# Disability associated with community cases of commonly occurring eating disorders

## Abstract

*Objective:* To examine disability associated with community cases of the more commonly occurring eating disorders and with particular eating disorder behaviours.
*Method:* Self-report questionnaires, which included measures of eating disorder symptoms and impairment in everyday functioning, were completed by 495 female residents of the Australian Capital Territory region aged between 18 and 45 years. A structured interview for the assessment of eating disorders was completed by a subgroup (n=208) of participants. Discriminant function analysis was used to identify cases of eating disorders in the total sample (n=495) based on the characteristics of individuals interviewed. Impairment in functioning, as measured by the Medical Outcomes Study Short Form, was compared among eating disorder cases and non-cases, among subgroups of participants engaging in particular eating disorder behaviours, and among community cases of anxiety and affective disorders identified from the Australian National Survey of Mental Health and Well-Being.
*Results:* Community cases of eating disorders (n=31; 6.3%) were associated with substantial impairment in functioning, comparable with that of community cases of anxiety and affective disorders. Among eating disorder behaviours, the use of extreme weight-control behaviours, in particular self-induced vomiting, was associated with the highest levels of impairment, although the occurrence of regular episodes of overeating was also associated with considerable impairment.
*Conclusions:* The burden on the community of the more commonly occurring eating disorders may be substantial. Improving women's recognition of the adverse effects of eating disordered-behaviour on functioning, as well as their knowledge of effective treatments, will be important in reducing this burden.

(*Aust N Z J Public Health* 2004; 28: 246-51)

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In recent years the public health burden of mental disorders has received widespread publicity. Findings from the Australian Burden of Disease studies[1] and the National Survey of Mental Health and Well-Being (SMHWB)[2] converged with those of overseas studies in demonstrating that the burden of mental disorders on society is considerable. A major finding of the SMHWB in particular was that anxiety and affective disorders together accounted for more than half of the disability – that is, impairment in individuals' everyday functioning – attributed to mental disorders as a whole.[3] Information of this kind has been used to support recommendations concerning the allocation of funding for mental health services as well as the implementation of health promotion initiatives such as the National Depression Initiative.[3,4]

Assessment of eating-disordered behaviour was not included in the SMHWB. Cases of eating disorders presenting for treatment place a considerable strain on health services because of high levels of clinical load (patient days), high levels of comorbidity with anxiety and affective disorders, and high rates of relapse.[5,6] Medical complications of anorexia nervosa (AN), including loss of menstruation, are a consequence of severe weight loss and may be life-threatening. However, AN is uncommon and affects primarily adolescent girls. Bulimia nervosa (BN) is more common, affecting approximately 1% of young adult women, with onset typically around 18 years.[7] It is characterised by recurrent episodes of binge eating and the use of extreme weight control behaviours, namely, self-induced vomiting, misuse of laxatives and/or diuretics

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(purging behaviours), excessive exercise and extreme dietary restraint. While individuals affected by BN are usually in the normal weight range, binge/purge behaviours may occur in individuals suffering from AN, and individuals treated for AN as adolescents may develop BN when they are older.[8]

A much greater number of women – in the order of 5% – are affected by bulimic-type eating disorders that do not meet formal diagnostic criteria for BN.[9] For example, some individuals do not have episodes of overeating, but nevertheless employ extreme methods of weight control. Others experience recurrent episodes of 'overeating' in which the amounts of food eaten are not very large, but which are nevertheless distressing. A particularly common variant of BN, known as Binge Eating Disorder (BED), is characterised by recurrent episodes of binge eating without the regular use of extreme weight control behaviours.[10] BED affects between 2% and 3% of young adult and middle-aged women.[11] It is associated with high levels of psychiatric comorbidity, obesity, and poor overall health.[11,12] BED, like other eating disorders, occurs primarily in women, although the gender difference appears to be less pronounced than for AN and BN.[11] Notwithstanding their prevalence, the burden on society of these more commonly occurring eating disorders is largely unknown.

