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## Comorbidity in eating disorders

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### Abstract

**Objective of review.** To provide a review of the most recent research on the psychiatric comorbidity of eating disorders (EDs) reported during the years 2004–2005.

**Summary of recent findings.** Current research provides further evidence to support the high rates of DSM axis I and axis II disorders in EDs. The literature indicates that anxiety and mood disorders are prevalent across EDs while psychopathology related to impulsivity (e.g. substance use disorders, borderline personality disorder) is more commonly associated with EDs characterized by bulimic symptoms.

**Future directions.** Future research should include more diverse samples with respect to participant age, treatment status (e.g. inpatient, outpatient, community-based), gender, and ethnicity (e.g. increased cross-cultural research). Continued research in the area of psychiatric comorbidity will be useful in the classification and nosology of EDs, in informing our understanding of the pathophysiology of these disorders, and in the development of effective treatments for EDs.

### Introduction

Research has indicated that eating disorders (EDs) are often associated with a wide range of psychiatric comorbidity, which can influence differential diagnoses and affect treatment outcome and longitudinal course. This chapter provides a review of the most recent research on DSM axis I and axis II disorders associated with EDs reported during the years 2004–2005 and concludes with directions for future research in this area.

## Literature review

This review provides a summary of the research findings organized by *DSM-IV* ED diagnosis, including anorexia nervosa (AN), bulimia nervosa (BN), and ED not otherwise specified (EDNOS). Within each diagnostic category the review includes a summary of the findings for DSM axis I and axis II disorders, using evidence from cross-sectional, longitudinal, and family studies of EDs. The majority of published studies on psychiatric comorbidity in individuals with EDs are cross-sectional in design. The aim of these studies is to assess the relation between lifetime history of an ED and lifetime psychiatric comorbidity. Longitudinal studies follow cohorts of individuals with EDs using multiple assessments of EDs and other axis I and axis II disorders over time. In addition to assessing the relationship between lifetime ED and lifetime comorbidity, longitudinal studies have the potential to allow for the examination of sequencing of comorbidity and can provide a rich clinical picture of symptom development, which may offer insights into predictors of both EDs and comorbidity. Finally, family studies offer information about whether EDs co-aggregate with other types of disorders in families. The co-aggregation of disorders in families suggests that the disorders share common familial factors, usually related to genetics (for review, *see Hudson et al.* 2001).

These three types of studies all have strengths and limitations that warrant methodological consideration. The first such consideration, which is an issue common across study types, includes the method of diagnostic assessment. Notably, the studies included in this review report on the psychiatric comorbidity of *DSM-IV* axis I and axis II disorders, rather than subclinical syndromes or symptoms (e.g. depressive symptoms in individuals with BN). Diagnoses are most often made by clinical or semistructured interview but occasionally rely solely on questionnaires (e.g. EDE-Q). Interview-based assessments provide more reliable and valid diagnostic information; thus such methodological details (i.e. whether a questionnaire, validated interview, or nonvalidated interview is used) are noted in this review. The specific questionnaires or interviews are not noted in the present review due to the wide array used. A related assessment issue that has relevance for longitudinal studies is the frequency of follow-up. Most often comorbidity is not assessed in the periods in between follow-up, which may limit our understanding of the dynamic relationship of EDs and their comorbid disorders.

The second issue, which is most relevant for cross-sectional and longitudinal designs, includes the sampling technique. Studies typically recruit from treatment-seeking populations or community-based samples, and the differences between samples can affect comorbidity estimates. The use of treatment-seeking samples may overestimate psychiatric comorbidity attributed to selection bias as individuals with both an ED and a comorbid disorder are more likely to seek treatment than those with an ED alone. Consequently, community samples are often preferred because they are typically less prone to selection bias. However, due to the low base rate of EDs in the population, large community-based samples are needed for this type of research and, accordingly, less rigorous assessment techniques are often used (e.g. questionnaires) because of the time-intensity

required by interviews. A related sampling issue concerns the participant demographics, specifically with regard to age and culture or ethnicity. Given that the risk for lifetime comorbidity increases with age and with duration of illness (which often increase in tandem), older samples often have higher levels of comorbidity than younger samples. Similarly, an important sampling consideration may be the country or region in which the study took place and the ethnic representation of the sample. Specifically, base rates of psychiatric disorders may differ, either crossculturally or by ethnic group; thus this may also be reflected in rates of comorbidity.

