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Comorbidity-independent Risk for Suicidality Increases with Bulimia Nervosa but not with Anorexia Nervosa

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Abstract

Background—Eating disorders are serious psychiatric illnesses with high levels of suicidality and high comorbidity. However, no study has established the extent to which suicidality is uniquely associated with eating disorders rather than attributable to comorbid mood, anxiety, or substance use disorders. The current study examined whether unique associations between eating disorders and suicidality exist and whether potential associations differ by eating disorder diagnosis.

Methods—Participants were women (n=364) from the second stage of a large epidemiological study examining eating and health related attitudes and behaviors. The Structured Clinical Interview for Axis I diagnoses (SCID-I) was used to determine lifetime psychiatric diagnoses and lifetime suicidality.

Results—A multiple regression model including eating and comorbid disorders indicated that bulimia nervosa (BN) was significantly associated with suicidality above and beyond risk predicted by comorbid disorders. No unique association was found for anorexia nervosa (AN) or eating disorder not otherwise specified while controlling for comorbidity.

Conclusions—BN is independently associated with suicidality, and findings emphasize the need to incorporate suicide risk assessment in standardized assessments of eating disorders.

Keywords

eating disorders; suicidality; bulimia nervosa; anorexia nervosa; suicide; risk factors

1. Introduction

Eating disorders are persistent and debilitating psychiatric illnesses affecting approximately 1–4% of women in the United States (Hudson, et al. 2007; Klump, et al. 2009) and are associated with increased risk of suicide and suicide-related behaviors (suicidality) (Franko & Keel 2006; Hoek 2006; Hudson, et al. 2007; Keel, et al. 2003; Pompili, et al. 2004).

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Contributors

Dr. Keel designed the original study from which data were used. Ms. Bodell wrote the first draft of the manuscript. All authors participated in the writing and preparation of the manuscript and have approved the final manuscript.

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Eating disorders also demonstrate elevated rates of comorbid disorders (Hudson, et al. 2007) that are themselves associated with increased suicide risk (Cogle, et al. 2009; Nepon, et al. 2010; Nock, et al. 2010; Sareen, et al. 2005). Despite observed patterns in suicidality and comorbidity, no study has established the extent to which suicidality in eating disorders is uniquely associated with the eating disorder rather than attributable to comorbid mood, anxiety, or substance use disorders. Establishing unique associations between psychiatric disorders and suicidality is important for identifying who is most at risk for suicide and possible mechanisms that confer increased risk for suicidality.

Although studies have investigated the unique prediction of some specific disorders (e.g., panic disorder, post-traumatic stress disorder, substance use disorders) on suicidal behavior (Cogle, et al. 2009; Nepon, et al. 2010; Nock, et al. 2010; Sareen, et al. 2005), only two studies have included eating disorders in such evaluations (Beautrais, et al. 1996; Shaffer, et al. 1996). Importantly, analyses were underpowered to determine any unique association between eating disorders and suicide or suicide attempts. For example, Beautrais and colleagues (1996) used a case-controlled design to examine the independent contribution of several psychiatric disorders on suicide attempts, and when analyses were conducted by age and gender, there was a marginally significant association between eating disorders and risk of suicide attempts in women younger than 30 years of age ($p=.08$). Furthermore, due to the small number of eating disorder cases in these studies ($n = 25$), both collapsed across eating disorder diagnoses in analyses, which may have diminished effect sizes due to diagnostic heterogeneity.

Importantly, differences in suicidality risk level seem to exist between specific eating disorders. In a recent meta-analysis, Preti and colleagues (Preti, et al. 2011) found significantly elevated standardized mortality ratios (SMR; the ratio of observed deaths in a target sample to expected deaths in a demographically matched population) for suicide in both anorexia nervosa (AN) (31: 21–44) and bulimia nervosa (BN) (7.5: 1.6–11.6). However, the 95% confidence intervals for suicide SMRs did not overlap between disorders, indicating risk of death by suicide is greater for AN than BN. Differences in suicide risk may be influenced further by differences in the prevalence of comorbid disorders. Based on the recent National Comorbidity Study Replication (NCS-R) (Hudson, et al. 2007), 94.5% of individuals with BN had a lifetime history of another core disorder compared with 56.2% of those with AN, reflecting a significantly elevated odds ratio (OR) in BN (17.6: 4.5–68.4) but not AN (1.3: 0.6–3.1). If comorbid disorders contribute to elevated suicidality in eating disorders, then suicide risk attributable to AN may be even greater than that attributable to BN after controlling for comorbidity.

