Assessing the prevalence of eating disorders in an Australian twin population

Tracey Wade, Andrew C. Heath, Suzanne Abraham, Susan A. Treloar, N.G. Martin, M. Tiggemann

Objective: This paper examines the prevalence of disordered eating in a female Australian twin population aged between 28 and 90 years in 1993.
Method: In two waves of data collection, the eating behaviour of 3869 female twins was first assessed in 1988–1989 by self-report questionnaire and then in 1992–1993 with a telephone interview, using the Semi-Structured Assessment for the Genetics of Alcoholism interview.
Results: It was found that about 0.4% of the women have a lifetime prevalence of anorexia nervosa and 1.8% of the group have suffered from bulimia nervosa. The incidence of bulimia nervosa but not anorexia nervosa was markedly higher for those women under 45 (2.3% bulimia nervosa) than for those women 45 years or older. Furthermore, one in three women have at some stage in their life used some extreme method of weight control.
Conclusions: The levels of bulimia nervosa and anorexia nervosa found are commensurate with those found in smaller studies in Australia and other parts of the world. The finding of widespread use of extreme weight control methods is of concern as this behaviour is a well-recognised precursor to more serious eating disorders.

Australian and New Zealand Journal of Psychiatry 1996; 30:845–851

According to the DSM-III-R criteria [1], eating disorders can be categorised into two types. The first, anorexia nervosa, describes a disorder consisting of an overvaluation of the importance of weight and shape in defining self-worth and an intense fear of gaining weight, even though the person has intentionally lost weight so as to be below 85% of the minimal normal body weight. A second type of eating disorders, a binge–purge syndrome, was first recognised in the late 1970s [2], and subsequently the term 'bulimia nervosa' was introduced to describe the presence of bingeing, purging and 'a morbid fear of becoming fat' [3]. A third type of disordered eating, recognised in DSM-IV [4], is called Eating Disorder Not Otherwise Specified (EDNOS) and covers a range of behaviours, typically components of anorexia nervosa or bulimia nervosa which do not reach the diagnostic threshold (e.g. the presence of all diagnostic components of anorexia nervosa with the exception of the loss of menses for three consecutive months).

School of Psychology, Flinders University of South Australia, Bedford Park, South Australia, Australia

Tracey Wade MClinPsych, Researcher

Marika Tiggemann PhD, Senior Lecturer in Psychology

Department of Psychiatry, Washington University Medical School, St Louis, Missouri, United States of America

Andrew C. Heath DPhil, Professor of Psychology

Department of Obstetrics and Gynaecology, University of Sydney, Sydney, New South Wales, Australia

Suzanne Abraham PhD, FRANZCP, Associate Professor in Psychiatry

Department of Epidemiology, Queensland Institute of Medical Research, Brisbane, Queensland, Australia

Susan A. Treloar PhD, Researcher

Nicholas G. Martin PhD, Professor

Examination of large scale population studies which have used diagnostic interviews would suggest that the levels of DSM-III-R anorexia nervosa are up to 0.7% [5]. Use of self-report questionnaires would suggest higher prevalence rates, between 0.7% and 1.6% [6]. One summary of epidemiology studies examining bulimia nervosa suggests that face-to-face or telephone interview-based studies find a mean prevalence rate of 1% to 2% and that self-report questionnaires find a mean prevalence rate of around 2.6% [7]. Self report studies find that about 35% of women are currently binge-eating, 29% are currently fasting, 8% are currently using self-induced vomiting and 6% are using laxatives. In a group of women attending a British family planning clinic it was found that between 20% and 27% of women had current bulimic episodes, about 2% to 3% were experiencing current self-induced vomiting and up to 2% could have a diagnosis of 'probable bulimia nervosa' [8].

Two recent large scale studies have examined the lifetime prevalence rates of bulimia nervosa. The first, a New Zealand study carried out by Bushnell and his colleagues [9], employed both female lay interviewers and male professionals to carry out face-to-face interviews using the Diagnostic Interview Schedule (DIS) [10] with a general population sample containing 1498 respondents aged between 18 and 64 years. Assessment of DSM-III-R bulimia nervosa in women who were in the 18–44 year age range gave a lifetime prevalence of 1.6%. The second study, that of Kendler *et al.* [11], examined a North American female twin population (ascertained through the Virginia Twin Registry), involving 2163 females aged between 17 and 55 years (mean age = 30.1, SD = 7.6). Using the Structured Clinical Interview for DSM-III-R (SCID) [12] to assess lifetime psychiatric illness, interviewers found a lifetime prevalence of bulimia nervosa of 2.8%.

