Psychological Medicine, 2001, **31**, 1455–1466. © 2001 Cambridge University Press
DOI: 10.1017/S0033291701004640 Printed in the United Kingdom

Health problems, impairment and illnesses associated with bulimia nervosa and binge eating disorder among primary care and obstetric gynaecology patients

J. G. JOHNSON,[1] R. L. SPITZER AND J. B. W. WILLIAMS

From Columbia University and the New York State Psychiatric Institute, New York, NY, USA

ABSTRACT

Background. Although psychiatric patients with eating disorders are known to be at risk for a variety of health problems, relatively little is known about eating disorders and associated health problems in other populations. An epidemiological study was conducted to investigate health problems and impairment associated with bulimia nervosa (BN) and binge eating disorder (BED) among female primary care and obstetric gynaecology patients.

Methods. Psychiatric disorders, physical illnesses, disabilities, functional status and stress were assessed among 4651 female patients (age range:18 to 99 years) at 8 primary care and 7 obstetric gynaecology clinics throughout the United States.

Results. Two hundred eighty-nine women (6·2%) were diagnosed with BN or BED. The prevalence of BN was approximately 1% among young and middle-aged women. The prevalence of BED increased steadily from early (3·3%) through middle (8·5%) adulthood. Anxiety disorders, mood disorders and diabetes were much more common among women with BN or BED than among women without these eating disorders. Women with BN or BED reported markedly poorer functioning and much higher levels of disability, health problems, insomnia, psychosocial stress and suicidal thoughts than did women without BN or BED, after co-occurring psychiatric disorders were controlled statistically. Yet, fewer than one of ten cases of BN or BED was recognized by the patients' physicians.

Conclusions. Patients with BN or BED often experience considerable disability, impairment, distress and co-occurring illnesses. Increased recognition of eating disorders may be a crucial step towards encouraging more patients to seek treatment for these disabling conditions.

INTRODUCTION

Eating disorders are known to be associated with a range of adverse health conditions, including physical illnesses (Palmer & Guay, 1986; Kaye *et al*. 1989; Devlin *et al*. 1990; Kaplan, 1990; Spitzer *et al*. 1992; Yanovski, 1995), psychiatric disorders (Yanovski *et al*. 1993; Braun *et al*. 1994; Brewerton *et al*. 1995; Grilo *et al*. 1996; Bulik *et al*. 1997; Wonderlich & Mitchell, 1997; Striegel-Moore *et al*. 1999), hospitalization and mortality (Theander, 1985; Favaro & Santonastaso, 1997; Grilo *et al*. 1997; Bulik *et al*. 1999). Many individuals with eating disorders experience chronic problems such as demoralization, impaired functioning, low self-esteem and psychological distress (Fichter *et al*. 1993; Spitzer *et al*. 1993*a*, 1996; Mitchell & Mussell, 1995). For these reasons, and because evidence suggests that some types of eating disorders are becoming more common (Fombonne, 1998), physicians are becoming in-

[1] Address for correspondence: Dr Jeffrey G. Johnson, Biometrics Research Unit, New York State Psychiatric Institute, Unit 60, 1051 Riverside Drive, New York, NY 10032, USA.

creasingly aware of the need to identify and treat eating disorders.

Most investigations of health problems associated with eating disorders have been conducted in specialized clinical populations, such as patients receiving treatment for eating disorders, participants in weight control programmes and psychiatric patients. Such studies have advanced the scientific understanding of eating disorders, but their findings may not be readily generalized to other populations in which eating disorders may be less severe (Grilo *et al.* 1997). Epidemiological studies are needed to investigate the prevalence of eating disorders in the larger population, and to investigate whether the types of health problems that co-occur with eating disorders in specialized clinical populations are also present among individuals with eating disorders in other populations. Although researchers have recently begun to investigate these issues in relatively small community samples (Telch & Stice, 1998), many questions remain unanswered, due in part to the fact that major epidemiological studies have not assessed the two most prevalent eating disorders – bulimia nervosa (BN) and binge eating disorder (BED) (Robins & Regier, 1991; Kessler *et al.* 1994). Current understanding of the health problems and impairment that are associated with eating disorders is also limited because few previous studies have investigated the association between different types of eating disorders and several different kinds of health problems, co-occurring psychiatric disorders, or specific types of impairment.

It is particularly important to investigate health problems associated with eating disorders among women in the larger population. Eating disorders are much more prevalent among women than among men, yet many women with eating disorders do not realize that they have eating disorders (Kaplan, 1990). Studies of women who seek medical services from primary care and obstetric gynaecology physicians are important because their physicians are in a unique position to inform them that they have an eating disorder and to recommend appropriate treatment. Although several recent studies have investigated psychiatric disorders and associated health problems in primary care samples (Spitzer *et al.* 1996), fewer studies have investigated psychiatric disorders among patients seen in obstetric/gynaecology clinics, and these involved small samples from single sites with limited generalizability (Byrne, 1984; Buekens *et al.* 1998; Miranda *et al.* 1998). Thus, relatively little is known about the prevalence and correlates of eating disorders among obstetric gynaecology patients. We report findings from the multi-site PHQ Primary Care and Obstetric Gynaecology Studies regarding a wide range of health problems, co-occurring psychiatric disorders, and specific types of functional impairment associated with bulimia nervosa (BN) and binge eating disorder (BED) among 4651 adult female patients in primary care and obstetric gynaecology clinics located in geographically diverse regions of the United States.

METHOD

Participants

Participants were 4651 female patients at eight primary care (five general internal medicine and three family practice) and seven obstetric gynaecology (OB-GYN) sites (see acknowledgment on p. 1464). Internal medicine and family practice clinics provide a wide range of primary care health services to men, women, children and adolescents. OB-GYN clinics provide specialized health care to girls and women who seek diagnosis and/or treatment for reproductive or genito-urinary problems, or who seek pre-, peri-, or post-natal care associated with pregnancy and childbirth. Most Americans have a primary care physician or receive routine medical care from a primary care clinic. Most American women have an OB-GYN physician or receive health care services from an OB-GYN clinic. The institutional review board of each site approved the study protocol. From May 1997 to March 1999, 3890 primary care patients and 3636 OB-GYN patients, 18 years or older, who presented to the centres for medical care were approached to participate in the study. There were 435 patients who declined to participate, 393 who did not complete the questionnaire and 698 whose questionnaires were not entered into the data set because $\geqslant 20$ items were not answered. This resulted in 6000 cases, of which 4980 were females. Sufficient data to permit assessment of every psychiatric diagnosis was

obtained from 4651 females. Of these women, 872 (19%) completed a Spanish version of the PHQ (translated by two experienced and accredited medical translators). All sites used one of two subject selection methods to minimize sampling bias: either consecutive patients for a given clinic session, or every *n*th patient until the intended quota for that session was achieved.