A third methodological issue relates to the use of a control or comparison group. Studies that have a comparison group (i.e. which assess and present the prevalence of psychiatric morbidity in groups of individuals without EDs) are stronger than those without such a group as they control for the influence of the assessment technique (e.g. interview, interviewer) and the location of the study or participant demographics. Simply comparing prevalence rates of psychiatric disorders in individuals with EDs to general population figures is misleading, as it does not control for these variables. This issue is particularly relevant for family studies as well, which need to use analytic techniques to control for proband comorbidity in order to parcel out co-aggregation (Hudson *et al.* 2001).

Thus, the following review includes a range of studies. Methodological details are presented to allow the reader to consider the level of methodological rigor when interpreting findings.

## Anorexia nervosa

During the last two years, investigators have published six studies that include an examination of axis I and/or axis II comorbidity among individuals with AN. In one study, Zonneville-Bender and colleagues (2004) described the psychiatric comorbidity of adolescent ( $n = 48$ ; mean age 15.5 years; standard deviation (SD) 1.1 years) and adult ( $n = 23$ ; mean age 21.3 years; SD 3.1 years) inpatients with AN. Adult psychiatric comorbidity was diagnosed by validated clinical interview; adolescent comorbidity was diagnosed using a validated parent-report interview. In both groups, the most common comorbidities included major depression (adolescents 53.2%; adults 40.9%), social phobia (adolescents 25.5%; adults 50.0%), dysthymia (adolescents 42.5%; adults 27.3%), generalized anxiety disorder (GAD) (adolescents 27.7%; adults 27.3%), specific phobia (adolescents 14.9%; adults 40.9%), and obsessive compulsive disorder (OCD) (adolescents 8.5%; adults 22.7%). Panic disorder with and without agoraphobia was less common. With the exception of specific phobia and social phobia, which were significantly more common among older patients with a longer duration of illness, anxiety comorbidity was similarly elevated in adolescent and adult patients, which suggests that most anxiety comorbidity is not simply related to duration of illness in AN.

In a Price Foundation study report, Kaye *et al.* (2004) examine lifetime psychiatric comorbidity of anxiety disorders in individuals with EDs assessed by validated clinical interview. The authors report on 97 individuals with a

lifetime history of AN (mean age 26.64 years; SD 9.71 years) and 293 with a history of AN and BN (mean age 29.30 years; SD 9.10 years); additionally, 282 individuals with lifetime BN were included and are described below. Fifty-five percent of those with a history of AN alone and 62% of those with a history of AN and BN had at least one lifetime anxiety disorder. OCD (AN 35%; AN+BN 44%) and social phobia (AN 22%; AN+BN 23%) were particularly elevated in both groups while other anxiety disorders were less common. Notably, while anxiety disorders were elevated across groups, posttraumatic stress disorder (PTSD) was significantly less common in those with AN alone (5%) than in those with a history of AN and BN (15%), or BN alone (described below). The authors noted one possible explanation for the significant elevations in anxiety disorders in this population may be that the sample represented “enriched pedigrees” as it was part of a genetics/family study of EDs. With regard to the timing of onset, the authors reported that across ED diagnostic groups the onset of the ED was more likely to follow the onset of the anxiety disorder for individuals with comorbid OCD (62%), social phobia (74%), specific phobia (83%), and GAD (65%), while PTSD (59%), panic disorder (71%), and agoraphobia (53%) were more likely to onset concurrently with or after the ED. Thus, like the report of Zonneville-Bender and colleagues (2004), this investigation highlights the significant comorbidity of EDs and anxiety disorders.

In a second Price Foundation study report, Bulik and colleagues (2004) report on alcohol use disorder (AUD) comorbidity in the same sample: 16.8% of those with AN had a lifetime history of an AUD (either alcohol abuse or dependence) and 37.8% of those with a lifetime history of both AN and BN had a lifetime history of an AUD; those with AN alone were significantly less likely than the other ED groups to have an AUD. With regard to timing of onset, approximately half of those with AN (46.7%) and the majority of those with AN and BN (59.2%) developed the ED prior to the onset of their AUD. Across ED diagnoses, major depression, OCD, PTSD, social phobia, specific phobia, and Cluster B personality disorders were all significant predictors of AUD. Given the high prevalence of anxiety disorders in individuals with EDs, these individuals may use alcohol for its anxiolytic effects. The specific findings for individuals with BN are presented below.

