazard. + hazardous and harmful	19	11	2.8 (1.0–7.2)	2	33.3 (8.2–73.6)	1	3.8 (0.4–26.7)	3	75.0 (23.3–96.7)	2	11.4 (2.1–43.9)	
Current smoking												
No	114	92	84.2 (74.7–90.6)	5	83.3 (36.3–97.8)	9	92.4 (68.1–98.6)	1	25.0 (3.3–76.7)	7	82.9 (47.8–96.3)	0.08
Yes	31	22	15.8 (9.4–25.3)	1	16.7 (2.2–63.7)	2	7.6 (1.4–31.9)	3	75.0 (23.3–96.7)	3	17.1 (3.7–52.2)	
Any drug use (prev. year)												
No	97	4	91.8 (84.2–95.9)	9	66.7 (26.4–91.8)	9	92.4 (68.1–98.6)	2	50.0 (12.1–87.9)	8	88.6 (56.1–97.9)	0.05
Yes	17	2	8.2 (4.1–15.8)	2	33.3 (8.3–73.6)	2	7.6 (1.4–31.9)	2	50.0 (12.1–87.9)	2	11.4 (2.1–43.9)	
Suicidality												
No	107	89	83.8 (74.3–90.2)	3	50.0 (16.5–83.5)	6	80.9 (49.7–94.8)	1	25.0 (3.3–76.7)	8	88.6 (56.1–97.9)	0.06
Yes	38	25	16.3 (9.8–25.7)	3	50.0 (16.5–83.5)	5	19.1 (23.3–50.3)	3	75.0 (23.3–97.4)	2	11.4 (2.1–43.9)	
SAPAS												
No	120	104	98.5 (97.1–99.2)	3	50.0 (16.5–83.5)	6	80.9 (49.7–94.8)	1	25.0 (3.3–76.7)	6	77.2 (39.9–94.5)	< 0.0001
Yes	25	10	1.5 (0.8–2.9)	3	50.0 (16.5–83.5)	5	19.1 (23.3–50.3)	3	75.0 (23.3–97.4)	4	22.7 (5.4–60.1)	
PTSD												
No	134	109	99.3 (98.2–99.7)	3	50.0 (16.5–83.5)	10	96.2 (73.4–99.6)	2	50.0 (12.1–87.9)	10	100 (100)	< 0.0001
Yes	11	5	0.7 (0.3–1.9)	3	50.0 (16.5–83.5)	1	3.8 (0.4–26.7)	2	50.0 (12.1–87.9)	0	0 (0)	
CMD												
No	107	94	97.0 (95.2–98.1)	1	16.7 (2.2–63.7)	3	69.4 (33.6–91.1)	2	50.0 (12.1–87.9)	7	83.0 (47.8–96.3)	< 0.0001
Sub-threshold	7	4	0.6 (0.2–1.6)	1	16.7 (2.2–63.7)	1	3.8 (0.4–26.7)	0	0 (0)	1	5.7 (0.6–36.6)	
Mood/anxiety	31	16	2.4 (1.4–4.1)	4	66.7 (26.4–91.8)	7	26.7 (7.7–61.4)	2	50.0 (12.1–87.9)	2	11.4 (2.1–43.9)	

Characters in bold denote statistically significant differences ($p < 0.05$); characters in italics denote differences which approached statistical significance ($0.1 > p > 0.05$)
 ED eating disorders, BN bulimia nervosa, BED binge eating disorder, PD purging disorder, OSFED other specified feeding and eating disorders

Table 3 Frequency, percentage and significance of the association between ED diagnosis and psychiatric and behavioural correlates; and univariate and multivariate logistic regression models for the association between any ED diagnosis (any ED vs. no ED) and psychiatric and behavioural correlates