With respect to the Australian population, two epidemiological surveys have previously been carried out, both in South Australia [13,14]. The first study examined the prevalence of DSM-III anorexia nervosa in 5705 schoolgirls aged 12–18 years. Initial identification relied on teacher's assessments of the presence of anorexia nervosa. Results suggested that there were 1.05 cases per 1000 of the population studied (0.1%). The second study focused on the prevalence of DSM-III-R bulimia nervosa. Three different groups (high school students, people using a suburban shopping centre, and people attending a general practice) were assessed by self-report questionnaires, with respective response rates of 74%, 66% and 94%. A total of almost 1000 women were sampled and ages ranged from 11 to 82 years. The prevalence of bulimia nervosa was about 1.7%. However, the authors acknowledged the problems of a non-representative sample and some low response rates.

The aim of the present study is to extend our knowledge of the presence of disordered eating in the general Australian population in a number of ways. First, it represents the first large scale investigation of a cross-sectional sample of an Australian population. Second, it examines the full range of disordered eating rather than focusing solely on bulimia nervosa or anorexia nervosa. Third, it uses both a self-report questionnaire and telephone interview to ascertain prevalence rates of the various types of disordered eating.

Method

Sample

In 1988–1989 a self-report questionnaire concerning general health was sent out to twin pairs registered with the Australian National Health and Medical Research Council Twin Register who had completed a general 'Health and Lifestyle' questionnaire 8 years earlier [15]. The section relating to eating problems was completed by females only. Of the 4116 women who returned questionnaires, 247 (6%) did not answer any of the eating questions and were removed from further analysis. Results of the present study include data from 3869 female twins whose ages ranged between 24 and 86 years, the mean age (on 1 January 1989) being 41.9 years (SD = 13.1). This age should permit lifetime prevalence to be established with some confidence, given that the mean age of onset of anorexia nervosa is 17 years [4] and of bulimia nervosa is 20.9 years (SD = 6.5) [11].

An examination of the sociodemographic features of the respondents is provided in Table 1. The present sample is not notably different from the Australian female population assessed by the Australian Bureau of Statistics (ABS) between 1986 and 1992 on the criteria of age, overall educational level and marital

Table 1. Sociodemographic characteristics of respondents to the questionnaire

	Total	Percentage
Marital status (n=3198)		
Never married	340	10.6
Married	2239	70.0
De facto/living together	132	4.1
Separated/divorced/widowed	264	11.8
Remarried	113	3.5
Highest education level attained (n=3167)		
Less than 7 years of schooling	60	1.9
8–10 years of schooling	1151	36.3
11–12 years of schooling	718	22.7
Apprenticeship/diploma	401	12.7
University first degree	682	21.5
University postgraduate training	155	4.9
Workforce participation (n=3117)		
Student	47	1.5
Unemployed	44	1.4
Part-time worker	752	24.1
Homemaker	958	30.7
Full-time worker	1036	33.2
Retired	221	7.1
Major lifetime occupation (n=2752)		
Managers and administrators	204	7.4
Professionals/para-professionals	1005	36.4
Tradespersons	124	4.5
Clerks	993	36.1
Salespersons/personal services	265	9.6
Labourers and related workers	161	5.9

status [Treloar A: unpublished data]. There were more people in the twin sample with degrees rather than diplomas or trade qualifications and there was a relative excess of labour force participation by older twins. The categories of occupational classification were similar, with the exception of more twins in the professionals category and fewer twins in the sales/service workers category.

Questionnaire

The questionnaire contained the following five questions relating to eating problems, all of which required a 'yes' or 'no' answer. For questions 1–4, subjects were asked to report both 'now' and 'previously'.

(1) Do you feel that you have difficulty controlling weight?

(2) Do you feel you have had problems with disordered eating?

(3) Have you used any of the following methods to control your body weight: starvation, self-induced vomiting, excessive exercise, laxatives, fluid tablets or slimming tablets?