Godart and colleagues (2004) describe mood and anxiety disorder comorbidity in a sample of inpatients and outpatients with AN restricting type (ANR) ( $n = 111$ ; mean age 19.31 years; SD 3.01 years), AN binge/purge type (ANBP) ( $n = 55$ ; mean age 20.60 years; SD 3.02 years), and BN (described further below) in comparison to a sample of matched healthy control subjects. Mood and anxiety diagnoses were made by validated clinical interview and included major depression (ANR 44.1%; ANBP 49.1%), GAD (ANR 48.6%; ANBP 45.5%), social phobia (ANR 30.6%; ANBP 32.7%), OCD (ANR 17.1%; ANBP 21.8%), and agoraphobia (ANR 14.4%; ANBP 20.0%). Panic disorder and PTSD were less common. With the exception of panic disorder and PTSD, all mood and anxiety disorders were more common among AN subjects than among matched healthy controls; there were no significant differences in comorbidity by subtype. Both major depression and agoraphobia were predictive of social disability in AN.

In a cross-cultural study conducted in Singapore, Lee *et al.* (2005) reported on psychiatric comorbidity in a treatment-seeking sample of individuals with AN ( $n = 126$ ; 82 ANR, 44 ANBP). One hundred and fifteen of the AN subjects were females with an average age of 17.6 years. Eighty four percent of the subjects were ethnically Chinese. Comorbid diagnoses were obtained from medical record review. The authors reported that a minority (31.7%) had psychiatric comorbidity most often including major depression (25.4%). Anxiety disorders, substance use disorders, and PDs were rare in this sample (each <5%). Compared with rates in Western samples, the prevalence of axis I and axis II disorders in this sample was relatively low and it is unclear whether this is attributable to lower base rates of psychiatric comorbidity in the population or potentially due to the methods of comorbidity assessment (e.g. record review may be less sensitive than validated clinical interview).

In a second cross-cultural study, Ro *et al.* (2005a) report on axis II comorbidity assessed by validated clinical interview at admission, and at one and two years of follow-up in a Norwegian sample of inpatients with EDs that included a small AN sample ( $n = 74$ ; 12 AN, 40 BN, 22 EDNOS; mean age 29.7 years; SD 7.4 years). In the ANs, the majority (75%) had one or more PD with avoidant PD and obsessive compulsive PD being the most common. Axis II comorbidity for BN and EDNOS are described below.

## Bulimia nervosa

During the last two years, investigators have published 11 studies that include an examination of axis I and/or axis II comorbidity among individuals with BN.

In a Price Foundation study report, described above, Kaye *et al.* (2004) underscore the prevalence of anxiety disorders among individuals with lifetime EDs. Among individuals with a lifetime history of BN ( $n = 282$ ; mean age 27.96 years; SD 9.65 years), 68% had a lifetime history of at least one anxiety disorder, 40% had OCD, 16% had social phobia, and 15% had PTSD. Specific phobia and panic disorder with and without agoraphobia were less common.

In another Price Foundation study report, also mentioned above, using the same sample, Bulik *et al.* (2004) reported that 46.1% of those with BN had a lifetime history of an AUD. Similar to those with AN, the majority of those with comorbid BN and AUDs (55.3%), were characterized by BN preceding the AUD. As in AN, correlates of AUD in BN included major depression, OCD, PTSD, social phobia, specific phobia, and Cluster B PDs. Notably, the prevalence of AUDs in BN was significantly elevated when compared to those with AN alone.

As described above, Godart and colleagues (2004) reported on mood and anxiety disorder comorbidity in a sample of inpatients and outpatients with BN-purging type (BN-P) ( $n = 86$ ; mean age 22.78 years; SD 4.47 years) and BN-nonpurging type (BN-NP) ( $n = 19$ ; mean age 24.63 years; SD 6.91 years). On the basis of a validated clinical interview, the following diagnoses were made: major depression (BN-P 31.4%; BN-NP 36.8%), GAD (BN-P 32.6%; BN-NP 26.3%), and social phobia (BN-P 29.1%; BN-NP 36.8%). Panic disorder with and without agoraphobia, OCD, and PTSD were less common. Major depression

was significantly more common among individuals with BN than healthy matched controls; GAD, social phobia, and PTSD were all significantly more common among individuals with BN-P than healthy matched controls. Major depression and the number of anxiety disorders were significantly predictive of social disability in BN.