The primary aim of the present study was to examine disability associated with BN-type eating disorders (including BED) among women in the community, using a generic measure of disability employed in the SMHWB. It was hypothesised that community cases of these more commonly occurring eating disorders would be associated with substantial impairment in functioning, comparable with that of community cases of anxiety and affective disorders. A secondary aim was to examine the relative contributions of particular eating disorder behaviours to impairment in functioning.

## Method

### Design and participants

The study was carried out in the Australian Capital Territory (ACT) region of Australia (population 324,000), a highly urbanised region that includes the city of Canberra. Self-report questionnaires were delivered to a random sample of 802 female ACT residents aged 18-45. The questionnaire included measures of eating disorder psychopathology (EDE-Q),[13] disability (SF-12),[14] general psychological distress (K-10),[15] weight, height and socio-demographic information. Individuals who returned a completed questionnaire and who indicated a willingness to be contacted by telephone at a future date were approached to participate in a second phase of the study, involving administration of the Eating Disorder Examination (EDE), a structured interview for the assessment of eating disorders.[16]

### Measures

#### Eating Disorder Examination Questionnaire (EDE-Q)

The EDE-Q[13] is a 36-item measure derived from the interview schedule. Eating disorder (i.e. binge eating and weight control)

behaviours are assessed in terms of their occurrence and frequency during the past four weeks, with the exception of dietary restraint, which is assessed with more detailed questions. Subscales relating to attitudinal aspects of eating disorder psychopathology are derived from other questionnaire items. With respect to the assessment of overeating, a distinction is made between episodes involving both loss of control and consumption of an objectively large amount of food ('objective overeating'), and episodes in which a loss of control is experienced but in which the amount of food consumed is not large ('subjective overeating'). Reliability and validity are well established.[13,17]

#### Medical Outcomes Study Short Form Disability Scale (SF-12)

The SF-12[14] is a 12-item measure of impairment in daily functioning associated with physical and mental health problems. Both the SF-12, and its parent instrument, the SF-36, have been widely used as measures of health-related quality of life in studies of both mental disorders and physical illnesses.[14,18] Items of the SF-12 are summarised into two weighted scales (Mental Component Summary scale, MCS; Physical Component Summary scale, PCS), each scored to have a mean of 50 and standard deviation of 10, with lower scores indicating higher levels of impairment. The scale has robust psychometric properties and its validity in the Australian population has been demonstrated.[19] A score of 40 or less on the MCS is considered indicative of moderate impairment, while a score of 30 or less indicates severe impairment.[20]

#### Kessler Psychological Distress Scale (K-10)

The K-10[15] is a 10-item measure of general psychological distress developed for use in general population studies. In Australia it is also used as an outcome measure among individuals treated within mental health services. The frequency of each of 10 depressive or anxiety symptoms is measured on a scale from one to five. In the present study, coding of response options was such that total scale scores range from 10 to 50, with higher scores indicating fewer symptoms. Individuals scoring in the extreme range ($\leq$30) have a very high probability of meeting criteria for a clinically significant anxiety or affective disorder.[21] In this study, the K-10 was used as an additional measure of impairment, rather than as a covariate, because scores on this measure were highly correlated with those on the MCS ($r$=0.71, $p$<0.001).

### Statistical analysis

Discriminant function analysis was used to identify probable cases of eating disorders in the total sample based on the EDE-Q responses of actual cases identified at interview. In this method, a linear combination of (EDE-Q) item responses that best distinguishes between cases and non-cases is developed from the interviewed sample. The function is then calculated for each member of the total sample, with individuals scoring above a fixed cut-point deemed to be 'probable cases'. A cut-point was chosen so that only individuals in the total sample with EDE-Q profiles very similar to those of actual cases were selected. Mean age, body mass index (BMI, kg/m$^2$) and scores on the PCS, MCS and K-10

were then compared between probable cases of eating disorders and probable non-cases by means of independent sample *t*-tests. Mean scores on the MCS for cases of anxiety and affective disorders identified in the SMHWB are given for descriptive purposes. Multiple regression models were used to examine the relative contributions of particular eating disorder behaviours to the prediction of scores on the MCS, while controlling for age and BMI. Overlap between the occurrence of different behaviours was assessed by means of the Pearson correlation coefficient. All analyses were conducted using SPSS version 10.0.