(4) Do you feel you have been preoccupied with thoughts of food or body weight?

(5) Have you suffered from, or been treated for, an eating disorder, low body weight, binge-eating, obesity, weight loss, anorexia nervosa, or bulimia?

Interview

Follow-up telephone interviews were conducted with those people who had earlier completed questionnaires over 1992–1993, using a psychiatric interview schedule: the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) [16]. The SSAGA is an instrument modified for Australian use, which is comprised primarily of items previously validated by other research interviews, including the DIS and the SCID. The interview was administered, on average, 3.8 years (SD = 0.6) after the questionnaire was completed. The section relating to eating behaviour asked questions relating to DSM-III-R criteria for both anorexia nervosa and bulimia nervosa. The following questions assessed bulimia nervosa:

(1) Were you ever greatly concerned about eating too much, looking too fat, or gaining too much weight?

(2) Has there ever been a time in your life when you went on eating binges, eating a large amount of food in a short period of time (usually less than 2 hours)?

(3) Did you go on eating binges as often as twice a week?

(4) During these binges were you afraid that you could not stop eating, or that your eating was out of control?

(5) Did you do anything to prevent weight gain from binge-eating, such as making yourself vomit, taking laxatives or diuretics, dieting strictly, fasting, exercising vigorously, or anything else?

In addition, if women indicated problems with weight loss they were asked, 'How old were you (when this was happening)?', and if they admitted to

Table 2. Percentage of subjects responding positively to questionnaire items

Question	Now (%)			Previously (%)			Ever (%)		
	Total	<45	≥45	Total	<45	≥45	Total	<45	≥45
(1) Difficulty controlling weight	37.2	36.6	38.3	34.5	36.1	30.7	49.1	49.6	48.0
(2) Problems with disordered eating	16.8	17.3	15.6	18.3	20.1	14.1	23.4	24.5	20.8
(3) Methods of controlling body weight									
Starvation	3.3	3.7	2.4	8.7	11.2	3.4	9.7	12.2	4.3
Self-induced vomiting	0.5	0.6	0.2	1.9	2.5	0.5	2.2	2.9	0.6
Excessive exercise	4.4	5.5	2.1	8.0	10.1	3.4	9.7	12.2	4.3
Laxatives	3.0	2.6	3.7	6.9	8.2	4.0	8.0	9.1	5.7
Fluid tablets	5.1	3.3	8.8	7.9	7.6	8.5	10.0	8.9	12.4
Slimming tablets	4.9	5.7	3.3	15.9	17.8	11.9	17.6	19.7	12.9
(4) Preoccupied with food/body weight	24.2	27.9	16.5	27.4	32.9	15.4	34.4	40.6	21.2
(5) Ever suffered from/treated for									
An eating disorder							2.6	2.9	1.9
Low body weight							4.0	4.3	3.2
Binge-eating							1.9	2.5	0.6
Obesity							6.9	6.8	7.1
Weight loss							4.6	5.3	3.2
Anorexia nervosa							1.0	1.3	0.4
Bulimia							0.6	0.9	0.1

bingeing, they were asked 'How old were you when you first went on an eating binge?'

To obtain a diagnosis of bulimia nervosa, women had to have answered the first four questions positively and indicated at least one of the weight control methods (question 5).

The total number of women who completed satisfactory interviews with regards to eating problems was 3845, with mean age on 1 January 1993 being 45.2 years (SD = 12.6), age range from 28 to 90 years old. Interviews were administered by trained lay interviewers, all of whom were female. The scoring of the interview was subsequently carried out by the principal author, a clinical psychologist with a number of years' postgraduate experience running an eating disorders clinic.

Results

Response rates

Of the 4870 women who completed the original 1980–1981 mailed survey, 4116 returned the self-report questionnaire in 1988–1989 and 3845 completed the follow-up telephone interview in 1992–1993 (79.0% of the original 4870). The completion rate for the telephone interview among the respondents to the 1988–1989 survey was 93.4%.

Questionnaire estimates of prevalence of disordered eating

Women's responses to the questionnaire items relating to eating are summarised in Table 2 using three categories: (i) 'now', problems being reported at the time of filling in the questionnaire; (ii) 'previously', problems being experienced in the past; and (iii) 'ever', a summation of the number of individuals who selected at least one of the first two categories. To facilitate comparisons with other studies, results are also divided into two age groups: less than 45 years old and 45 years old or over (at 1 January 1989).

