

Cost-of-illness for Non-underweight Eating Disorders

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Research Article

Keywords: healthcare costs, healthcare utilisation, binge eating, impairment

Posted Date: May 28th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-543732/v1>

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Version of Record: A version of this preprint was published at Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity on July 30th, 2021. See the published version at <https://doi.org/10.1007/s40519-021-01277-3>.

Abstract

Purpose: This study examined economic costs associated with untreated eating disorders characterised by regular binge eating in the absence of low weight. Both direct and indirect costs were assessed, taking a partial societal perspective of economic impact.

Methods: One-hundred and twenty-six adults seeking treatment for recurrent binge eating were asked to report impairment associated with an eating disorder. Total direct, indirect, and out-of-pocket costs were calculated using 2017 prices. Overall costs per individual were estimated, including an examination of variables correlated with costs.

Results: Estimated costs for the year preceding assessment were £2,428.59 (€2,792.88) per person. Frequency of binge eating was associated with several elements of cost, and BMI was associated with productivity costs.

Conclusion: The economic cost of eating disorders characterised by regular binge eating is significant, and underscores the need for efficacious and cost-effective treatments. Individuals with eating disorders report work impairment and healthcare usage that may cost the UK economy upwards of £2.6–3.5 billion (€3–4bn). Further studies should consider academic impairment and the economic impact on families.

Level of evidence

Level III: Evidence obtained from well-designed cohort or case-control analytic studies

Introduction

Attention paid to the economic burden of eating disorders (EDs) has been increasing, particularly over the last 15 years or so [1]. Given the high degree of morbidity and mortality associated with EDs, attempts have been made to estimate cost-of-illness, covering both direct costs (e.g., meetings with a therapist, transportation) and indirect costs (e.g., absence from work), often referred to as taking a societal perspective [2]. Such estimates detail the economic burden that EDs impose on society, as well as informing service delivery, policies, and assuring value-for-money in healthcare [3].

Reviews of cost-of-illness studies in EDs have underlined heterogeneity in samples and methods used, resulting in wide variation in estimated costs (e.g., [1, 4]; see also [5]) and questionable generalisability [5, 6]. There has been limited consideration of wider costs, such as those not directly associated with treatment [4], and studies have underestimated the societal impact in economic terms [1], rarely taking into account factors such as absence from work. A large proportion of recent studies originate from North America and many obtain cost information from health insurance databases (see also [7]). As well as posing a risk in terms of sampling bias, such studies are influenced by the fact that “a considerable percentage of the [US] population is uninsured or has no insurance at all” ([4], p. 487) and “research taking a societal perspective continues to be sparse and incomplete” ([1], p. 60).

Comparatively little is known about individuals with regular binge eating who are not underweight, with a shortage of published studies from the UK and Europe, where approaches to healthcare differ. This group represents the majority of those residing in the community [8] and those presenting for outpatient treatment [9] but is often overlooked in cost-of-illness studies. Existing work has tended to focus on one particular illness rather than considering a range of ED presentations [1, 7, 10–13], with studies of anorexia nervosa particularly common, and there has been limited exploration of factors associated with healthcare costs [7], which can help inform both healthcare and research priorities.

Healthcare usage for non-underweight individuals who report regular binge eating is higher than that for individuals without EDs (e.g., [12, 14, 15]), even when accounting for comorbidities (e.g., [7, 16]). When examining economic impact, these studies have generally focused on healthcare costs, with annual estimates for BN in the range of €888 to €18,823, and €1762 to €2902 for individuals with BED [17], with societal costs seldom reported (cf. [18]). Data on individuals with subthreshold and atypical EDs (e.g., Other Specified Feeding and Eating Disorders [OSFED]) are notably lacking given that “these disorders are more prevalent and thus have contributed substantially to the total cost of EDs” ([19], p. 1).

Although some studies have looked at the influence of demographic factors such as age and gender (e.g., [7, 13]), few have explored whether common ED symptoms, such as binge eating, are associated with costs. Looking at a sample of women seeking treatment for regular binge eating, Dickerson et al. [20] found that baseline binge eating frequency was not associated with costs, although age was positively related to both medication costs and total healthcare costs. Higher body mass index (BMI) was associated with medication costs (see also [5]).