The mean age of the patients was 37 years (S.D.: ±15·5 years), with a range of 18 to 99. Fifty-five per cent were Caucasian, 24% were Hispanic; 14% were African-American; 48% were married, 20% had not graduated from high school and 21% were college graduates. There was considerable site variability with regard to patient characteristics (site ranges: Hispanic 1% to 81%, African-American 1% to 21%, college graduate 2% to 61%). Of the total sample, 75% were established clinic patients while the remainder were being seen for the first time. The most common types of physical disorders were: hypertension (10%), arthritis (5%), pulmonary disease (4%) and diabetes (3%).

Assessment of psychiatric disorders

The Patient Health Questionnaire (PHQ; Spitzer *et al*. 1999), a self-administered version of the PRIME-MD (Primary Care Evaluation of Mental Disorders; Spitzer *et al*. 1994), was used to assess DSM-IV anxiety (panic disorder, other anxiety disorder), eating (BED, BN) and mood disorders (major depressive disorder (MDD), other depressive disorder), probable alcohol abuse or dependence, and somatic symptoms (e.g. headache, gastrointestinal problems). The PHQ is a four-page questionnaire that is self-administered by the patient in $\leqslant 10$ min. The first three pages assess the psychiatric disorders listed above. The fourth page assesses physical health problems and psychological stressors. The clinician scans the completed questionnaire, verifies positive responses and applies diagnostic algorithms; this is typically completed in < 5 min (Spitzer *et al*. 1999). In the present study, the data from the PHQ were entered into a computer program, which applied the diagnostic algorithms.

The diagnostic portion of the PHQ was validated in the PHQ Primary Care Study (Spitzer *et al*. 1999). When the diagnostic results of the PHQ were compared with those of a mental health professional who had administered a structured clinical interview, the PHQ demonstrated satisfactory overall sensitivity (75%), specificity (90%), overall diagnostic accuracy (85%), and diagnostic agreement ($\kappa =$ 0·65) (Spitzer *et al*. 1999). With regard to eating disorders, the sensitivity (89%), specificity (94%), overall diagnostic accuracy (96%) and diagnostic agreement ($\kappa = 0{\cdot}61$) of the PHQ were comparable. In addition, patients who received PHQ diagnoses had more functional impairment, disability days, and health care utilization than patients who did not receive PHQ diagnoses (Spitzer *et al*. 1999).

Assessment of health problems disabilities and psychosocial stressors

The fourth page of the PHQ screens for disorders that are especially common or unique to women, such as premenstrual syndrome, post-partum and menopausal mood disorders and post-traumatic stress disorder. The PHQ also includes questions about menstruation, pregnancy and childbirth and enquires about 10 common psychosocial stressors that may have occurred in the last month. One item inquires about physical or sexual abuse within the last year. A final item asks patients who reported any problems on the PHQ, 'How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?'. The four response categories range from 'not difficult at all' to 'extremely difficult'. Additional items assessed physician visits and disability days during the past 3 months, limitations in daily activities during the past 3 months, patients' comfort or discomfort regarding the questions on the PHQ, and patients' beliefs regarding whether the PHQ would help their doctor to understand and treat the problems they were having.

Assessment of impaired functioning

The Medical Outcomes Study Short-Form General Health Survey (SF-20; Stewart *et al*. 1988) was used to assess impaired functioning. The SF-20 is a 20-item questionnaire that assesses physical functioning, social functioning, role functioning, mental health, bodily pain and general health perception. Scores on each of these six dimensions range from 0 to 100, with higher scores indicating better health and less

impairment. A 5-point reduction in SF-20 scale scores is generally considered clinically significant. Research has provided considerable support for the reliability and validity of the SF-20 (Nelson *et al*. 1983; Read *et al*. 1987; Steward *et al*. 1989).

Procedure

All patients completed the PHQ before seeing their physician. Forty-one physicians and 22 nurse practitioners participated in the obstetric gynaecology sites. Their mean age was 39 years (S.D. = 8·9) and 48% were male. Sixty-two physicians participated in the primary care sites. Their mean age was 37 years (S.D. = 6·5) and 63% were male. The clinicians were provided with written instructions on how to use the PHQ. After evaluating each patient, but before reviewing the PHQ, clinicians reported whether the patient was new or established, and their knowledge of any current mental disorders, and current physical disorders, including hypertension, heart disease, diabetes, liver disease, renal disease, arthritis, pulmonary disease, cancer, or other physical disorders. They then reviewed the PHQ and asked any additional questions necessary to clarify patients' responses on the questionnaire. They also noted any treatments or referrals for mental disorders that they were initiating or planned to initiate in the future. They noted how long it took for them to review each PHQ and ask clarifying questions. At the conclusion of the study, they completed confidential questionnaires assessing the value and usefulness of the PHQ.

RESULTS

Prevalence of psychiatric disorders and association of psychiatric disorders with age

Findings regarding the prevalence of psychiatric disorders are presented in Table 1. There were significant associations between patients' age and the prevalence of alcohol, anxiety, eating and mood disorders. BED, MDD, panic disorder and other anxiety disorders increased in prevalence from age 18 through age 55, and then became gradually less prevalent among those more than 55 years of age. In contrast, the prevalence of BN was approximately 1% from age 18 to age 55, and was somewhat less prevalent after age 55. Probable alcohol abuse or dependence peaked in prevalence among 26 to 35 year-olds, and then declined steadily in prevalence with increasing age.

The prevalence of BED was significantly greater among OB-GYN patients than among primary care patients (odds ratio (OR) = 2·00; 95% confidence interval (CI): 1·54–2·59). One thousand and thirty-five patients (22%) reported that they were pregnant or had recently given birth. These patients tended to have fewer mental and physical health problems than did the remainder of the patients in the sample, although they reported more stomach pain ($\chi^2 = 138{\cdot}55$; df = 1; $P < 0{\cdot}00001$), back pain ($\chi^2 = 72{\cdot}42$; df = 1; $P < 0{\cdot}00001$), and nausea ($\chi^2 = 40{\cdot}78$; df = 1; $P < 0{\cdot}00001$) than did other patients. There were no significant associations between ethnicity and the prevalence of eating disorders in this sample. All of the patients who were