	No ED, <i>N</i> (%)	ED, <i>N</i> (%)	<i>p</i>	Crude OR (95 % CI)	Adjusted OR (95 % CI) ^a
Drinking					
Regular	102 (97.2)	23 (85.1)	0.004	Ref.	Ref.
Hazard. + Hazardous and harmful	11 (2.8)	8 (14.9)		6.1 (1.5–24.6)	79.8 (6.0–1056.3)
Current smoking					
No	92 (84.2)	22 (83.3)	0.9	Ref.	Ref.
Yes	22 (15.8)	9 (16.7)		1.1 (0.3–3.3)	0.5 (0.1–2.4)
Any drug use (prev. year)					
No	97 (91.8)	23 (85.1)	0.3	Ref.	Ref.
Yes	17 (8.2)	8 (14.9)		1.9 (0.6–6.6)	4.3 (0.8–22.2)
Suicidality					
No	89 (83.8)	18 (75.8)	0.4	Ref.	Ref.
Yes	25 (16.3)	13 (24.2)		1.6 (0.5–4.9)	4.5 (1.2–17.6)
Personality disorders					
No	104 (98.5)	16 (72.1)	<0.0001	Ref.	Ref.
Yes	10 (1.5)	15 (27.9)		25.4 (8.1–80.5)	94.5 (17.5–509.9)
PTSD					
No	109 (99.3)	25 (88.8)	<0.0001	Ref.	Ref.
Yes	5 (0.8)	6 (11.2)		16.7 (4.2–66.3)	11.1 (2.5–50.1)
CMD					
No	94 (97.1)	13 (66.5)	<0.0001	Ref.	Ref.
Any mood/anxiety	20 (2.9)	18 (33.5)		16.3 (5.5–48.3)	32.6 (9.7–110.0)

Characters in bold denote statistically significant differences ($p < 0.05$); characters in italics denote differences which approached statistical significance ($0.1 > p > 0.05$)

ED eating disorders, OR odds ratios, CI confidence interval, PTSD post-traumatic stress disorder, CMD common mental disorder

^a Adjusted for age, gender, ethnicity, BMI, education, and marital status

Table 4 Weighted Prevalence of service use in the previous year by ED diagnosis in the SELCoH sample. ($N = 145$)

Outcome (Selcoh1)	<i>N</i>	No ED		Any ED		<i>P</i> (χ^2)
		<i>n</i>	% (95 % CIs)	<i>n</i>	% (95 % CIs)	
Sough help						
No	84	76	78.4 (68.5–85.8)	8	57.2 (31.8–79.4)	0.03
No, though I should have	29	21	13.4 (7.6–22.4)	8	14.9 (6.2–14.9)	
Yes	32	17	8.2 (4.1–15.8)	16	27.9 (13.2–49.7)	
Seen a GP						
No	120	101	92.4 (84.6–96.4)	19	77.7 (57.9–89.8)	0.04
Yes	25	13	7.6 (3.6–15.4)	12	22.3 (10.2–42.1)	
Seen a mental health specialist/therapist						
No	129	106	97.7 (92.9–99.3)	23	85.1 (68.4–93.8)	0.003
Yes	16	8	2.3 (0.7–7.1)	8	14.9 (6.2–31.6)	

ED eating disorders, GP general practitioner

believed that the shift from DSM-IV to DSM-5 has reduced the prevalence of this ‘residual’ category, by means of reassigning sub-threshold diagnoses to full threshold ones. [6] We found OSFED prevalent in 2.4 % of our sample, which is lower than the estimate reported in other recent

adult studies [12]. It is possible that different definitions of ‘sub-threshold’ could have resulted in this discrepancy.

Despite it being a condition with early onset and peak in adolescent years [50], the absence of individuals with AN in this sample is unusual, as the average point prevalence in

females has been estimated around 0.3 % [1]. The lack of AN in this population could be explained by evidence showing that individuals with severe mental illnesses are systematically under-represented in community studies [51]. It is thus possible that participants with AN were lost to follow up, as all four underweight participants who had screened positive to the SCOFF were not interviewed in the ED module of SELCoHII (Table S1). Alternatively, given the low levels of sensitivity found for the SCOFF in this sample [47], it is also possible that AN cases were not fully detected and that the SCOFF might not be a suitable instrument for the identification of anorexia nervosa cases in the community. It is also known that two-stage-prevalence design can be limited in for uncommon disorders [52] such as AN. Future studies should aim to undertake diagnostic interviews with a shorter follow-up time in order to minimise these losses.

Socio-demographic characteristics of ED

This study confirms some of the previous findings in the literature, whilst contradicting others. Reflecting the known epidemiology of ED we found a higher prevalence in women. The only men who reported an ED were diagnosed with BED. This is the most common ED diagnosis amongst men and it is believed that males contribute up to 25 % of all BED cases [53].