Of all the listed problems, the most commonly experienced was the control of weight with almost half the sample reporting difficulties in this area at some stage of their life. Over one-third of the group had experienced preocupation with food or body weight. About one-quarter of the group reported problems with disordered eating. The number of individuals who responded positively to use of any extreme methods of weight control, as specified in question (3), was a full 29.2% of the sample.

Interview estimates

There were 17 women (0.4%: CI 0.2–0.6%) who met the lifetime prevalence of DSM-III-R anorexia nervosa (four of these also met criteria for bulimia nervosa). Of these women under 45 years of age, 13 (0.6%: CI 0.3–0.9%) were diagnosed as having lifetime prevalence of anorexia nervosa. There were four women (0.3%: CI 0.03–0.6%) who were 45 years or older and who had a lifetime diagnosis of anorexia. There was no difference between the prevalence levels of anorexia nervosa for the two age groups (likelihood ratio χ^2 =3.57, df=1, p>0.05).

Of the total sample, 68 (1.8%: CI 1.4–2.2%) had a lifetime prevalence of bulimia nervosa. There were 51 (2.3%: CI 1.8–2.8%) women under 45 years of age who had a lifetime prevalence of bulimia nervosa. When women 45 years or over were considered, 17 (1.1%: CI 0.8–1.4%) had a lifetime diagnosis of bulimia nervosa. There was a significant difference between the age groups in terms of the prevalence of bulimia nervosa (likelihood ratio χ^2 =6.97, df=1, p<0.01).

Age of onset

Development of anorexia nervosa (as ascertained at interview) began at a mean age of 22.8 years (SD=8.3), age range 14–48 years. The mean onset of bingeing for those women with bulimia nervosa is 21.4 years (SD=10.0), with an age range from 8 to 59 years. An unweighted survival analysis was used to examine the mean age of onset of bingeing for all the women who admitted to bingeing in their lifetime (n=88). Figure 1 suggests that the greatest time of risk for starting to binge is between the ages of 13 and 26. For this group, there is a correlation of 0.61 between current age and reported age of first binge.

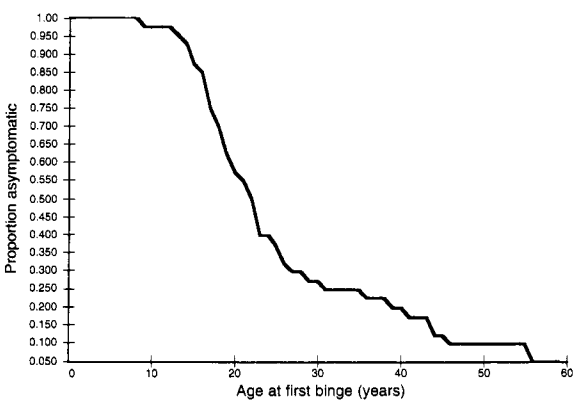

Figure 1. Age at onset of bingeing in women with DSM-III-R definite and probable bulimia nervosa

Discussion

Anorexia nervosa

The lifetime prevalence of DSM-III-R anorexia nervosa as assessed in the telephone interview was 0.4%. This correlates closely with other epidemiological studies, where the rates of DSM-III-R anorexia nervosa are found to be between 0.2% and 0.7%. The mean age of onset (22 years) is somewhat older than would be expected from DSM-IV population estimates [4], but it is commensurate with other population estimates [17].

Bulimia nervosa

Interview levels of DSM-III-R bulimia nervosa are 1.8% or 2.3% for women under 45. The results from this study would indicate that the level of bulimia nervosa in Australia is similar to the levels experienced in New Zealand (1.6%) and Britain (2%) and slightly less than that assessed in the United States (2.8%). The mean age of onset of bingeing is very similar to that found by Kendler *et al.* [11] for the onset of bulimia nervosa.