Table 1. *Prevalence of psychiatric disorders by age group*

	Age group (years)						
Psychiatric disorder	18–25 ($N = 1284$) %	26–35 ($N = 1346$) %	36–45 ($N = 782$) %	46–55 ($N = 528$) %	56–99 ($N = 605$) %	Overall prevalence ($N = 4651$) %	χ^2(df, 4)
Any eating disorder	4·1	6·4	7·5	9·5	5·1	6·2	23·09***
Binge eating disorder	3·3	5·1	6·5	8·5	4·8	5·3	24·54****
Bulimia nervosa	0·9	1·3	1·0	0·9	0·3	0·9	4·05
Any anxiety disorder	6·5	8·5	10·9	13·6	5·0	8·5	40·36*****
Any mood disorder	15·0	12·6	15·0	19·5	10·9	14·4	21·49***
Alcohol abuse or dependence	3·3	5·0	4·2	3·2	2·5	3·8	9·42
Any psychiatric diagnosis	21·5	22·6	24·9	30·9	17·7	23·2	31·55*****

***$P < 0{\cdot}001$; ****$P < 0{\cdot}0001$; *****$P < 0{\cdot}00001$.

Although diagnoses were obtained from all 4651 patients, 16 patients did not report their age.

https://doi.org/10.1017/S0033291701004640 Published online by Cambridge University Press

Table 2. *Associations between binge eating disorder (BED), bulimia nervosa (BN) and other psychiatric disorders*

Psychiatric disorder	No eating disorder ($N = 4362$) %	BED ($N = 245$) %	OR (95% CI)	BN ($N = 44$) %	OR (95% CI)
Any anxiety disorder	7	26	5·77 (3·06–10·86)*	34	6·62 (3·51–12·46)*
Panic disorder	3	13	6·29 (2·97–13·28)*	20	7·22 (3·41–15·29)*
Other anxiety disorder	4	13	3·52 (1·47–8·41)*	14	3·99 (1·66–9·57)*
Alcohol abuse/dependence	4	6	1·63 (0·93–2·87)	11	3·46 (1·34–8·89)*
Any mood disorder	13	33	3·82 (2·07–7·05)*	39	4·18 (2·26–7·72)*
Major depressive disorder	7	23	6·20 (3·29–11·66)*	34	7·03 (3·73–13·25)*
Other depressive disorder	6	10	1·71 (1·11–2·63)*	5	0·72 (0·17–2·87)
Any psychiatric disorder†	18	43	6·00 (3·27–10·98)*	59	6·55 (3·57–12·01)*

* Significant association after controlling for age. (An odds ratio is considered statistically significant if the number 1·0 does not fall within the 95% confidence interval.)

† Category does not include eating disorders.

Table 3. *Associations between binge eating disorder (BED), bulimia nervosa (BN) and indicators of poor health*

Health indices	No psychiatric disorders %	Other psychiatric disorders %	BED %	OR (95% CI)	BN %	OR (95% CI)
Health described as 'poor' or 'very poor'	1	10	7	6·09 (3·42–10·85)[abd]	12	10·56 (3·96–28·13)[abcd]
Health problems prevented usual activities on > 10 days in the past year	6	23	22	4·18 (2·94–5·93)[abcd]	23	4·29 (2·02–9·14)[ad]
Health problems limited usual activities for > 3 months in the past year	6	21	15	2·86 (1·95–4·18)[ad]	26	5·56 (2·76–11·20)[ad]
Health problems limit some activities 'a lot' during a typical day	7	20	17	2·62 (1·83–3·73)[abcd]	23	3·72 (1·82–7·61)[a]
Health problems described as 'very difficult' or 'extremely difficult'	2	26	18	8·72 (5·71–13·31)[abcd]	19	9·71 (4·34–21·74)[abcd]
Trouble sleeping on more than half of the nights in the last 2 weeks	12	60	40	5·01 (3·79–6·61)[abcd]	57	10·02 (5·47–18·35)[abcd]
Suicidal thoughts on several days or most days in the last 2 weeks	3	26	19	8·31 (5·69–12·15)[abcd]	28	13·78 (6·87–27·65)[abcd]

Odds ratios were computed to compare the rate of psychosocial stressors among women with BN or BED with the rate of psychosocial stressors among women without psychiatric disorders.

[a] Significant after controlling for co-occurring alcohol abuse/dependence.

[b] Significant after controlling for co-occurring mood disorders.

[c] Significant after controlling for co-occurring anxiety disorders.

[d] Significant after controlling for co-occurring somatic symptoms.

diagnosed with BN or BED reported two or more episodes of binge eating per week during the past 3 months or longer. Eleven (4%) of the patients with BED and 26 (62%) of the patients with BN reported that they had exercised for > 1 h specifically to avoid gaining weight after episodes of binge eating. Three (1%) of the patients with BED and 6 (14%) of the patients with BN reported that they had taken twice the recommended doses of laxatives to avoid gaining weight after episodes of binge eating. Fifteen (6%) of the patients with BED and 28 (67%) of the patients with BN reported that they had fasted for 24 h or longer to avoid gaining weight after episodes of binge eating. Four (2%) of the patients with BED and 9 (21%) of the patients with BN reported self-induced vomiting to avoid gaining weight after episodes of binge eating. BN was only diagnosed if patients reported using these techniques to avoid gaining weight twice a week, on average.

Psychiatric co-morbidity associated with BN and BED

As Table 2 indicates, both BED and BN were associated with substantial psychiatric co-mor-

https://doi.org/10.1017/S0033291701004640 Published online by Cambridge University Press