In line with studies showing few differences in ED across ethnic groups [54], we did not find significant inter-group differences with respect to ethnicity; nevertheless, it is possible that type II error occurred and that significant differences were not detected. Participants of White ethnicity had the highest prevalence of BED, but not of other disorders, whereas a third of all BN cases occurred in participants of Black ethnicity. Binge eating with or without purging, and use of laxatives and diet pills to control weight has been previously documented in these populations [54] and our results support these findings. Purging behaviours are believed to be rare in individuals of Asian ethnicity [55, 56]. Our study found that the only participant of Asian ethnicity with an ED had PD. Although the small sample size means that some of these results could be attributable to chance, we have previously shown that, in this sample, the SCOFF question relative to purging behaviours was endorsed most frequently by participants of Asian ethnic background [45]. It is therefore possible that cultural differences exist between individuals of Asian ethnicity living in the US (where the majority of previous studies has been undertaken) and in the UK and that environmental factors could influence eating behaviours in ethnic minority groups as well as their own cultural norms. Our findings could also mean that ED in Asian communities are more likely to go undetected. Future studies should explore ED and ED

behaviours in ethnic minorities across different settings in order to further investigate these hypotheses.

We found some indication of differences in BMI across ED diagnoses. Notably, all participants with BED were either overweight or obese. Although high BMI is not a diagnostic criterion for BED, previous findings highlight high comorbidity between BED and obesity [57]. Participants in the PD category were more likely to belong to the overweight category. The use of purging methods after episodes of overeating and the small effects of self-induced vomiting and of laxative/diuretics use on weight-loss especially in normal/overeaters, could explain the maintenance of a normal or even overweight BMI, which is also observed in BN.

Finally, mean age was lowest in PD (28.6 years) and highest in BED (46.3 years), respectively, confirming previous literature. To date, studies have shown that BED has a later age of onset compared to other ED, a longer duration and is more frequent in older ages [58]. Conversely, prevalence of PD seems to peak in mid-late adolescence [10]. Impulsive (and thus risk-taking) traits are more pronounced amongst adolescents, who might therefore engage in risky weight-control practices as part of the range of risk-taking behaviours characteristic of adolescence. Nevertheless, these are hypothesised risk mechanisms, and more research is needed to disentangle these relationships.

Psychiatric comorbidity

This study found high proportions of comorbid substance use, suicidality, personality disorders, PTSD and mood and anxiety disorders in individuals with ED and, in particular, those who purged.

Purging disorder was associated with particularly high comorbidity. Individuals with PD had the highest proportions of hazardous levels of alcohol consumption, having ever smoked, and having used illegal substances in the 12 months prior to assessment. Substance use is more frequent amongst individuals engaging in purging-type compensatory behaviours across ED diagnoses [59]. Half of the BN sample in this study suffered from the non-purging type of the disorder and this could explain why prevalence of substance use was lower in this group, thus further substantiating this hypothesis. Increased levels of impulsivity and risk-taking attitudes have been hypothesised to constitute a shared risk factor for these behaviours [49], which could also explain the comparatively higher prevalence of suicidal ideation or attempts amongst participants with PD and BN. Literature suggests that suicide attempts are higher in individuals suffering from ED with a purging dimension, whilst suicide deaths are higher in EDs with restrictive-only traits [60]. More research drawing from general population samples is warranted to

investigate whether PD is a separate ED, or rather, a condition existing on continuum of severity between personality disorders (e.g., purging behaviours could be one amongst several impulsive behaviours) and ED.

We found high levels of mood and anxiety disorders in individuals with BN and PD diagnoses, although potentially higher in those with BN. Previous studies have found higher levels of depression in BN than in PD individuals, suggesting that individuals with PD could have less difficulty with affect regulation than those with BN who express it through binge eating [61]. Current and lifetime anxiety disorders have been found to be more prevalent in individuals with PD compared to BN [43, 61], although the former presented with lower levels of state anxiety [61]. It has been hypothesised that purging could act as a means to reduce the anxiety about weight gain induced by bingeing, thus resulting in lower state anxiety in individuals who purge in the absence of bingeing [61]. We found that a third of participants with BED had comorbid mood and anxiety disorders, supporting evidence suggesting that these conditions are frequently comorbid with the disorder especially in individuals who are also overweight/obese, a group highly represented in our sample [62]. Given the small size of our sample it was not possible to investigate these associations in detail and more studies using general population samples are warranted.

As previously shown [63, 64], we found that screening positive for personality disorders was prevalent across ED diagnoses and that PTSD was common in participants with BN. However, since screeners were used to define these conditions, inferences on their associations with ED should be made with caution.

Health service use

Less than half of participants with an ED had sought help in the year prior to assessment, and more participants were seen in primary than in secondary settings, although we could not establish patterns of referral or self-referral.