Age effects

When women under the age of 45 are compared to those 45 years or older, findings from the interview would suggest that the same level of anorexia nervosa exists in both age groups. However, with regards to bulimia nervosa, there are significantly more women in the younger group who have suffered from bulimia nervosa than those in the older group. These data are consistent with other evidence that the prevalence of anorexia nervosa is not increasing [18], but that the prevalence of bulimia nervosa may be increasing [11]. However, caution must be exercised in the interpretation of this latter finding as there exist other explanations for this phenomenon. Accurate recall of past psychiatric disorders is notoriously poor [19,20]. It is also affected by many social and psychological influences, including whether the person was treated or untreated during

the active phase of the disorder, the effect of current life events on memory, the current status of the symptoms and the saliency of the events associated with the disorder [21]. Thus, it is likely that people who have a history of an eating disorder 15 years or more in the past may not remember or consider such events relevant to the present. It may also be the case that people view past events differently with hindsight. For example, when asked 'Were you afraid that you could not stop eating?', in retrospect women may feel that they weren't afraid, partly informed by their current experience of not bingeing. It is also important to remember that bulimia nervosa has only officially existed since 1980. Behaviours associated with bulimia nervosa before this time would not have been so labelled, and there was little general awareness of this constellation of eating disordered behaviour. Likewise, anorexia nervosa was also an uncommon diagnosis in the earlier part of this century, the behaviours going under other names or diagnoses (e.g. conversion disorder). The results suggest that binge-eating is more likely to start when women are under 26 years of age, although even the recall of this may be affected by current age.

Other disordered eating

There were also groups of women who acknowledged significant problems with their eating while not meeting the diagnostic criteria for anorexia nervosa or bulimia nervosa. To date, there has been very little published Australian data on the types of weight reduction or weight-control behaviours used by women [22]. Of interest is the finding that at some time in their life up to half the female population had experienced difficulty in controlling their weight. This finding supports the results of other studies which report a widespread dissatisfaction among women about their body weight and shape, affecting up to 56% of women [23], leading to the description of weight dissatisfaction as a 'normative discontent' [24]. One-third of the self-report respondents (34.4%) suggested that they had actually been preoccupied with thoughts of food or body weight and up to 43.1% of the interview respondents admitted to concerns about weight or shape. Such concern about weight and shape has been associated with dieting, which is a high prevalence behaviour among women [25]. Of the group studied here, 29.2% had used the more extreme methods of weight control. However, levels of self-reported starvation or fasting were considerably lower than in other studies, as was the number of women admitting to binge-eating. Levels of laxative abuse and self-induced vomiting were similar to levels found in other studies. The reasons for these differences are unclear. One possibility is that concepts like bingeing have various meanings in popular usage, and that within the confines of a self-report format, women do not identify themselves with that label. Binge-eating is a very difficult concept to define clearly and objectively, and usually requires some more explanation [26].

Conclusion

In summary, the level of anorexia nervosa ascertained in this study is within the range found in other studies. Interview assessments yield a diagnosis of bulimia nervosa of between 1.4% and 2.2% (or between 1.8% and 2.8% for women under 45), which is similar to levels found in New Zealand and Britain. This can increase our confidence in comparing levels of bulimia nervosa in an Australian community with other approximations gathered in different communities, even though we are prevented from making direct comparisons because of different age ranges, instruments and sample groups.

While the rates of anorexia nervosa and bulimia nervosa may be small compared to some other psychiatric disorders, this study shows that there are a large number of women affected by concerns about their weight and shape. These concerns lead about one in three women to use extreme methods of weight control. Such a high prevalence of behaviour aimed at influencing weight and shape is of great concern, as it is well-recognised as a precursor of more disabling eating disorders. Futhermore, such prevalence of weight control behaviours would suggest that the thin ideal of the female figure continues to have a central place in determining women's self concept.

Acknowledgements

This study was supported by grants from the National Health and Medical Research Council (Australia), the National Institute of Alcoholism and Alcohol Abuse (AA 07535, USA) and a Flinders URB grant. We acknowledge the contribution of Kathleen Bucholz PhD, Steven Dinwiddie MD,

Michael Dunne PhD, Pamela Madden PhD, Dixie Statham, Olivia Zheng and John Pearson. We also thank the twins for their cooperation.