In a cross-sectional study aimed at elucidating the relevance of separating BN and EDNOS (characterized by purging at least 1x/week in the absence of objective binge episodes), Binford and le Grange (2005) examined psychiatric comorbidity in 56 adolescents (36 BN, 20 EDNOS-P; mean age 16.55 years; SD 1.36 years). Psychiatric comorbidity was assigned by validated clinical interview and in both ED groups it was high, including major depression (BN 56.3%; EDNOS-P 50.0%) and anxiety disorders (BN 25.0%; EDNOS-P 30.0%); there were no significant between-group differences in rates of major depression or anxiety disorders. The authors concluded that similar patterns of mood and anxiety comorbidity argue against the utility of separating BN and EDNOS diagnostically.

Spindler and Milos (2004) report on psychiatric comorbidity in a treatment-seeking and community-recruited sample of 126 females with BN purging type (mean age 27.1 years; SD 6.9 years). Based on validated clinical interview, 74.6% of the sample had a lifetime history of any axis I disorder, with affective disorders (53.2%), anxiety disorders (50.0%), and substance abuse (27.8%) being particularly common. Some 68.3% of the sample had a lifetime history of any axis II comorbidity, with 47.6% with Cluster C PDs, 30.2% with Cluster B PDs, and only 7.9% with Cluster A PDs. When the investigators ran comparisons between those with and without a history of inpatient treatment for their EDs, they found that lifetime affective disorders, anxiety disorders, Cluster B PDs, and Cluster C PDs were all significantly more common in those with inpatient histories.

In a study described briefly above, Ro *et al.* (2005a) reported on axis II disorders in 40 inpatients with BN. At intake, the majority (75%) had one or more PD with borderline PD (50%) and avoidant PD (30%) being the most common, followed by obsessive-compulsive PD (18%), paranoid PD (18%), and dependent PD (13%); histrionic PD and schizoid PD were less common (8%). In a second report, Ro *et al.* (2005b) reported on the longitudinal relationship between ED symptoms and axis II comorbidity, concluding that ED symptoms tended to improve before PD symptoms, which they argued may suggest that personality pathology is partially attributable to the ED symptoms in those with chronic EDs.

In a longitudinal study, Fichter and Quadflieg (2004) assessed psychiatric comorbidity over 12 years of follow up in a longitudinal sample of 167 females with BN-P using a validated clinical interview. Lifetime major depression (58.2%), anxiety disorders (36.1%), and substance use disorders (36.1%) were most common. The authors highlighted the significance of psychiatric comorbidity noting that lifetime comorbidity at study intake was predictive of ED outcome at 12 years of follow up.

In a longitudinal community study, Perez *et al.* (2004) used a validated clinical interview to assess the relation between EDs, major depression, and dysthymia

in adolescent females ( $n = 937$ ) at three time points from mean age 16.6 years (SD 1.2 years) to 24.2 years (SD 0.57 years). During the course of follow-up, 17 participants received a diagnosis of BN. The authors reported that dysthymia was more strongly associated with BN than was major depression, which may suggest that the presence of dysthymia in adolescence is a risk factor for the onset of BN.

Stice *et al.* (2004) conducted a community-based longitudinal study of 496 adolescent females (mean age 13 years) to study the temporal relationships between BN, major depression, and substance use disorders. EDs were assessed by validated clinical interview; major depression and substance abuse were assessed using modified versions of validated clinical interviews. Eight girls (1.6%) met criteria for BN or subthreshold BN at time 1, 2.4% at time 2 (one-year follow-up), and 1.8% at time 3 (two-year follow-up); 24 (4.8%) girls met criteria for BN or subthreshold BN at any point during the study. Analyses revealed that depressive symptoms but not substance abuse symptoms at time 1 were significant predictors of the onset of BN and subthreshold BN; similarly, BN symptoms predicted the onset of depressive pathology. BN and subthreshold BN did not predict onset of substance abuse.

Duncan *et al.* (2005) used data from the Collaborative Study of Genetics in Alcoholism to examine psychiatric comorbidity in BN using latent class analyses. One hundred and twenty-two women (mean age 34.7 years; SD 10.3 years) within a large sample of 4110 female relatives of cases and control subjects met criteria for BN; 94.3% of those with BN came from case families rather than controls. Lifetime comorbidity as diagnosed by validated clinical interview was common among those with BN: 72.1% had major depression, 38.5% had alcohol dependence, 20.5% had an anxiety disorder, 19.5% had marijuana dependence, and 19.5% had cocaine dependence; only 13.1% had no non-ED comorbidity. Latent class analyses of those with BN yielded two classes: one characterized only by elevated major depression and one characterized by elevations in all psychiatric comorbidity, increased impulsivity, and poorer global functioning. These findings support the existence of a more impulsive subtype of individuals with BN, characterized by increased comorbidity, including substance dependence, which may have relevance for etiology/classification as well as for treatment.