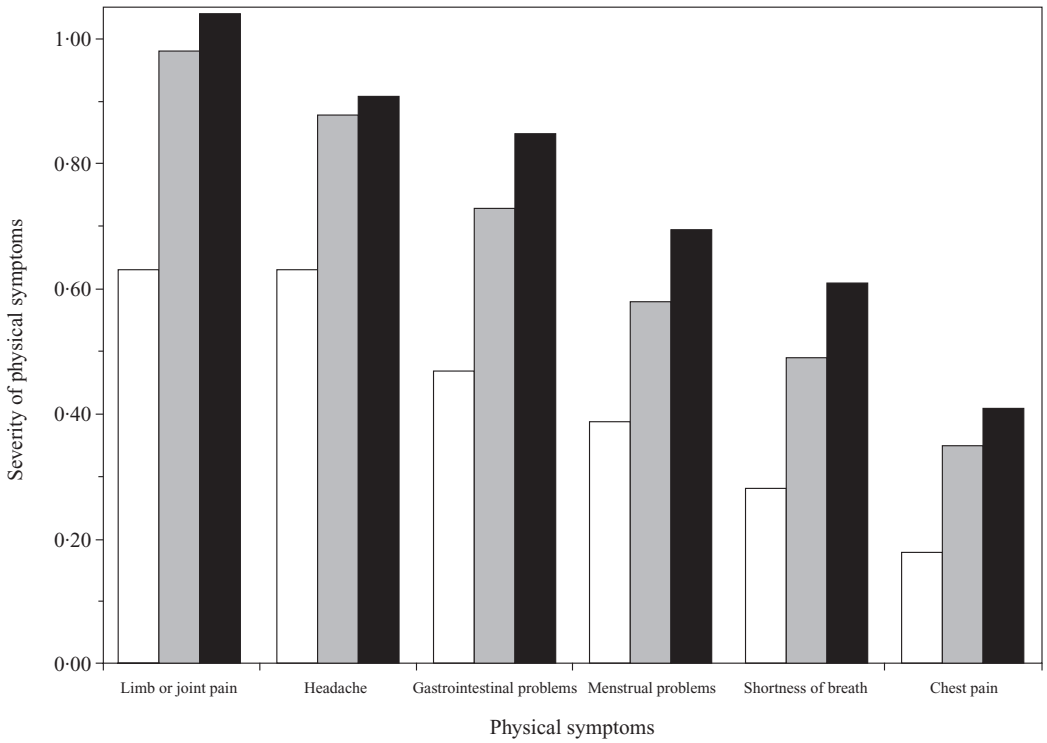

FIG. 1. Somatic symptoms associated with bulimia nervosa (BN) and binge eating disorders (BED). All six types of physical symptoms were significantly more severe among patients with BED (▨) and BN (■) than among patients without psychiatric disorders (□). There were no significant differences between the BED and BN groups.

bidity. Overall, women with BED were more than twice as likely as women without eating disorders were to have co-occurring alcohol, anxiety, or depressive disorders. Women with BN were more than three times as likely as women without eating disorders to have co-occurring alcohol, anxiety, or depressive disorders. Women with BED were more than four times as likely as women without eating disorders to have panic disorder, and were more than three times as likely as those without eating disorders to have MDD. Women with BN were more than six times as likely as women without eating disorders to have panic disorder, and were more than four times as likely to have MDD. Although co-occurring psychiatric disorders were somewhat more prevalent among women with BN than among women with BED, chi-square tests indicated that none of these differences were statistically significant. Similar patterns of co-morbidity were observed among the primary care and OB-GYN patients.

Impaired functioning associated with BN and BED

Primary care and OB-GYN patients with BED or BN reported markedly poorer functioning than those without psychiatric disorders on all six indices of functional impairment assessed by the SF-20. Analyses of variance and Scheffé *post-hoc* tests indicated that patients with BED and BN had significantly lower scores on all six SF-20 scales than patients without psychiatric disorders. The mean score of the patients without psychiatric disorders on the SF-20 general health perception scale, which ranges from 1 to 100, was 69·4 (S.D. = 23·6). The corresponding mean scores of patients with BED and BN were 49·3 (S.D. = 26·5) and 41·1 (S.D. = 23·5), respectively ($F = 104{\cdot}15$; $P < 0{\cdot}00005$). Women with BN had significantly lower scores than the women with BED on only the SF-20 mental health scale. Analyses of covariance indicated that the associations of BED and BN with poor physical,

https://doi.org/10.1017/S0033291701004640 Published online by Cambridge University Press

social, and role functioning, poor mental health, and poor general health perception remained significant after co-occurring alcohol, anxiety, and mood disorders and somatic symptoms were controlled statistically.

Health problems associated with BN and BED

Both BED and BN were associated with the indicators of poor health presented in Table 3. Primary care and OB-GYN patients with BED or BN were six times as likely as patients without psychiatric disorders to report that the problems that they had described on the PHQ were 'very difficult' or 'extremely difficult', and that they had suicidal thoughts on several days or most of the days in the last 2 weeks. In addition, patients with BED or BN were more than three times as likely as patients without psychiatric disorders to report that they had trouble sleeping on more than half the nights in the past 2 weeks. All of these associations remained significant after controlling for co-occurring alcohol, anxiety, and mood disorders, and for somatic symptoms. Furthermore, patients with BED and BN were, respectively, seven and twelve times as likely as those without psychiatric disorders to report that they were 'in poor' or 'very poor' health. However, the association of BED with 'poor' or 'very poor' health did not remain significant after co-occurring mood disorders were accounted for, suggesting that this association may have been attributable to mood disorders that co-occurred with BED. After controlling for co-occurring psychiatric disorders and somatic symptoms, BED was significantly associated with patient reports that health problems prevented them from their usual activities on more than 10 days during the past year, and that health problems limited some of their activities 'a lot' during a typical day.

As indicated in Fig. 1, primary care and OB-GYN patients with BED and BN reported more limb or joint pain, headaches, gastrointestinal problems, menstrual problems, shortness of breath and chest pain than patients without psychiatric disorders. Analyses of variance and Scheffé *post-hoc* tests indicated that patients with BED and BN had significantly more severe physical symptoms on all of these dimensions than patients without psychiatric disorders. The physical symptoms of patients with BN were not significantly more severe than those of patients with BED. Analyses of covariance indicated that the associations of BED and BN with all six types of physical symptoms remained significant after co-occurring alcohol, anxiety, and mood disorders were controlled statistically.

Chronic illnesses associated with BN and BED

Patients with BED (OR = 2·33; CI:1·34–4·04) and BN (OR = 3·57; CI:1·26–10·13) were significantly more likely than patients without eating disorders to have diabetes. Six per cent of the patients with BED and 9·1% of the patients with BN had diabetes. In comparison, the prevalence of diabetes among the patients without eating disorders was 2·7%. Neither BED nor BN were associated with the prevalence of arthritis, cancer, hypertension, or with cardiac, hepatic, pulmonary, or renal diseases.

Health care utilization associated with BN and BED

Patients with BED and BN, respectively, reported means of 1·54 (S.D. = 2·57) and 1·62 (S.D. = 2·46) visits to a physician in the past 3 months. In comparison, patients with no psychiatric disorders reported a mean of 1·07 (S.D. = 2·08) physician visits in the past 3 months. Analyses of covariance indicated that the overall difference in physician visits was statistically significant before, but not after controlling statistically for co-occurring anxiety and depressive disorders. These findings suggest that, although health care utilization tends to be elevated among patients with BED and BN, this is likely to be attributable to the elevated prevalence of anxiety and depressive disorders among patients with BED and BN.