References

1. American Psychiatric Association. *Diagnostic and statistical* manual of mental disorders. 3rd ed., revised. Washington, DC: American Psychiatric Association, 1987.
2. Boskind-Lodahl M, Sirlin J. The gorging–purging syndrome. Psychology Today 1977; 10:50–52, 82–85.
3. Russell GFM. Bulimia nervosa: an ominous variant of anorexia nervosa. Psychological Medicine 1979; 9:429–448.
4. American Psychiatric Association. *Diagnostic and statistical* manual of mental disorders. 4th ed. Washington, DC: American Psychiatric Association, 1994.
5. Rastam M, Gillberg C, Gorton M. Anorexia nervosa in a Swedish urban region: a population based study. British Journal of Psychiatry 1989; 155:642–646.
6. Pope HG, Hudson JI, Yurgelun-Todd D. Anorexia nervosa and bulimia among 300 suburban women shoppers. American Journal of Psychiatry 1984; 141:292–294.
7. Fairburn CG, Beglin SJ. Studies of the epidemiology of bulimia nervosa. American Journal of Psychiatry 1990; 147:401–408.
8. Cooper PJ, Charnock DJ, Taylor MJ. The prevalence of bulimia nervosa. A replication study. British Journal of Psychiatry 1987; 151:684–686.
9. Bushnell JA, Wells JE, Hornblow AR, Oakley-Browne MA, Joyce P. Prevalence of three bulimia syndromes in the general population. Psychological Medicine 1990; 20:671–680.
10. Robins LN, Helzer JE, Croughan J, Ratcliff KS. National Institute of Mental Health Diagnostic Interview Schedule: its history, characteristics and validity. Archives of General Psychiatry 1981; 38:381–389.
11. Kendler KS, MacLean C, Neale M, Kessler K, Heath A, Eaves L. The genetic epidemiology of bulimia nervosa. American Journal of Psychiatry 1991; 148:1627–1637.
12. Spitzer RL, Williams JBW, Gibbon M. Structured clinical interview for DSM-III-R (SCID). New York: New York State Psychiatric Institute, Biometrics Research, 1987.
13. Ben-Tovim DI. DSM-III, draft DSM-III-R and the diagnosis and prevalence of bulimia in Australia. American Journal of Psychiatry 1988; 145:1000–1002.
14. Ben-Tovim DI, Morton J. The epidemiology of anorexia nervosa in South Australia. Australian and New Zealand Journal of Psychiatry 1990; 24:182–186.
15. Heath AC, Cloninger CR, Martin NG. Testing a model for the genetic structure of personality: a comparison of the personality systems of Cloninger and Eysenck. Journal of Personality and Social Psychology 1994; 66:762–775.
16. Bucholz K, Cadoret R, Cloninger CR *et al.* A new, semi-structured psychiatric interview for use in genetic linkage studies: a report on the reliability of the SSAGA. Journal of Studies on Alcohol 1994; 55:149–158.
17. Woodside DB, Garfinkel PE. Age of onset in eating disorders. International Journal of Eating Disorders 1992; 12:31–36.
18. Fombonne E. Anorexia nervosa: no evidence of an increase. British Journal of Psychiatry 1995; 166:462–471.
19. Helzer JE, Robins LN, McEvoy LT *et al.* Diagnostic Interview Schedule diagnoses: physician re-examination of lay-interviewed cases in the general population. Archives of General Psychiatry 1985; 42:657–666.
20. Kendler KS, Neale MC, Kessler RC, Heath AC, Eaves LJ. The lifetime history of major depression in women. Archives of General Psychiatry 1993; 50:863–870.
21. Aneshensel CS, Estrada AL, Hansell MJ, Clark VA. Social and psychological aspects of reporting behaviour: lifetime depressive epsiode reports. Journal of Health and Social Behaviour 1987; 28:232–246.
22. Crawford D, Owen N. The behavioural epidemiology of weight control. Australian Journal of Public Health 1994; 18:143–148.
23. Tiggemann M, Pennington B. The development of gender differences in body size dissatisfaction. Australian Psychologist 1990; 25:306–313.
24. Rodin J, Silberstein L, Striegel-Moore R. Women and weight. A normative discontent. In: Sonderegger TB, ed. Psychology and gender. Lincoln: University of Nebraska Press, 1985.
25. Polivy J, Herman CP. Diagnosis and treatment of normal eating. Journal of Consulting and Clinical Psychology 1987; 55:635–644.
26. Beglin SJ, Fairburn CG. What is meant by the term 'binge'? American Journal of Psychiatry 1992; 149:123–124.