## Results

### Characteristics of the study sample

Completed questionnaires were received, following reminder letters, from 495 individuals, which represented a response rate of 69.5% after addresses known to be incorrectly listed (n=90, 11.2%) were taken into account. Most respondents (81.5%) were born in Australia and had English as a first language (88.6%); 54.6% were married and 57.5% had one or more children; 85.0% of respondents had completed 12 years of formal education, 27.7% a trade or technical qualification, 20.1% a bachelor's degree, and 9.3% a postgraduate degree; 47.3% were employed full time, 13.7% listed home duties as their main activity; while a further 11.7% were full-time students. The mean age of respondents was 34.5 years (SD=8.9). Mean BMI was 24.8 kg/m$^2$ (SD=5.4).

Of 308 participants who provided a contact telephone number, 208 (67.5%) completed interviews. Individuals interviewed were older (mean=35.3 years vs. 32.1 years; *t*=4.09, *p*<0.05) and more likely to be married (64.2% vs. 51.9%, $\chi^2$=14.12, *p*<0.01), and to have one or more children (66.2% vs. 51.2%, $\chi^2$=12.80, *p*<0.01), than individuals not interviewed (n=287). The two groups did not differ with respect to any of the other demographic variables assessed, nor with respect to eating-disordered behaviour, as measured by the EDE-Q or BMI. A detailed analysis found no evidence for the occurrence of non-response bias at either phase of the study.[22]

### Derivation of probable cases in the total sample

Thirteen individuals (6.3% of the interviewed sample) met the study criteria for a clinically significant eating disorder based on the EDE interview. There were no individuals meeting criteria for AN, or for BN purging subtype, but one individual met criteria for BN non-purging subtype.[10] The remaining 12 cases would be classified as 'Eating Disorders Not Otherwise Specified'.[10] These included two cases of BED, four participants who met criteria for BED, except that their overeating episodes were not objectively large, and six cases that involved recurrent episodes of subjective overeating in conjunction with the use of extreme weight-control behaviours. A total of 31 probable cases (hereafter referred to as 'cases'; 6.3%) were identified on the basis of the discriminant function analysis, while the remaining 464 individuals (93.7%) were classified as probable non-cases (hereafter referred to as 'non-cases').

**Table 1: Mean (SD) age, body mass index (BMI), and scores on measures of disability (MCS, PCS) and general psychological distress (K-10) for cases of eating disorders and non-cases in a community sample of women.**

| | Cases (n=31) | Non-cases (n=464) | *p*[d] |
|---|---|---|---|
| Age (years) | 29.14 (8.84) | 33.75 (8.84) | *p*<0.01 |
| BMI (kg/m$^2$) | 27.91 (7.60) | 24.65 (5.23) | *p*<0.01 |
| MCS[a] | 34.98 (10.56) | 48.23 (9.74) | *p*<0.001 |
| PCS[b] | 49.10 (11.03) | 50.84 (8.59) | *p*>0.05 |
| K-10[c] | 36.30 (9.56) | 43.70 (5.93) | *p*<0.001 |

*Notes:*
*(a) Medical Outcomes Short Form Mental Component Summary scale.[14]*
*(b) Medical Outcomes Short Form Physical Component Summary scale.[14]*
*(c) Kessler 10-item Psychological Distress Scale.[15]*
*(d) Significance of comparison according to an independent sample t-tests.*

### Comparison of eating disorder cases and non-cases

Table 1 shows mean age and BMI, and scores on the MCS, PCS and K-10, for cases of eating disorders and non-cases. It can be seen that the mean age of cases was lower than that of non-cases, while the mean BMI of cases was higher than that of non-cases. While 14.1% of non-cases met the accepted criterion for obesity (BMI ≥30kg/m$^2$), 39.3% of cases met this criterion. However, scores on SF-12 PCS did not differ between groups. Scores on the MCS and K-10 remained significantly lower among cases after controlling for the effects of age and BMI (*F*=33.11, *p*<0.001; F=22.69; *p*<0.001; respectively). While 5.6% of non-cases had scores in the extreme range (≤30) on the K-10, 30.0% of cases had scores in this range.