Wade *et al.* (2004) reported on a population-based study of White twins from the Virginia Twin Registry (male–female dizygotic twins,  $n = 1192$  pairs, mean age 36.6 years, SD 8.9 years; female–female dizygotic twins,  $n = 467$ , mean age 36.0 years, SD 7.6 years). A minority of the twins (6.3% of the male–female twins, 5.1% of the female–female twins) met criteria for BN or relaxed BN (less than 2x/week binge/purge). The study findings support the existence of shared familial risk factors among BN and GAD, and further, suggest that risk for BN in the female twin is manifested as risk for GAD in the male twin, supporting a sex-specific liability for risk transmission.

## Eating disorder not otherwise specified

In spite of the evidence suggesting that EDNOS is more prevalent than AN or BN, there is limited research on comorbidity for this group.

In a study described above, Ro *et al.* (2005a) report on axis II comorbidity in a small sample of inpatients with EDNOS ( $n = 22$ ). Similar to those with AN and BN, the majority (82%) had one or more PD, including avoidant PD (50%), paranoid PD (27%), obsessive compulsive PD (23%), and borderline PD (14%).

Striegel-Moore and colleagues (2005) assessed the prevalence of night eating syndrome (NES) and its association with psychiatric comorbidity in a large community sample (682 Black women, mean age 21.5 years, SD 0.73; 659 White women, mean age 21.2 years, SD 0.73). Using a telephone interview based on a validated clinical interview, the authors reported a NES prevalence rate of 1.6% (22 Black women; 2 White women). In the Black women with NES, psychiatric comorbidity was reported in 35.0%, with 30% meeting criteria for major depressive disorder (MDD), 10% with PTSD, 5% with panic disorder, and 5% with GAD.

## Eating disorder samples not broken down by diagnosis

A number of reports described psychiatric comorbidity in EDs without breaking down the comorbidity by ED diagnosis.

In a series of reports, Milos *et al.* (2004a, 2004b) describe axis I and axis II comorbidity in a sample of treatment-seeking (outpatient and inpatient) and community-recruited women with EDs ( $n = 288$ ; 87 AN, 158 BN, 43 EDNOS; mean age 29.0 years, SD 9.6 years)\* assessed by validated clinical interview. Across the sample, 72.9% had lifetime axis I comorbidity (51% affective disorders, 25.3% had substance related disorders, 53.1% had any anxiety disorders), and 68.1% had any axis II lifetime comorbidity (8.7% had a Cluster A PD, 21.9% had a Cluster B PD, and 51.7% had a Cluster C PD). The authors reported that purging and psychiatric comorbidity (in particular, affective disorders and Cluster B PDs) were associated with an increase in suicide attempts (Milos *et al.* 2004a).

In an investigation of the impact of traumatic history on treatment response in a sample of Colombian women with EDs ( $n = 160$ ; 52 AN, 62 BN, 38 BED; mean age 21.4 years, SD 7.21 years), Rodriguez and colleagues (2005) reported on psychiatric comorbidity diagnosed by validated clinical interview. Lifetime axis I comorbidity was significant (OCD 79.4%; major depression 67.5%; PTSD 14.4%; bipolar disorder 13.1%; substance abuse 13.1%), while axis II comorbidity was less common (<20%). Outcome analyses suggested bipolar disorder was more common in those with poor treatment outcome (odds ratio = -3.25); OCD

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\* Note that Milos *et al.* (2004b) contains a subsample from Milos *et al.* (2004a) so the data reported here are only from the larger study.

and PTSD were associated with poor outcome at the trend level. Notably, the rates of OCD comorbidity were particularly elevated in this sample.