Psychosocial stressors associated with BN and BED

As Table 4 indicates, primary care and OB-GYN patients with BED or BN were substantially more likely than those without psychiatric disorders to report that they had been 'bothered a lot' by several types of psychosocial stressors during the last month. After co-occurring psychiatric disorders were controlled statistically, patients with BED and BN were more likely than those without psychiatric disorders to report that they had been bothered a lot by having no one to turn to when they had a problem, worrying about their health, a lack of

https://doi.org/10.1017/S0033291701004640 Published online by Cambridge University Press

Table 4. *Psychosocial stressors associated with binge eating disorder (BED) and bulimia nervosa (BN)*

Psychosocial stressors that patients reported being 'bothered a lot' by	No psychiatric disorders %	Other psychiatric disorders %	BED %	OR (95% CI)	BN %	OR (95% CI)
Having no one to turn to with a problem	3	21	14	5·50 (3·61–8·36)[abcd]	28	13·34 (6·65–26·77)[abcd]
Something terrible that happened in the past	2	14	11	7·25 (4·47–11·75)[abcd]	21	15·49 (7·11–33·78)[abd]
Difficulties with spouse, boyfriend, or girlfriend	4	21	12	3·08 (2·02–4·69)[abcd]	17	4·33 (1·89–9·91)[ad]
Taking care of family members	6	24	18	3·71 (2·58–5·34)[abcd]	12	2·24 (0·87–5·76)
Financial problems or worries	10	37	34	4·98 (3·73–6·65)[abcd]	39	6·11 (3·23–11·56)[ad]
Something bad that happened recently	7	27	17	2·83 (1·97–4·08)[ad]	21	3·67 (1·74–7·77)[ad]
Worrying about health	10	37	32	4·05 (3·02–5·43)[abcd]	42	6·32 (3·42–11·72)[abcd]
Little or no pleasure during sex	3	12	11	3·63 (2·30–5·74)[abcd]	24	9·22 (4·42–19·24)[abcd]
Work-related stress	7	24	19	3·21 (2·25–4·57)[abcd]	16	2·72 (1·20–6·18)[ad]
Concerns about weight or appearance	16	41	61	8·40 (6·39–11·05)[abcd]	75	16·30 (8·19–32·44)[abcd]
Physical or sexual abuse in the past year	3	10	6	2·15 (1·21–3·82)[a]	5	1·71 (0·41–7·19)

Odds ratios were computed to compare the rate of psychosocial stressors among women with BN or BED with the rate of psychosocial stressors among women without psychiatric disorders.
[a] Significant after controlling for co-occurring alcohol abuse/dependence.
[b] Significant after controlling for co-occurring mood disorders.
[c] Significant after controlling for co-occurring anxiety disorders.
[d] Significant after controlling for co-occurring somatic symptoms.

pleasure during sex, and concerns about weight or appearance. In addition, after psychiatric co-morbidity was controlled statistically, patients with BED were more likely than those without psychiatric disorders to report that they had been bothered a lot by something terrible that happened in the past, difficulties with a spouse, boyfriend, or girlfriend, taking care of family members, financial problems or worries and work-related stress.

Physician recognition of BN and BED

Of the 289 patients with eating disorders, there were 268 patients for whom the clinician indicated, prior to reviewing the PHQ, whether or not they believed the patient had an eating disorder. Of these, only 24 (9%) had been recognized by their clinicians as having an eating disorder. Ten per cent of the patients with BED had been recognized by their clinicians as having an eating disorder. Less than 3% of the patients with BN had been recognized by their clinicians as having an eating disorder.

DISCUSSION

The present findings indicate that BN and BED are relatively common among female primary care and obstetric gynaecology patients across a remarkably wide age span. These findings suggest that approximately 1% of patients between the ages of 18 and 55 may have BN, and that BED may increase gradually in prevalence from late adolescence through middle adulthood, with a peak prevalence as high as 8% among 46–55 year-old patients. The present findings are somewhat counter-intuitive because eating disorders are generally thought to be more common among young women than among middle-aged women, and because several studies have suggested that eating disorders tend to become less prevalent between early and middle adulthood (Heatherton *et al.* 1997; Keel & Mitchell, 1997; Keel *et al.* 1999). However, our findings are consistent with previous research indicating that BED tends to be a persistent condition with a high recurrence rate (Spitzer *et al.* 1993*a*). In addition, BED is frequently associated with obesity (Spitzer *et al.* 1993*a*; De Zwaan *et al.* 1994), and obesity is known to increase in prevalence from adolescence through middle adulthood (Carpenter *et al.* 2000). It will be of interest for longitudinal studies to investigate the role of binge eating in the increased prevalence of obesity between adolescence and middle adulthood. Because obesity is associated with increased risk for depression and suicidality (Carpenter *et al.* 2000), it will also be important

to investigate the role of BED in the association between obesity, depression and suicidality. Insofar as individuals with BED tend to have higher depressive symptom levels than obese individuals without BED (Fichter *et al.* 1993; Spitzer *et al.* 1993*a*; De Zwaan *et al.* 1994; Telch & Stice, 1998), previous research has suggested that binge eating may account for a significant proportion of the association between obesity and depression.

The present findings are particularly striking because they indicate that both BED and BN are strongly associated with numerous health problems, co-occurring illnesses, poor overall health, limitations in daily activities, psychosocial stressors, impaired functioning, difficulty sleeping and suicidal thoughts. Importantly, these associations tended to remain significant after controlling for co-occurring psychiatric disorders. Our findings regarding suicidal thoughts are a cause of particular concern, and are consistent with similar findings from previous research (Favaro & Santonastaso, 1997; Bulik *et al.* 1999; Carpenter *et al.* 2000). Clearly, the present findings indicate that BED and BN are serious health conditions that require routine assessment and treatment. However, our findings suggest that BED and BN are unlikely to be recognized by primary care and obstetric gynaecology physicians. Routine administration of instruments such as the PRIME-MD PHQ may contribute to increased physician recognition of eating disorders (Spitzer *et al.* 1994, 1999). BED, BN, and co-occurring anxiety and depressive disorders can be effectively treated, and primary care physicians can play an important role in the treatment of these disorders (Fairburn *et al.* 1985; De Zwaan *et al.* 1994; Carter & Fairburn, 1995; Fava *et al.* 1997; Sunday & Halmi, 1997). It is particularly important to identify and treat women with eating disorders because research has shown that eating disorders are associated with adverse outcomes during pregnancy, including miscarriage, low birth weight, obstetric complications and post-partum depression (Franko & Spurrell, 2000).