Looking at the impact of EDs at a national level, a 2015 report commissioned by a UK ED charity [21] suggested an annual cost of between £2.6 billion and £3.1 billion to sufferers and carers, with costs to the National Health Service (NHS) of between £3.9 billion and £4.6 billion. A report of societal costs to the US in 2018-19 [5, 22] assumed a prevalence of 1.66% and estimated costs in excess of \$64 billion (equivalent to \$11,808 [approximately €9,784] for each person with an ED). Similar estimates have been made in other countries (e.g., [23]). Such figures provide an overview of the significant financial burden of EDs although further work is required to explore these findings and triangulate estimates [23].

The current study aims to provide an estimate of societal costs in a group of non-underweight individuals referred for specialist outpatient treatment for regular binge eating, using a ‘bottom-up’, prevalence-based approach. Additionally, the study will look at associations between costs and demographic factors, as well as exploring diagnostic differences (e.g., [15, 16, 24]) and associations with binge eating frequency.

Methods

Participants

Participants were 126 adults (n = 118 female; 93.7%) referred to one of three specialist ED services in the UK. Demographic information is summarised in Table 1. Individuals with a diagnosis of bulimia nervosa (BN), binge-eating disorder (BED), or OSFED participated in a randomised controlled trial of CBT-based guided self-help with few exclusion criteria (see [25]). Conduct of the trial was approved by an ethics review board and registered with ClinicalTrials.gov (NCT01832792) and findings are reported in Jenkins et al. [26]. The current study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Healthcare utilisation

A questionnaire was designed for the purposes of this study, completed retrospectively by participants (see [25]). Although self-report methods of estimating economic impact can be challenging, it is recommended that they consider: a recall time frame of 6 months or less; resource utilisation frequency; and type of utilisation [27]. As such, the questionnaire asked participants about healthcare utilisation over the three months prior to treatment and included number of visits to healthcare professionals for support regarding their ED.

Participants were also asked to estimate the amount of time lost from work or education (i.e., absenteeism) and reduced productivity (i.e., presenteeism). Information was requested regarding medical investigations and out-of-pocket expenses for attending appointments, specifically travel costs.

The suggestions of Jo [2] were used as a guide, although some costs were not gathered and so the estimate is from a partial societal perspective. As the questionnaire covered a three-month period, annual estimates are provided, including an estimate of the annual cost to society through multiplying annual costs per patient by the prevalence of binge eating problems in a sample of the population of England (1.6%; [28]). Cost data are reported in pound sterling (GBP), with summaries converted to Euros for comparative purposes (using a rate of £1:€1.15).

Estimating unit costs

Total costs were calculated by taking the average usage for the sample and multiplying this by the unit cost. Prices were obtained through either (1) the Unit Costs of Health and Social Care [29] or (2) a policy paper regarding NHS reference costs 2013 to 2014 [30]; the latter was adjusted to 2017 prices using the Consumer Price Index rate (details from [31]). Cost details are provided in Online Resource 1 covering: Primary care physician visits (£38.00), Other healthcare professional visits (£106.42), Medication (see Online Resource 1), Blood tests (£8.41), Cardiac investigations (£40.97), Dual energy X-ray absorptiometry (£72.32), and Other appointments. Where participants stated that they used a service but did not specify the number of visits, a value of "1" was given.

In the UK, individuals are entitled to healthcare which is free at the point of access. For example, appointments with a primary care physician or attendance at A&E will generally be free of charge to the patient. Some interventions (e.g., medications) do incur a charge although some individuals (e.g., women who are pregnant or who have had a baby in the last 12 months) are entitled to free prescriptions.

Work and study impairment

Absenteeism costs were estimated from the number of full days participants reported having lost from work or study due to ED symptoms or concerns. As presenteeism, generally defined as reduced productivity whilst at work, is more complex to estimate [32], this was based on the findings of a sample of individuals with BED [33] reporting around 30% of time lost due to impaired productivity. Thus, if a participant reported 10 days of reduced productivity, this was 'costed' as the equivalent of three days of lost work. (A ratio of around 1:2.1 was estimated in a study of depression; [34].) Study impairment is presented as number of full days lost and days affected by reduced productivity for individuals in education, with no economic value attached.

To calculate costs, the Human Capital Method was used. This involved taking the number of days missed in the last three months, multiplying this by the equivalent mean wage (£16.65 per hour[1]), and extrapolating for one year. The wage estimate was based on that of a female in her late 20s [35] given the median age and gender distribution of this sample. Some individuals provided data for healthcare costs but not productivity costs. These individuals were included in the primary analyses (with a cost of zero) and removed for a sensitivity analysis (see Online Resource 2). A further sensitivity analysis (Online Resource 3) used different prevalence rates for men (0.5%) and women (2.5%) [28].