Comparison of the present data with those of the SMHWB indicated that scores on the SF-12 MCS among eating disorder cases were similar to those of community cases of any current (one-month) affective disorder (mean=33.6), and those of any current anxiety disorder (mean=36.9), among women aged 18 to 45 years.[23] The proportion of individuals likely to be severely disabled by their symptoms (MCS ≤30) was similar among cases of eating disorders (45.2%) and those of affective disorders (41.3%), but somewhat lower among cases of anxiety disorders (31.7%).

### Disability associated with particular eating disorder behaviours

Table 2 shows the number of individuals in each group reporting the use of particular eating disorder behaviours during the past 28 days. Chi-square tests confirmed that the proportion of participants engaging in each behaviour was higher among cases than among non-cases, as would be expected.

Table 3 shows mean scores on the MCS and K-10 among subgroups of participants reporting each behaviour. It can be seen that the use of purging behaviours, in particular that of self-induced vomiting, was associated with very high levels of impairment and general psychological distress. The regular occurrence

**Table 2: Frequency of self-reported eating disorder behaviours among cases of eating disorders (n=31) and non-cases (n=464) (past 28 days).**

| Behaviour | Cases n (%) | Non-cases n (%) | $p^f$ |
|---|---|---|---|
| Self-induced vomiting[a] | 6 (19.4) | 0 (0) | $p<0.001$ |
| Laxative misuse[b] | 12 (38.7) | 0 (0) | $p<0.001$ |
| Diuretic misuse[c] | 3 (9.7) | 2 (0.4) | $p<0.001$ |
| Restraint[d] | 6 (19.4) | 11 (2.4) | $p<0.001$ |
| Objective overeating[e] | 12 (38.7) | 12 (2.6) | $p<0.001$ |
| Subjective overeating[h] | 7 (22.6) | 14 (3.0) | $p<0.001$ |
| Exercise[g] | 3 (9.7) | 12 (2.6) | $p<0.01$ |

Notes:
(a) Any episodes of self-induced vomiting.
(b) Any episodes of laxative misuse.
(c) Any episodes of diuretic misuse.
(d) Not eating for periods of eight or more waking hours three or more times per week.
(e) Four or more objective overeating episodes.
(f) Four or more subjective overeating episodes.
(g) Twenty or more sessions of vigorous exercise for weight or shape reasons.
(h) Significance of comparison according to a chi-square test (df=1).

of both objective and subjective episodes of overeating, and extreme dietary restraint, were also associated with considerable impairment, while impairment associated with the use of exercise as a means of weight control was minimal.

### *Correlational and multiple regression analysis*

Correlations between the occurrence of different eating disorder behaviours in the total sample are shown in Table 4. In this sample the occurrence of objective overeating was associated with that of subjective overeating, but not with the use of purging behaviours or dietary restraint, while the occurrence of subjective overeating was associated with both misuse of laxatives and dietary restraint. Dietary restraint was associated with each of the purging behaviours and individuals who used one purging behaviour tended to use other such behaviours. The use of excessive exercise as a means of weight control was not related to episodes of either objective or subjective overeating, or to the use of other weight-control behaviours.

**Table 4: Correlations (Pearson r) between the occurrence of particular eating disorder behaviours in the total sample (n=495) (see Table 2 for item descriptors).**

| | V | L | D | R | O | S |
|---|---|---|---|---|---|---|
| Vomiting (V) | – | | | | | |
| Laxatives (L) | 0.34[a] | – | | | | |
| Diuretics (D) | 0.36[a] | 0.38[a] | – | | | |
| Restraint (R) | 0.28[a] | 0.26[a] | 0.20[a] | – | | |
| OBEs (O) | 0.06 | 0.03 | -0.02 | 0.01 | – | |
| SBEs (S) | 0.08 | 0.18[a] | 0.08 | 0.19[a] | 0.29[a] | – |
| Exercise | -0.02 | 0.06 | -0.02 | 0.03 | 0.02 | 0.02 |

Note:
(a) $p<0.01$ (two-tailed).