The present findings indicate that primary care and OB-GYN patients with eating disorders tend to have high rates of anxiety and depressive disorders. Although some previous studies have obtained similar findings (Laessle *et al.* 1989; Spitzer *et al.* 1993*a*; Yanovski *et al.* 1993; Striegel-Moore *et al.* 1999), the present findings are unique in that they suggest that these associations persist from late adolescence to middle adulthood. Of further interest, the present findings regarding the association between age, anxiety disorders and MDD closely parallel our findings regarding the association between age and BED. Although the directional nature of these associations has not yet been determined, research has suggested that anxiety and depression may often precede the onset of eating disorders (Braun *et al.* 1994; Bulik *et al.* 1997; Deep *et al.* 1995; Fairburn *et al.* 1997; Zaider *et al.* 2000) and that eating disorders may increase risk for the development of anxiety and depressive disorders (Zaider *et al.* 2000). The present findings suggest that BED, anxiety and depression may tend to develop in tandem from late adolescence to middle adulthood. Indirect evidence supporting this hypothesis has been provided by findings indicating that treatment for MDD among patients with eating disorders was associated with reductions in both depressive and eating disorder symptoms (Fava *et al.* 1997), and that depressive symptoms decreased after eating disorder symptoms were successfully treated (Fairburn *et al.* 1985). However, while depressive disorders have been reported to increase in prevalence between early and middle adulthood in the general population, anxiety disorders have been found to peak in prevalence by the beginning of middle adulthood (Kessler *et al.* 1994; Robins & Regier, 1991). It should also be noted that there is more consistent evidence indicating that BED and BN are associated with depression than with anxiety (Mitchell & Mussell, 1995; Wonderlich & Mitchell, 1997; Telch & Stice, 1998). Thus, the present findings may apply, in particular, to female primary care and obstetric gynaecology patients.

The present findings regarding BED are of particular interest to the psychiatric community because BED was not included as a diagnostic category until the publication of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). BED is included in an appendix of the DSM-IV as a diagnostic criteria set provided for further study. The present findings are important in this regard because they provide support for the inclusion

of BED as an official diagnostic category in DSM-V. In this respect, the present findings confirm the results of previous studies that have supported the validity and utility of BED as a diagnostic category (Spitzer *et al.* 1992, 1993*a*, *b*; Fichter *et al.* 1993; Yanovski *et al.* 1993; De Zwaan *et al.* 1994; Mitchell & Mussell, 1995; Telch & Stice, 1998).

The present findings are also of interest because diabetes was substantially more prevalent among women with BED or BN than among women without eating disorders. Previous studies have obtained similar findings, suggesting that eating disorders may increase risk for the development of diabetes, and/or that conditions associated with diabetes may contribute to the development of eating disorders (Herpertz *et al.* 1998; Kaplan, 1990; Crow *et al.* 1998; Yanovski, 1995). Although both of these hypotheses will require further investigation, eating behaviour problems among individuals with or at high risk for diabetes require careful assessment and treatment. Of additional interest, our findings indicated that patients with BN were more likely than patients without eating disorders to have alcohol abuse or dependence. These findings are consistent with previous research indicating that BN was associated with alcohol problems and with psychoactive substance abuse and dependence (Holderness *et al.* 1994; Wiederman & Pryor, 1996; Wonderlich & Mitchell, 1997).

The limitations of the present study require consideration. The PHQ is a self-administered instrument, and some self-report measures have been found to yield excessive rates of false positive diagnoses (Cooper & Fairburn, 1987; Williamson & Martin, 1999). It would have been preferable, although prohibitively expensive given the size of the sample, to administer a structured clinical interview. However, PHQ specificity coefficients of 0·97, 0·94, 0·96, and 0·97 have been reported with regard to the assessment of anxiety, depressive, eating and substance use disorders, indicating that the PHQ yields few false positive diagnoses. Research has indicated that patients who are identified by the PHQ as having a probable mental disorder tend to experience significantly elevated levels of impairment, distress, somatic symptoms, health care utilization, and disability (Spitzer *et al.* 1999). In addition, the prevalence rates of psychiatric disorders in the present study are comparable with those found in previous research using structured diagnostic interviews administered by mental health professionals (Barrett *et al.* 1988; Schulberg & Burns, 1988). Thus, it appears to be unlikely that the overall rate of false positive diagnoses was excessive in the present study. Yet, because the prevalence of BED was somewhat higher in the present study than in some previous community-based studies (Hsu, 1996), it is possible that some of the patients who were diagnosed with BED in the present study may have had a somewhat less severe form of Eating Disorder Not Otherwise Specified (EDNOS) characterized by recurrent episodes of binge eating.

Because patients' weights were not recorded, it was not possible to investigate the association between BED, obesity and the variables assessed in the present study. However, in previous studies, when weight was controlled statistically, individuals with BED had higher levels of psychiatric co-morbidity than obese individuals without BED (Fichter *et al.* 1993; Yanovski *et al.* 1993). Because complete data were available from fewer than 900 male primary care patients, and because there were few cases of BED and BN among these men, these data could not be used to conduct all of the analyses that were conducted with the data obtained from the female patients. Because anorexia nervosa (AN) was not assessed by the PHQ, findings regarding AN could not be reported. It will be of interest for future research to investigate health problems and impairment associated with AN among primary care and OB-GYN patients. Finally, because this is a cross-sectional study, no inferences can be made about the direction of the reported associations.

Nevertheless, despite these limitations, this is the first large multi-site study to investigate BN and BED among female primary care and obstetric gynaecology patients. In addition to the size and heterogeneity of the sample with regard to age, education, ethnicity, geography and language, the study included a comprehensive set of measures assessing co-occurring physical and psychiatric illnesses, functional status, health-related disabilities, health care utilization and psychosocial stressors. Therefore, the present findings contribute to an increased understanding of the health problems, impair-

ment, and illnesses that are associated with BN and BED among female primary care and obstetric gynaecology patients.

The development of PRIME-MD PHQ was underwritten by an educational grant from Pfizer US Pharmaceuticals Inc., New York, NY. PRIME-MD® is a trademark of Pfizer Inc. Copyright © 1999 Pfizer Inc.

The members of the Patient Health Questionnaire Primary Care and Obstetric Gynecology Study Groups that coordinated this collaborative study at each site were: Dr Hilda Hutcherson, New York Physicians, New York City, NY; Dr Albert G. Thomas, Mt Sinai Department of Obstetrics, Gynecology, and Reproductive Science, New York City, NY; Dr Mark Kennedy Curtis, Western Gynecological and Obstetrical Clinic Inc., Sandy, UT; Dr Ray Hornyak, Conemaugh Memorial Health System, Johnstown, PA; Dr Jodi Lerner, New York Presbyterian Hospital Department of Obstetrics and Gynecology; Dr Stephen F. Heartwell, Division of Maternal Health and Family Planning, Department of Obstetrics and Gynecology, University of Texas Southwestern Medical Center, Dallas, TX; Dr Robert N. Mucciola, Riverside Obstetrics, Gynecology and Family Care, Newport News, VA; Dr Robert Joseph, Cambridge Hospital, Cambridge, MA; Dr Mark Linzer, University of Wisconsin General Internal Medicine Clinic, Madison, WI; Dr Julia McMurray, Women's Health Center, Madison, WI; Dr Lawson Wulsin, Franciscan University of Cincinnati Family Practice Center, Cincinnati, OH; Dr Joseph Kovaz, Mazomanie Community Clinic, Mazomanie, WI; Dr Michael Roy, Walter Reed Army Medical Center General Medicine Clinic; and Dr Kim Seeger, Columbia-Presbyterian Family Health Center, New York, NY. The institutional review board of each site approved the study protocol.