Binge eating frequency was taken from the Eating Disorder Examination questionnaire (EDE-Q; [36]), collected at the same time as cost data. Therefore, the timeframe of cost estimates (three months) was longer than that assessed by the EDE-Q (28 days), meaning that temporal precedence cannot be determined.

Statistical analyses

Kolmogorov-Smirnov tests were significant for cost estimates ($ps < 0.01$). Therefore, the Kruskal-Wallis H Test was used to look at group differences and, given the skew in cost data, the generalised linear model with a gamma probability distribution and log link function was used to explore correlates of costs. Regression models were used to look at associations with binge eating when controlling for covariates identified in previous literature (age, BMI).

Results

Inpatient costs were zero as no patients were admitted in the three months prior to completing the questionnaire. Healthcare usage and associated costs are provided in Table 2. The majority of the sample had contacted a primary care physician in the last three months, and over half had undergone investigations such as blood tests. Just over one-quarter had taken psychotropic medication.

Work absenteeism was reported by 40.0% of participants and 60.0% reported missing days of study / education (see Table 1). The majority of participants reported at least some work (n = 49; 84.5%) or study (n = 19; 82.6%) presenteeism. Eleven individuals gave information regarding both work and study.

Out-of-pocket expenses

Costs were estimated based on travel to the Eating Disorders Service (EDS). Where participants gave mileage only, costs were estimated based on £0.40 (£0.46) per mile travelled. Participants mentioned costs associated with missing work in order to attend appointments although this was sporadic and therefore not included.

Seventy-five individuals provided data on out-of-pocket expenses, of whom 28 (37.3%) cited no costs to themselves; for example, some used modes of transport from which running costs were not estimated (e.g., bicycle). As such, this is likely to be an underestimate of true cost impact, particularly as costs to attend other appointments (e.g., blood tests) were not accounted for. Estimated out-of-pocket expenses for the previous three months varied from zero to £60, and was not extrapolated for the year as the majority related to attendance for assessment at the EDS.

Costs by diagnosis

Costs by DSM-5 diagnosis [37] are presented in Table 4. Societal cost was estimated at £2,428.59 (£2,792.88) per person per annum across binge-eating disorders (a lower estimate than the sensitivity analysis, which was £3325.38 [£3,824.19]).

Correlates of costs

Frequency of binge eating was associated with all costs, and BMI was associated with productivity costs (Table 5). Age was not correlated with any costs, although costs appeared to be lowest in the 40+ age group (see Online Resource 4).

Discussion

The current study reports cost-of-illness data for adults referred for treatment of recurrent binge eating in the absence of significantly low body weight. Estimated costs to society were £2,428.59 (£2,792.88) per individual per annum. A sensitivity analysis (where individuals with missing data were excluded) suggested a figure of £3325.38 (£3,824.19). Results should be considered indicative (rather than exact) and taken alongside those of other studies – such as appraisals obtained from health insurance databases (e.g., [7, 15]) and other surveys (e.g., [5, 38]) – to estimate the overall economic impact of the full range of EDs.

Previous societal estimates have suggested that costs of EDs range between €10,000 - €14,000 per person per year [5]. Around a decade ago, Mitchell et al. [24] estimated that individuals with EDs incur costs of around \$4,000 (2005 prices) in the year preceding diagnosis, close to the current estimate (see also [15]). Although the current study asked participants about costs in the three months prior to treatment (and thus may reflect costs over a longer period less accurately; see also [12]), tangible costs borne by UK society for individuals with similar presentations equate to around £2.6 – £3.5 billion (assuming a prevalence of 1.6% in 66,435,550 adults in the UK [28] and [39]). A sensitivity analysis (changing the estimate of prevalence; see Online Resource 2) produced a similar result. The economic burden of this subset of EDs is significant (e.g., in 2010, UK societal cost of all anxiety disorders was estimated to be around €11.7bn and €1.6bn for epilepsy; [40]) and yet likely to underestimate the true cost of EDs to society as the current study did not consider children with regular binge eating, individuals with anorexia nervosa, nor costs to carers. Similarly, some costs were omitted due to inconsistent reporting, or underestimated given uncertainty (e.g., travel). Much of the economic burden noted in previous studies has been attributed to hospital admission, with the average cost of a hospitalised individual approximately four times that of someone not admitted [1]. As most individuals with EDs are not treated as inpatients, further reports of cost estimates for those commonly seen in outpatient clinics are needed.