**Table 3: Mean (SD) scores on the MCS and K-10 among subgroups of participants engaging in particular eating disorder behaviours over the past 28 days.**

| Behaviour[a] | n | MCS | K-10 |
|---|---|---|---|
| Self-induced vomiting | 6 | 27.17 (7.91) | 27.00 (5.39) |
| Laxative misuse | 12 | 33.36 (10.04) | 31.58 (9.87) |
| Diuretic misuse | 5 | 35.43 (12.09) | 34.20 (10.21) |
| Restraint | 17 | 37.82 (11.40) | 34.94 (10.16) |
| Objective overeating | 24 | 39.37 (11.51) | 40.63 (7.16) |
| Subjective overeating | 21 | 38.27 (10.84) | 37.00 (8.54) |
| Exercise | 15 | 46.40 (11.51) | 43.50 (6.19) |

Note:
(a) See Table 2 for item descriptors.

Multiple regression analysis indicated that the occurrence of any episodes of purging and the regular occurrence of episodes of objective overeating both contributed significantly to the prediction of scores on the MCS, while the contribution of extreme dietary restraint approached significance. Controlling for other variables, the occurrence of any purging activity was associated with a nine-point decline on the MCS scale (see Table 5).

## Discussion

We found that community cases of the more commonly occurring eating disorders were associated with marked impairment in functioning among young adult women, comparable with that of community cases of anxiety and affective disorders. Further, close to half of those individuals identified as eating disorder cases were likely to be severely disabled by their symptoms. Among eating disorder behaviours, the use of purging as a means of weight control, in particular that of self-induced vomiting, was associated with the highest levels of disability and general psychological distress. Episodes of objective overeating were also associated with

**Table 5: Multiple regression analysis of eating disorder behaviours predictive of impairment in everyday functioning, as measured by the Medical Outcomes Study Short-Form Mental Component Summary scale (MCS) (see Table 2 for item descriptors).**

| Variable | Unstan. coeffic. | Standard error | Beta | Signif. of $t$ |
|---|---|---|---|---|
| (constant) | 46.9 | 2.67 | | 0.000 |
| Age | 0.079 | 0.056 | 0.068 | 0.157 |
| BMI | -0.046 | 0.092 | -0.025 | 0.613 |
| Purging[a] | -9.20 | 3.15 | -0.151 | 0.004 |
| Restraint | -5.35 | 2.79 | -0.098 | 0.056 |
| OBEs | -6.63 | 2.35 | -0.139 | 0.005 |
| SBEs | -4.00 | 2.50 | -0.082 | 0.110 |
| Exercise | -0.397 | 2.59 | -0.007 | 0.878 |

Notes:
(a) Any episodes of self-induced vomiting, laxative misuse or diuretic misuse.
$R^2 =0.096$, $F_{7,409} = 6.228$; $p<0.001$.

considerable impairment in functioning, independent of the occurrence of extreme weight-control behaviours, while impairment in functioning associated with excessive exercise was minimal.

It has been suggested that, for 'administrative' purposes, epidemiological estimates of need for treatment associated with mental disorders should be based on the demonstration of "substantial disablement in daily life".[24] Generic measures of health-related quality of life, such as the SF-12, the SF-36, and the 'disability days' measure employed in the United States National Comorbidity Study, have been widely used for this purpose.[3,25] In the SMHWB, anxiety and affective disorders accounted for more than half of the total disability days attributable to mental disorders in the total sample (n=10,641), due to the combination of their prevalence and the degree of associated disability.[3] The findings of the present study suggest that the burden on the community of the more common types of eating disorders may also be considerable. Further, rates of treatment seeking among individuals affected by bulimic-type disorders are low[9] and detection of these disorders in primary care is poor.[9,12] Effective treatments are available for these disorders.[26] However, knowledge of these treatments may be poor among women in the community.[27]

The present findings also indicate that estimates of disability associated with eating disorders that consider only narrowly defined AN and BN are likely to seriously underestimate the extent of the problem. In the Australian Burden of Disease studies,[1] anxiety and affective disorders accounted for nearly 70% of the total burden of mental disorders – measured in disability-adjusted life years – in women, while eating disorders accounted for only 6.3% of this burden. However, only AN (assumed prevalence=0.5%) and BN (assumed prevalence=1.0%) were modelled in these studies. In the present study, the prevalence of probable cases of clinically significant eating disorders was 6.3%. Findings from another Australian study, in which interview assessment of all probable cases of eating disorders presenting to primary care was conducted, found a similar prevalence of 5.2%.[9] The current (one-month) prevalence of any anxiety disorder among women aged 18 to 45 in the SMHWB was 5.5%, while the current prevalence of any affective disorder was 4.6%.[23]