Wildman *et al.* (2004) describe 54 treatment-seeking women with a current (85%) or past (15%) ED; women were categorized as having a history of suicide attempts/gestures ( $n = 27$ ; mean age 29 years, SD 7 years) or having no suicidal history ( $n = 27$ ; mean age 28 years, SD 9 years). Based on a validated clinical interview, 74% had a lifetime history of an anxiety disorder, with lifetime anxiety being significantly more likely in the parasuicidal women (25/27) than in the nonparasuicidal women (15/27). With regard to course, the majority (85%) of women with lifetime anxiety disorders developed the anxiety disorder prior to the development of the ED. Eighty-three percent of the sample had lifetime major depression, there were no differences in prevalence between groups; however, the parasuicidal women were significantly more likely to develop the major depression prior to the ED (14/22) than the nonparasuicidal women (1/18). Fifty percent of the sample met criteria for a lifetime substance use disorder and similarly there were no differences between groups on the prevalence of this disorder; only two women developed the substance use disorder prior to the ED. Notably, the average age of onset of MDD and anxiety disorders was significantly younger in the parasuicidal women than in the nonparasuicidal women. The authors concluded that there may be etiologic differences in EDs in women who develop major depression prior to the onset of the ED compared with those who develop the ED first. Two hypotheses presented include the suggestion that premorbid depression may be instrumental in the development or maintenance of EDs for some, or, alternatively, that early onset depression broadly increases vulnerability to psychopathology, including EDs.

Thompson-Brenner and Westen (2005a, 2005b) used a clinician-report design to investigate comorbidity and treatment outcome in individuals with bulimia spectrum disorders (125 BN, 9 ANBP, 11 EDNOS characterized by bulimic symptoms; mean age 28.5 years, SD 10.2 years). Based on a clinician-report questionnaire, 91.0% of the sample had a comorbid axis I disorder; the most commonly reported were mood (dysthymia 52.8%; major depressive disorder 46.5%), anxiety disorders (OCD 23.4%; PTSD 20.0%; panic disorder 17.2%), and substance use disorders (20.7%). Axis II comorbidity was also common, with 56.9% being diagnosed with one or more PD (borderline PD 24.1%; narcissistic PD 11.0%; histrionic PD 13.1%; avoidant PD 15.2%; obsessive compulsive PD 15.2%; dependent PD 23.1%). Increased comorbidity was associated with longer treatment duration and worse outcome. Using an alternative assessment methodology, this study supports other research indicating high levels of axis I and axis II comorbidity in individuals with bulimic spectrum EDs.

Keel and colleagues (2005) examined EDs and psychiatric comorbidity in 672 female twins (mean age 17.46 years, SD 0.51 years) who were reared together using validated clinical interviews. Some 5.7% of the sample had an ED, with 3.9% meeting criteria for AN and 1.8% meeting criteria for BN; notably, 10 came from concordant monozygotic twin pairs, thus 33 girls from different families were included in the analyses. Comorbidity was significantly higher among those with an ED when compared to those without an ED (major depression

30.3% in those with an ED, 12.4% in those without an ED; anxiety disorder 38.7% in those with an ED, 20.6% in those without; alcohol use 24.2% in those with an ED, 12.2% in those without; nicotine dependence 27.3% in those with an ED, 12.9% in those without). However, in the non-ED co-twins ( $n = 14$ ), anxiety disorders were significantly more common compared to anxiety disorders in the general non-ED relatives (46.2% compared with 20.6%) and major depression was more common at the trend level (28.6% compared with 12.4%). Anxiety disorders, major depression, and nicotine dependence were all significantly higher in those with EDs than in the control subjects, and the monozygotic twin pairs discordant for EDs were more than twice as likely to have an anxiety disorder compared to the non-ED controls, independent of whether the co-twin had an anxiety disorder. These findings support the notion of a shared diathesis model between EDs and anxiety disorders.

Notably, in another report from the Price Foundation study, Reba *et al.* (2005) examined the relation between symptoms of purging and psychiatric comorbidity, assessed by validated clinical interview in a large sample of women with EDs ( $n = 672$ ; mean age 28.36 years, SD 9.45 years). There were no differences in axis I or axis II comorbidity by presence of purging.

In a large population study, Lewinsohn *et al.* (2004) used a validated clinical interview to identify psychiatric disorders in adolescents ( $n = 1704$ , 52.1% female; mean age 16.6 years, SD 1.2 years). Thirteen individuals with EDs were identified (12 were female), including eight with BN and five with AN. Three (23.1%) individuals had no psychiatric comorbidity, four (30.8%) had one additional diagnosis, four had two additional diagnoses, and two had three or more additional diagnoses. The most common comorbidities included major depression and substance use disorders; bipolar disorder, separation anxiety, GAD, and specific phobia were also represented (Lewinsohn, 2005).