Drs Mark Linzer, Frank Verloin deGruy III, Steven R. Hahn, and David Brody helped develop the original PRIME-MD. Drs Jonathan Davidson, Jodi Lerner, Barbara Mason, Jeanne McCauley, Julia McMurray, Katherine Shear, Zachary Stowe and Kimberly Yonkers, were members of an advisory committee to the development of the PHQ. Dr Michael J. Devlin, provided comments and suggestions regarding an earlier draft of this article.

REFERENCES

American Psychiatric Association (1994). *Diagnostic and Statistical Manual of Mental Disorders*, *4th edn*. American Psychiatric Press: Washington, DC.

Barrett, J. E., Barret, J. A., Oxman, T. E. & Gerber, P. D. (1988). The prevalence of psychiatric disorders in a primary care practice. *Archives of General Psychiatry* **45**, 1100–1106.

Braun, D. L., Sunday, R. & Halmi, K. A. (1994). Psychiatric comorbidity in patients with eating disorders. *Psychological Medicine* **24**, 859–867.

Brewerton, T. D., Lydiard, B. R., Herzog, D. B., Brotman, A. W., O'Neil, P. M. & Balenger, J. C. (1995). Comorbidity of Axis 1 psychiatric disorders in bulimia nervosa. *Journal of Clinical Psychiatry* **56**, 77–80.

Buekens, P., van Heeringen, K., Boutsen, M., Smekens, P. & Mattellaer, P. (1998). Depressive symptoms are often unrecognized in gynaecological practice. *European Journal of Obstetrics, Gynecology, and Reproductive Biology* **81**, 43–45.

Bulik, C. M., Sullivan, P. F., Fear, J. L. & Joyce, P. R. (1997). Eating disorders and antecedent anxiety disorders: a controlled study. *Acta Psychiatrica Scandinavica* **96**, 101–107.

Bulik, C. M., Sullivan, P. F. & Joyce, P. R. (1999). Temperament, character, and suicide attempts in anorexia nervosa, bulimia nervosa, and major depression. *Acta Psychiatrica Scandinavica* **100**, 27–32.

Byrne, P. (1984). Psychiatric morbidity in a gynaecology clinic: an epidemiological survey. *British Journal of Psychiatry* **144**, 28–34.

Carpenter, K. M., Hasin, D. S., Allison, D. B. & Faith, M. S. (2000). Relationships between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: results from a general population study. *American Journal of Public Health* **90**, 251–257.

Carter, J. C. & Fairburn, C. G. (1995). Treating binge eating problems in primary care. *Addictive Behaviors* **20**, 765–772.

Cooper, Z. & Fairburn, C. G. (1987). The Eating Disorder Examination: a semi-structured interview for the assessment of the specific psychopathology of eating disorders. *International Journal of Eating Disorders* **6**, 1–8.

Crow, S. J., Keel, P. K. & Kendall, D. (1998). Eating disorders and insulin-dependent diabetes mellitus. *Psychosomatics* **39**, 233–243.

Deep, A., Nagy, L., Weltzin, T., Rao, R. & Kaye, W. (1995). Premorbid onset of psychopathology in long-term recovered anorexia nervosa. *International Journal of Eating Disorders* **17**, 291–298.

Devlin, M. J., Walsh, T. B., Kral, J. B., Heymsfield, S. B., Xavier Pi-Sunyer, F. & Dantzic, S. (1990). Metabolic abnormalities in bulimia nervosa. *Archives of General Psychiatry* **47**, 144–148.

De Zwaan, M., Mitchell, J. E., Raymond, N. C. & Spitzer, R. L. (1994). Binge eating disorder: clinical features and treatment of a new diagnosis. *Harvard Review of Psychiatry* **1**, 310–325.

Fairburn, C. G., Cooper, P. J., Kirk, J. & O'Connor, M. (1985). The significance of the neurotic symptoms of bulimia nervosa. *Journal of Psychiatric Research* **19**, 135–139.

Fairburn, C. G., Welch, S., Doll, H. A., Davies, B. A. & O'Connor, M. E. (1997). Risk factors for bulimia nervosa. *Archives of General Psychiatry* **54**, 509–517.

Fava, M., Abraham, M., Clancy-Colecchi, K., Pava, J. A., Matthews, J. & Rosenbaum, J. E. (1997). Eating disorder symptomatology in major depression. *Journal of Nervous and Mental Disease* **185**, 140–144.

Favaro, A. & Santonastaso, P. (1997). Suicidality in eating disorders: clinical and psychological correlates. *Acta Psychiatrica Scandinavica* **95**, 508–514.

Fichter, M. M., Quadflieg, N. & Brandl, B. (1993). Recurrent overating: an empirical comparison of binge eating disorder, bulimia nervosa, and obesity. *International Journal of Eating Disorders* **14**, 1–16.

Fombonne, F. (1998). Increased rates of psychosocial disorders in youth. *European Archives of Psychiatry and Clinical Neuroscience* **248**, 1–3.

Franko, D. L. & Spurrell, E. B. (2000). Detection and management of eating disorders during pregnancy. *Obstetrics & Genecology* **95**, 942–946.

Grilo, C. M., Levy, K. N., Becker, D. F., Edell, W. S. & McGlashan, T. H. (1996). Comorbidity of DSM-III-R Axis I and Axis II disorders among female inpatients with eating disorders. *Psychiatric Services* **47**, 426–429.

Grilo, C. M., Devlin, M. J., Cachelin, F. M. & Yanovski, S. Z. (1997). Report of the National Institutes of Health (NIH) Workshop on the Development of Research Priorities in Eating Disorders. *Psychopharmacology Bulletin* **33**, 321–333.

Heatherton, T. F., Mahamedi, F., Striepe, M., Field, A. E. & Keel, P. (1997). A 10-year longitudinal study of body weight, dieting, and eating disorder symptoms. *Journal of Abnormal Psychology* **106**, 117–125.

Herpertz, S., Albus, C., Wagener, R., Kocnar, M., Wagner, R., Henning, A., Best, F., Foerster, H., Schulze Schleppinghoff, B., Thomas, W., Kohle, K., Mann, K. & Senf, W. (1998). Comorbidity of diabetes and eating disorders: does diabetes control reflect disturbed eating behavior? *Diabetes Care* **21**, 1110–1116.

Holdernness, C. C., Brooks-Gunn, J. & Warren, M. P. (1994). Co-morbidity of eating disorders and substance abuse: review of the literature. *International Journal of Eating Disorders* **16**, 1–34.