Given high levels of comorbidity between eating disorders and both anxiety and affective disorders, the extent to which low scores on the MCS among eating disorder cases reflects impairment in functioning associated with eating-disordered behaviour *per se*, as opposed to impairment associated with symptoms of anxiety and depression, is a moot point, although the attribution of disability has implications for both treatment and prevention. For example, methods effective in the treatment of binge eating behaviour may not be applied if it is assumed that symptoms of depression are 'primary', while efforts to prevent eating disorders may give insufficient attention to pre-existing depression if it is assumed that eating disorder symptoms are primary. It would be of interest to examine the extent to which perceived impairment in functioning is attributed to eating disorder symptoms, as opposed to symptoms of anxiety and depression, in a community sample of women affected by eating disorders.

A component of the impairment in functioning observed among cases of eating disorders might also be attributed to poor physical health associated with being overweight. In the present study, close to 40% of individuals identified as eating disorder cases met the accepted criterion for obesity. However, scores on the Physical Component Summary Scale of the SF-12 did not differ between cases of eating disorders and non-cases and BMI did not contribute to the prediction of variance in scores on the MCS after controlling for eating disorder behaviours. Whether the public health consequences of poor physical health outweigh those of mental disorders is a matter of opinion. In a study of health-related quality of life among individuals with mental disorders in primary care,[18] mental disorders accounted for considerably more of the impairment in health-related quality of life than did common medical conditions such as diabetes, arthritis and hypertension.

Consistent with findings from large-scale epidemiological studies,[28] the use of purging behaviours, while uncommon, was associated with very high levels of impairment. For this reason, purging and non-purging subtypes of both AN and BN are distinguished in classification schemes for the eating disorders.[10] Also under current classification schemes, the occurrence of objective overeating episodes is required for the diagnoses of BN and BED, while variants of BN not involving consumption of large amounts of food fall into the residual category of 'Eating Disorders Not Otherwise Specified'. The present results might be seen to support this distinction, in that the occurrence of subjective overeating did not contribute to the prediction of impairment in functioning after controlling for other eating disorder behaviours. However, the association between subjective overeating and the use of extreme weight control behaviours is worthy of further investigation.[9] The finding that 'excessive' exercise was associated with minimal impairment in functioning may reflect an ego-syntonic effect of vigorous exercise among individuals who might otherwise resort to more extreme weight control behaviours.[29] Also, obligatory aspects of exercise, such as continuing to exercise when injured or unwell, may be a better predictor of functional impairment than frequency of exercise.[30]

There were a number of limitations of the study. First, identification of eating disorder cases was based on extrapolation from a subgroup of individuals with whom interviews were conducted. While interview assessment of all possible cases would have been preferable, interviewed participants did not differ from those not interviewed on key features and the fact that all (n=15) participants reporting episodes of self-induced vomiting and/or laxative misuse were identified as cases supports the validity of the method employed. Second, assessment of eating disorder behaviours was by self-report. Because self-report assessment of some behaviours may be less reliable than interview assessment,[13,17] and given the small number of participants involved, findings relating to disability associated with particular eating disorder behaviours should be interpreted with caution. Finally, we included only one measure of disability. Findings from the SMHWB indicated a very high correlation between scores on the MCS scale and the 'disability days' measure, the advantage of the SF-12

being its sound psychometric properties.[3] However, use of a broader range of assessment methods in future research will provide a clearer picture of the burden of eating-disordered behaviour on the individual and on the community.

In conclusion, the burden on the community of the more commonly occurring eating disorders may be substantial. Improving women's recognition of the adverse effects of eating-disordered behaviour on functioning, as well as their knowledge of effective treatments, will be important in reducing this burden. Further research is needed to examine impairment in functioning associated with eating-disordered behaviour using a range of assessment instruments.

## Acknowledgement

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