Around 8 million days may be lost through absenteeism, and an even greater number through presenteeism, due to binge eating problems. Findings are comparable to those of other major psychiatric disorders, such as around nine annual days lost per worker with depression [34], and economic reports in the US and elsewhere have estimated that 75% of overall cost of EDs is attributable to productivity losses [5]. Given that the current cost estimate of presenteeism was based on previous work [33], which has also been the case in a recent US study [5], more work is needed to clarify the individual productivity losses attributable to EDs. A related finding concerned assessment of academic impairment (see also [41]), suggesting that around 40 days of study time per year are lost for each individual with a non-underweight binge-eating disorder. Study presenteeism was also high, reported at a similar prevalence to that within a study of depression (92%; [42]), although sample sizes were small. Given that academic impairment has rarely been considered in cost-of-illness studies [1], this area warrants further research.

The current estimates, whilst substantial, are less than those presented in a recent report commissioned by a UK eating disorder charity [21] and those in other countries [22, 23]. This is likely a result of several factors. First, only 'tangible' costs (e.g., healthcare, productivity) were included in the current study, with no assessment of the impact on wellbeing (e.g., in terms of disability-adjusted life years; see [5]). Second, children and adults with symptoms requiring intensive (e.g., inpatient) treatment were omitted, underestimating total costs for EDs. Where data were missing regarding a proportion of illness-related costs (i.e., a valid response to at least one question but at least one other was missing), costs were assumed to be zero for the missing estimate – a conservative estimate of total costs.

Age was not associated with costs, contrary to some previous research (e.g., [7]), although costs appeared to be lower in the oldest group (see also [5]). Binge eating frequency was consistently associated with higher costs, unlike the study of Dickerson et al. [20]. Although sample sizes were small, those with BN reported greater costs than BED and similar to OSFED although non-parametric comparisons were non-significant. Although further study is required, this accords with previous studies from the US (e.g., [16, 24]) and emphasises the importance of considering all ED presentations.

Strengths And Limits

The study employed a timeframe of three months as a trade-off between accuracy of recall and coverage, which was then generalised to estimate one-year costs. An attempt was made to balance costs associated with disordered eating and costs that might be incurred by non-affected individuals (e.g., a GP appointment for an unrelated issue) although it was difficult to separate these, which may confound findings. Costs associated with comorbidity were not estimated (e.g., [43]) and absence of a control group prevented direct comparisons with other samples (e.g., see [12]). A strength of the methodology was use of bootstrapping to account for data skew [4] and an attempt to focus on a range of costs from a societal perspective [1]. However, some areas (e.g., accommodation and living situation, food) were not covered in detail, which may contribute to underestimation of associated costs (e.g., see [14]). Similarly, there was no estimate of the economic impact of caring for someone with an ED, such as time spent attending joint appointments, and no assessment of expenditure on private treatment, which has been noted in previous UK studies [21].

The current study is one of the first to estimate societal costs of EDs focusing on a sample characterised by regular binge eating in the absence of low weight. Although this population is at low risk of hospital admission, costs associated with both healthcare usage and productivity losses were high, and comparable with previous estimates for similar binge-eating disorders. The findings highlight the widespread cost of EDs in individuals who are not underweight (representing those most commonly seen in clinical practice) and underscore the need for efficacious and cost-effective interventions. Paired with emerging data regarding the traditional underinvestment in ED research [19], the findings should act as a call-to-arms to stimulate funding and direction of resources to reduce the burden of EDs.

What is already known on this subject?

Several cost estimates have been provided for EDs, showing a huge economic toll. Estimates suggest that EDs cost society between €10,000 - €14,000 per person per year. However, several important limitations to previous work necessitate further studies in this area.

What this study adds

The current study looks at individuals reporting regular binge eating in the absence of low weight – perhaps the largest subgroup of EDs presenting to clinical services. It provides estimates of societal and healthcare provider costs, as well as looking at correlates of these costs. The findings are in line with previous estimates (costs to society of €2,792.88 per individual per annum) and suggest that greater investment in the treatment of binge eating is needed.

Declarations

Acknowledgements

The author is grateful to Dr Mara Violato for assistance in the early stages of this study.

Funding

Not applicable

Conflicts of interest/Competing interests

Not applicable

Availability of data and material

The data that support the findings of this study are available from the author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions (participants were not informed that this would be the case).

Code availability

Not applicable

Ethics approval

The data were collected as part of a randomised controlled trial, which was approved by the South Central – Oxford B Research Ethics Committee (13/SC/0217).