Contrary to AN, characterised by very low weight, and thus easily recognisable, BN, PD and BED might not be easily detected in primary care [65]. Long waiting times and limited resources, coupled with ego-syntonicity of behaviours in individuals with ED could also partially explain low proportions of participants accessing secondary care. Limited awareness of the burden of mental health associated with BED and sub-threshold diagnoses could also cause fewer individuals being referred to specialist services.

Strengths and limitations

This study has several strengths. Firstly, it employed a sample representative of both its catchment area and of the

wider London area [47], and it used a two-stage prevalence design. It was possible to investigate comorbidity with a large number of conditions and socio-demographic indicators. Diagnoses were adapted to DSM-5 criteria, meaning that results can be used to inform future research as well as current clinical practice.

Nevertheless, some limitations should be noted. Two-stage prevalence designs can be limited in the detection of uncommon conditions, such as AN, and their correlates in the absence of very large sample sizes in the first stage of the study and when the correlates under investigation are also rare [52, 66]. In fact, the small size of the sample of participants with an ED diagnosis did not allow investigating associations between individual ED and outcomes using regression models allowing for adjustment for confounders. This could mean that the observed inter-group associations could yield non-significant associations after regression adjustment and that our findings might be due to chance, especially with respect to PD, which was seen in only four participants. However, many of our results mirrored those of previous literature and more recent hypotheses, especially with respect to PD [67]. We also attempted to investigate the association between any ED diagnoses and the same outcomes using cross-sectional analyses and regression models, both of which yielded similar results. Nevertheless, the small sample size and the very large ORs and 95 % confidence intervals suggest that it is possible that some of the associations found could be due to chance, although findings replicate those of previous studies in adolescents [67, 68] and adults [8]. Therefore, we suggest that the associations identified here are likely to be present, although their magnitude might be under- or overestimated due to low power. However, given the current lack of studies on the prevalence and correlates of DSM-5 ED diagnoses in the UK, we believe that this is an important first step in identifying the national epidemiology in an inner city sample of ED, their comorbidity and their service use. Future studies should aim at recruiting larger samples to test, both cross-sectionally and prospectively, these associations with higher degrees of confidence in individuals with lifetime and current diagnoses.

A large proportion of participants was lost to follow up; therefore we could be over or underestimating the prevalence of ED diagnoses and their associations with the outcomes investigated. When comparing screen positive participants who were followed up and those who were not, we found that the only 4 underweight participants, potentially indexing AN cases, were lost to follow up. No other differences in observed values were found between participants who were interviewed and lost to follow up, suggesting that our final sample was representative of the overall one which generated it.

Underestimation of ED prevalence could also be the result of the validity of the SCOFF as a screening tool. We have previously validated the SCOFF in this community sample finding low levels of sensitivity (53.7 %) and high levels of specificity (93.5 %) [47], indicating the presence of a potentially high number of false negatives in the sample. This could lead to an underestimation of the point prevalence of ED in the present study, as a potentially large proportion of ED cases could have been missed and not selected for interview in the second stage of the survey. In order to tackle these two limitations, we weighted our sample estimates to account for any ED diagnosis in participants who had screened negative to the SCOFF and, therefore, for the true prevalence of ED and the diagnostic validity of the SCOFF within what was feasible as part of this study.

Our diagnoses were given retrospectively in order to capture behaviours present at the time at which the SCOFF was administered (2–3 years earlier). Whilst it is possible that recall bias, regression to the mean and transition between different diagnoses could have occurred, EDs are stable, chronic conditions and no incident (i.e., occurred in the previous 12–24 months) cases of ED were encountered during the interviews [47].

Finally, SCOFF negative participants were eligible for participation if they had no mental health comorbidities. Although a sub-sample of SCOFF positives ($N = 38$, 55 %) did not have an ED diagnosis, but could have had mental health problems, it is possible that association with CMD, PTSD, and personality disorders was overestimated. Moreover, when measuring comorbidity, both the PTSD and SAPAS questionnaires used to assess comorbidity with ED are screener measures, therefore inferences on the association between these conditions and ED should be made with caution. Nevertheless, our associations reflected those of other research previously mentioned suggesting that our findings could be valid.

Conclusions

In summary, we found prevalence estimates of ED, which were broadly in agreement with other studies of Western populations. Whilst unable to draw robust inferences owing to small cell sizes, our results indicate that ED are present across ethnic minorities, although the pattern of ED diagnosis may vary. We showed very high comorbidity of ED with other psychiatric diagnoses. Despite this high level of distress a minority of individuals with ED in this community received specific mental health treatment.

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Compliance with ethical standards

Conflicts of interest The authors do not report any conflicts of interest.

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