## Eating disorders in studies of other psychiatric disorders

A handful of studies published in 2004–2005 examined rates of EDs in other psychiatric disorder populations. Courbasson *et al.* (2005) described psychiatric comorbidity in a large cross-sectional study of individuals seeking outpatient treatment for substance use disorder (1177 males, 433 females). Using a validated clinical interview, the authors identified elevated rates of current and past AN and BN in women (7.4% current AN, 6.2% past AN; 7.6% current BN, 3.9% past BN) and men (2.6% current AN, 3.4% past AN; 1.5% current BN, 0.5% past BN). EDs were more common in women than in men, and past AN was more common than past BN. Individuals with comorbid EDs and substance use disorders were more likely than those without EDs to have increased psychiatric comorbidity, and those with current EDs were significantly more likely to have major depression, social phobia, bipolar disorder, schizophrenia, panic disorder with agoraphobia, and schizophreniform disorder. Further, those with EDs were also more likely to use a greater number of substances and to report more adverse consequences of substance use. The authors concluded that in individuals with substance use disorders, presence of a comorbid ED is

indicative of a more severe psychiatric profile and may require tailored intervention.

In a cross-sectional study, Ruffolo *et al.* (2006) examined 200 treatment-seeking individuals with body dysmorphic disorder (BDD) and found that 32.5% ( $n = 65$ ) had a lifetime history of an ED. Based on a validated clinical interview, 18 (9%) had a lifetime history of AN, 13 (6.5%) had a lifetime history of BN, 11 (5.5%) had a lifetime history of binge eating disorder (BED), and 24 (12.5%) had a lifetime history of another EDNOS (note that the percentages total above 32.5% because a minority of individuals had a history of more than one ED). Although there were no significant differences in age between those with a lifetime ED (mean age 30.6 years, SD 11.5 years) and those without (mean age 33.6 years, SD 12.3 years), those with a lifetime ED were significantly more likely to be female, significantly more likely to have additional comorbidity, and demonstrated increased body image disturbance when compared to those without a lifetime ED. With regard to sequence of onset, the majority (63.1%) of those with a lifetime ED developed BDD first. The authors conclude that the presence of a lifetime ED among individuals with BDD is significant and has important implications for intervention.

Ramacciotti *et al.* (2005) examined ED comorbidity using a validated clinical interview in a treatment-seeking sample of bipolar I patients ( $n = 51$ ; 29 males, mean age 40.9 years, SD 2.4 years; 22 females, mean age 40.3 years, SD 2.6 years). Some 27.5% had a lifetime history of an ED, with BED being the most common (17.6%) followed by BN (9.8%). With regard to sequence of onset, in the majority (57.1%) of those with a comorbid ED, the bipolar I preceded the onset of the ED. Notably, the ED was most likely to onset during a period of depression.

Becker *et al.* (2004) assessed EDs in a female outpatient anxiety disorder sample ( $n = 257$ ; mean age 39.11 years, SD 12.30 years); ED diagnoses were made using a diagnostic questionnaire, anxiety disorder diagnoses were made using a validated clinical interview. Twelve percent ( $n = 30$ ) of the sample met criteria for a probable ED (11 EDNOS excluding BED, nine BED, eight BN). EDs were most common among those with a principal diagnosis of social phobia (20% of those with social phobia had an ED), followed by those with principal PTSD (16.8%), principal GAD (7.7%), principal OCD (5.6%), and principal panic disorder (4.5%). EDs were present in a significant minority of female patients with anxiety disorders, particularly those with social phobia and PTSD.

Rodriguez *et al.* (2004) described psychiatric comorbidity in 539 primary care patients (76% female; mean age 39.1 years, SD 11.6 years) diagnosed with an anxiety disorder based on a validated clinical interview. Among the anxiety disorder diagnoses assigned were panic disorder with ( $n = 149$ ) and without ( $n = 86$ ) agoraphobia, PTSD ( $n = 199$ ), social phobia ( $n = 182$ ), GAD ( $n = 135$ ), and agoraphobia without panic ( $n = 23$ ); notably, 71% of the sample was diagnosed with more than one anxiety disorder. EDs occurred as comorbid psychiatric conditions in less than one-fifth of the sample and were most common in patients with PTSD, panic disorder with or without agoraphobia, and agoraphobia. The data presentation did not allow for exact numbers or breakdown of ED type.

## Summary of important findings

The findings from the studies published in 2004–2005 on psychiatric comorbidity as reviewed here provide further evidence to support the high rates of psychiatric comorbidity in EDs. Anxiety and mood disorders are prevalent across EDs, while psychopathology related to impulsivity (e.g. substance use disorders, borderline PD) is more commonly associated with EDs characterized by bulimic symptoms. Notably, the handful of studies that explore comorbidity by ED subtypes (e.g. ANR compared to ANBP; BN compared to BN-NP) have yielded few significant differences.