Consent to participate

Written informed consent was obtained from all participants.

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Tables

Table 1. Demographic and clinical characteristics of the sample (N = 126, except where indicated).

Variable	Value
Age, y: mean (SD)	30.20 (10.24)
Duration of illness, y: mean (SD) ^a	11.44 (9.87)
Body mass index, kg/m ² : mean (SD) ^b	27.42 (8.74)
Eating disorder diagnosis	
Bulimia nervosa: n (%)	76 (60.3)
Binge-eating disorder: n (%)	27 (21.4)
Other specified feeding and eating disorder: n (%)	23 (18.3)
Employment status	
Employed: n (%)	80 (63.5)
Unemployed: n (%)	7 (5.6)
Full-time Student: n (%)	34 (27.0)
Other: n (%)	5 (4.0)

^aN = 113; ^bN = 123

Table 2. Healthcare resource use and estimated costs

Domain	% with any use	Total no. of visits (last 3 months)	Mean no. of contacts for users (last 3 months)	Unit cost	Cost per person per year	% of total
Primary care physician	74/86 (86.0%)	NK	1	£38.00	£130.80	16.03%
Other HCP	31/84 (36.9%)	61	0.73	£39.00	£113.88	13.96%
A&E attendance	3/84 (3.6%)	13	0.15	£106.42	£65.88	8.08%
Medication						
Antidepressants	33/126 (26.2%)	-	-	£15.66	£16.40	2.01%
Other	3/126 (2.4%)	-	-	£24.33	£2.32	0.28%
Additional medication costs (e.g., dispensing)	36/126	-	-	£385.20	£440.24	53.97%
Medical investigations*						
Blood tests	45/85 (52.9%)	47	0.55	£8.41	£18.60	2.28%
Cardiac investigations	7/85 (8.1%)	7	0.08	£40.97	£13.48	1.65%
Bone density	3/85 (3.5%)	3	0.04	£72.32	£10.20	1.25%
Other	4/85 (4.7%)	4	0.05	£21.00	£3.96	0.49%
Subtotal	-	-	-	-	(£46.24)	(5.67%)

*Participants could report >1 investigation and could specify the number of visits (e.g., "two blood tests"). One participant reported having received an investigation but did not disclose its nature (so was costed as zero). NK = Not Known.

Table 3. Productivity costs

Domain	N*	Days (last 3 months), mean (SD)	Annual days, mean (SD)	Estimated cost loss per annum, mean (SD)
Work				
Absenteeism	60	2.41 (4.54)	9.63 (18.18)	£1203.01 (2269.84)
Presenteeism	58	17.90 (20.52)	71.59 (82.09)	£2681.91 (3075.45)
Total productivity loss	62	-	-	£3673.08 (3930.09)
Study				
Absenteeism	25	9.40 (18.60)	37.60 (74.40)	-
Presenteeism	23	28.70 (26.23)	114.78 (104.91)	-

*If data were missing from only one question, the cost is included in the Total

Table 4. Costs according to DSM-5 diagnosis and total sample

Diagnosis	Costs, mean (SD)				
	Healthcare use	Out-of-pocket	Productivity	Societal	Societal – SA
Total sample	£243.26 (547.39)	£10.76 (12.79)	£3673.08 (3930.09)	£2428.59 (3692.08)	£3325.38 (4022.53)
BN	£296.86 (697.98)	£9.14 (12.97)	£3996.16 (4296.80)	£2637.06 (4085.86)	£3487.30 (4432.17)
BED	£142.65 (94.43)	£13.95 (10.81)	£2163.31 (2652.28)	£1738.73 (2513.96)	£2244.31 (2691.20)
OSFED	£182.65 (110.02)	£12.33 (13.95)	£4375.80 (3614.02)	£2493.05 (3525.21)	£4115.48 (3868.27)
Kruskal-Wallis <i>H</i> Test (df = 2)	4.498	3.828	3.798	0.144	2.428

Note. SA = sensitivity analysis (individuals with missing cost data were excluded); all tests *ns*.

Table 5. Predictors of costs

Variable	Chi-square value for Dependent Variable (Costs, 2017 GBP)			
	Healthcare sector	Out-of-pocket	Productivity	Societal
Age	0.15	1.10	1.16	0.00
BMI	2.77	0.27	13.47**	0.22
Binge Eating	41.57**	45.36**	28.82*	35.23*

Note. BMI = body mass index. * $p < .05$. ** $p < .01$.

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