Hsu, L. K. G. (1996). Epidemiology of the eating disorders. *Psychiatric Clinics of North America* **19**, 681–700.

Kaplan, A. S. (1990). Biomedical variables in the eating disorders. *Canadian Journal of Psychiatry* **35**, 745–753.

Kaye, W. H., Gwirtsman, H. E. & George, D. T. (1989). The effects of binging and vomiting on hormonal secretion. *Biological Psychiatry* **25**, 768–780.

Keel, P. K. & Mitchell, J. E. (1997). Outcome in bulimia nervosa. *American Journal of Psychiatry* **154**, 313–321.

Keel, P. K., Mitchell, J. E., Miller, K. B., Davis, T. L. & Crow, S. J. (1999). Long-term outcome of bulimia nervosa. *Archives of General Psychiatry* **56**, 63–69.

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., Wittchen, H. & Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Archives of General Psychiatry* **51**, 8–19.

Laessle, R. G., Wittchen, H., Fichter, M. M. & Pirke, K. M. (1989). The significance of subgroups of bulimia and anorexia nervosa: lifetime frequency of psychiatric disorders. *International Journal of Eating Disorders* **8**, 569–574.

Miranda, J., Azocar, F., Komaromy, M. & Golding, J. M. (1998). Unmet mental health needs of women in public-sector gynecologic clinics. *American Journal of Obstetrics and Gynecology* **178**, 212–217.

Mitchell, J. E. & Mussell, M. P. (1995). Comorbidity and binge eating disorder. *Addictive Behaviors* **20**, 725–732.

Nelson, E., Conger, B. & Douglass, R. (1983). Functional health status levels of primary care patients. *Journal of the American Medical Association* **249**, 3331–3338.

Palmer, E. P. & Guay, A. T. (1986). Reversible myopathy secondary to abuse of ipecac in patients with major eating disorders. *New England Journal of Medicine* **313**, 1457–1459.

Read, L. J., Quinn, R. J. & Hoefer, M. A. (1987). Measuring overall health: an evaluation of three important approaches. *Journal of Chronic Diseases* **40**, (supplement): 7S–22S.

Robins, L. N. & Regier, D. A. (1991). *Psychiatric Disorders in America*. Free Press: New York.

Schulberg, H. C. & Burns, B. J. (1988). Mental disorders in primary care: epidemiologic, diagnostic, and treatment research directions. *General Hospital Psychiatry* **10**, 79–87.

Spitzer, R. L., Devlin, M., Walsh, T. B., Hasin, D., Wing, R., Marcus, M., Stunkard, A., Wadden, T., Yanovski, S., Agras, S., Mitchell, J. & Nonas, C. (1992). Binge eating disorder: a multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders* **3**, 191–203.

Spitzer, R. L., Yanovski, S., Wadden, T., Wing, R., Marcus, M. D., Stunkard, A., Devlin, M., Mitchell, J., Hasin, D. & Home, R. L. (1993*a*). Binge eating disorder: its further validation in a multisite study. *International Journal of Eating Disorders* **13**, 137–153.

Spitzer, R. L., Stunkard, A., Yanovski, S., Marcus, M. D., Wadden, T., Wing, R., Mitchell, J. & Hasin, D. (1993*b*). Binge eating disorder should be included in DSM-IV: a reply to Fairburn *et al*.'s 'The classification of recurrent overeating: the binge eating disorder proposal'. *International Journal of Eating Disorders* **13**, 161–169.

Spitzer, R. L., Williams, J. B. W., Kroenke, K., Linzer, M., deGruy, F., Hahn, S. R., Brody, D. & Johnson, J. G. (1994). Utility of a new procedure for diagnosing mental disorders in primary care: the PRIME-MD 1000 Study. *Journal of the American Medical Association* **272**, 1749–1756.

Spitzer, R. L., Kroenke, K., Linzer, M., Hahn, S. R., Williams, J. B.W., de Gruy, F. V., Brody, D. & Davies, M. (1996). Health-related quality of life in primary care patients with mental disorders: results from the PRIME-MD 1000 Study. *Journal of the American Medical Association* **274**, 1511–1517.

Spitzer, R. L., Kroenke, K. & Williams, J. B. W. (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ Primary Care Study. *Journal of the American Medical Association* **282**, 1737–1744.

Stewart, A. L., Hays, R. D. & Ware, J. E. Jr. (1988). The MOS Short-Form General Health Survey. *Medical Care* **26**, 724–735.

Stewart, A. L., Greenfield, S., Hays, R. D., Wells, K., Rogers, W. H., Berry, S. D., McGlynn, E. A. & Ware, J. E. (1989). Functional status and well-being of patients with chronic conditions: results from the Medical Outcomes Study. *Journal of the American Medical Association* **262**, 907–913.

Striegel-Moore, R. H., Garvin, V., Dohm, F. A. & Rosenheck, R. A. (1999). Eating disorders in a national sample of hospitalized female and male veterans: detection rates and psychiatric comorbidity. *International Journal of Eating Disorders* **25**, 405–414.

Sunday, S. R. & Halmi, K. A. (1997). Eating behavior and eating disorders: the interface between clinical research and clinical practice. *Psychopharmacology Bulletin* **33**, 373–379.

Telch, C. F. & Stice, E. (1998). Psychiatric comorbidity in women with binge eating disorder: prevalence rates from a non-treatment-seeking sample. *Journal of Consulting and Clinical Psychology* **66**, 768–776.

Theander, S. (1985). Outcome and prognosis in anorexia nervosa and bulimia: some results of previous investigations, compared with those of a Swedish long-term study. *Journal of Psychiatric Research* **19**, 493–508.

Wiederman, M. W. & Pryor, T. (1996). Substance use among women with eating disorders. *International Journal of Eating Disorders* **20**, 163–168.

Williamson, D. A. & Martin, C. K. (1999). Binge eating disorder: a review of the literature after publication of DSM-IV. *Eating and Weight Disorders* **4**, 103–114.

Wonderlich, S. A. & Mitchell, J. E. (1997). Eating disorders and comorbidity: empirical, conceptual, and clinical implications. *Psychopharmacology Bulletin* **33**, 381–390.

Yanovski, S. Z. (1995). Biological correlates of binge eating. *Addictive Behaviors* **20**, 705–712.

Yanovski, S. Z., Nelson, J. E., Dubbert, B. K. & Spitzer, R. L. (1993). Association of binge eating disorder and psychiatric comorbidity in obese subjects. *American Journal of Psychiatry* **150**, 1472–1479.

Zaider, T. I., Johnson, J. G. & Cockell, S. J. (2000). A prospective longitudinal investigation of psychiatric disorders associated with onset and persistence of eating disorders during adolescence. Manuscript submitted for publication.