While the majority of studies include adults or older adolescents exclusively, those that directly compare comorbidity in adolescents and adults with EDs suggest that there are not many significant age-related differences. This lack of differences suggests that comorbidity in EDs is not secondary to age or duration of illness. In fact, the research indicating that the anxiety disorder onsets prior to the ED onset is consistent with the hypothesis of a shared diathesis model for the development of these disorders.

Comorbidity appears to be common to both inpatient and outpatient ED populations, although research suggests it is highest in those receiving inpatient treatment. Cross-cultural research on psychiatric comorbidity in EDs is limited and heterogeneous on the basis of participant demographic characteristics (e.g. ethnicity). Further, cross-cultural research is difficult to interpret given that base rates of psychiatric disorders may differ and thus may be reflected in comorbidity findings.

## Clinical implications

These findings underscore the prevalence of psychiatric comorbidity in individuals with EDs. Across disciplines clinicians should be aware of the likelihood of comorbidity in patients with EDs and should therefore be comprehensive in their evaluations and treatment of ED patients. Further, given the increased lifetime risk for comorbidity in individuals with EDs, clinicians should continue to assess for other psychiatric disorders throughout the course of ED treatment. Similarly, clinicians should be aware of the prevalence of EDs among other clinical populations including individuals with internalizing disorders and impulse-related disorders and consequently assess fully for EDs in all patients.

Comorbidity should be carefully considered in both assessment and treatment planning. With regard to assessment, comorbidity should be weighed in assigning differential diagnoses, particularly as some ED symptoms can seem similar to symptoms of other disorders (e.g. major depression, OCD). In terms of treatment planning, the longitudinal findings generally indicate that increased comorbidity is associated with a more severe outcome and increased treatment-seeking. However the literature to date provides little guidance on how comorbidity should be addressed in the treatment of individuals with EDs. For example, should the ED be targeted first? Are there certain comorbid disorders that should be targeted first (e.g. which, if treated, would facilitate ED treatment)?

Or should EDs and comorbidity be addressed simultaneously in treatment? One study included in this review (Ro *et al.* 2005b) suggests that if comorbidity is secondary to the ED then symptomatic improvement in the ED may correspond to improvement in comorbidity. Some investigators have suggested that effective treatment for individuals with EDs would address underlying variables (e.g. personality styles) that may have contributed to the development and maintenance of the ED and psychiatric comorbidity (e.g. Westen and Harnden-Fischer 2001).

## Future directions

Continued research on comorbidity in EDs can be broadly useful in three important domains of ED study. First, it can be clinically useful with regard to assessment and treatment by providing clinicians with a more complete picture of their patients and by guiding treatment. While the literature to date has provided a comprehensive description of individuals with EDs with regard to axis I and axis II disorders, there is a need to include more heterogeneous samples in order to better understand comorbidity among different groups. For example, research should include samples that are diverse with regard to age, treatment status (e.g. inpatient, outpatient, community-based), gender, and ethnicity (e.g. increased cross-cultural research). Further, in order to guide treatment planning, continued longitudinal and prospective studies are needed to assess timing of onset of EDs and comorbidity, to allow for investigation of predictors of comorbidity, and to describe their impact on treatment. For example, the literature does not currently provide direction for clinicians treating patients with EDs and substance use disorders (e.g. what symptoms should be targeted first?). Following naturalistic studies in this area, clinical trials that differentially target ED and comorbid conditions are needed.

Second, comorbidity research in EDs may be instrumental in identifying the pathophysiology of EDs. Continued family/genetic studies will allow for investigation of specific risk factors for EDs and related disorders (e.g. anxiety disorders), rather than general risk factors for psychopathology. Further research on the relation between EDs and comorbidity suggesting a shared diathesis model will have implications for classification as well as for treatment and prevention.

Third, future research in comorbidity and EDs can be useful from a nosological perspective. In particular, studies that make use of varied assessment and statistical techniques (e.g. latent class analysis, taxometric analysis) yielding meaningful groups on the basis of EDs and comorbid symptoms may provide information that would guide future ED research – in particular genetics research – and inform the next iteration of the DSM.

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(References included from the targeted review years are preceded by one asterisk. References preceded by three asterisks are of particular significance. The significance is explained by a short commentary following the complete reference.)

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