In summary, examination of unique associations between eating disorders and suicidality has been limited to underpowered studies, and no studies have compared differences across eating disorder diagnoses. Thus, the current study aimed to examine whether unique associations between eating disorders and suicidality may exist and whether associations differ by eating disorder diagnosis.

2. Method

2.1 Sample

Data came from female participants in a two-staged epidemiological study that examined eating and health related attitudes and behaviors (for more detailed methods see Keel et al., 2011). In the springs of 1982, 1992, and 2002, 1,732 women completed self-report surveys from a randomly selected sample of 2,400 female students attending a northeastern university (72% participated). Ten- and twenty-year follow-up assessments were conducted in established cohorts in 1992 and 2002. In 2002, participants were invited to participate in

semi-structured interviews if their survey responses indicated the presence of a current eating disorder at any assessment ($n=272$), and 68% completed interviews. No differences were found on demographics or eating disorder symptoms in individuals who completed interviews versus those who did not ($p>.20$). Individuals whose survey responses did not indicate the presence of a current eating disorder were matched to the cases on demographic variables and also recruited to complete interviews. Given that these controls were recruited based on their survey responses about current eating disorder symptoms, they could have met criteria for an eating disorder at a different point in their life. The current study included the 364 women who completed the interviews in 2002. Overall, 220 women met DSM-IV criteria for a lifetime eating disorder, including 30 women with a lifetime diagnosis of AN, 50 with a lifetime diagnosis of BN (8 of whom also had a lifetime diagnosis of AN), and 148 with a lifetime diagnosis of eating disorder not otherwise specified (EDNOS). The mean(SD) age of the sample was 35(± 9) and the racial/ethnic composition was as follows: 77.2% Caucasian, 9.3% Asian, 7.4% Black, 5.5% Hispanic, 0.6% Mixed/Other.

2.2 Procedure

A signed consent form was obtained from each participant prior to participation. A telephone interview using the Structured Clinical Interview for DSM-IV (SCID-I) (First, 1995) was conducted to assess lifetime history of DSM-IV eating (AN, BN, EDNOS), mood, anxiety, and substance use disorders. Previous research has not found significant differences between telephone and face-to-face interview assessment (Herzog, et al. 1999; Keel, et al. 1999). Interviews were audiotaped with participant consent, and 15% of all interviews were reviewed to determine interrater reliability. Both ongoing assessment meetings and annual reviews of interrater reliability with feedback for interviewer drift contributed to good interrater reliability in the study: $\kappa=.71$ for eating disorders, $\kappa=1.00$ for mood disorders, $\kappa=.70$ for anxiety disorders, and $\kappa=.86$ for substance use disorders. Due to an inability to distinguish between partially remitted eating disorders (i.e., AN or BN in partial remission) and EDNOS, lifetime EDNOS was not diagnosed in individuals with a lifetime diagnosis of AN or BN.

The SCID-I was also used to assess lifetime suicidality. All participants were asked the suicidality item (“*Have things ever been so bad that you were thinking a lot about death or that you would be better off dead? What about thinking of hurting yourself?*”) from the major depression module regardless of endorsement of lifetime depressed mood or anhedonia. As such, we were able to examine suicidality in the absence of any lifetime mood disorder, which would otherwise be missed by standard SCID-I assessments. As indicated by the SCID-I, follow-up questions were used to establish the nature of thoughts endorsed and the presence of suicidality. Moreover, as instructed by the SCID-I, self-injury without any suicidal intent was coded as absent (=1). Suicidality was defined in two ways 1) as a dichotomous variable using SCID-I criteria including recurrent thoughts of own death (not just fear of dying), recurrent suicidal ideation without a specific plan, a specific plan for death by suicide, and a suicide attempt (i.e., lower threshold) and 2) as a dichotomous variable including recurrent suicidal ideation with or without a specific plan for suicide and suicide attempts (i.e., higher threshold). Previous studies have used similar methods of defining suicidality including single-item semi-structured interview methods (e.g., Hamilton Depression Rating Scale; Dilsaver et al., 1994; Strakowski et al., 1996)(Joiner et al., 2009) and single-item self-report of lifetime ideation and attempts (Cougale et al., 2009; Nepon et al., 2010).

2.3 Data Analyses

Analyses were conducted using *Predictive Analysis Software (PASW) version 18.0*. Due to the potential influence of age on the variables of interest, age was entered as a covariate in

all analyses. Cross-tabulations were used to examine characteristics of the sample, including prevalence of lifetime suicidality among individuals with a lifetime diagnosis of each eating disorder. Additionally, logistic regression was used to examine comorbidity patterns across eating disorders.

Consistent with methods from previous studies (e.g., Cogle et al., 2009; Nock et al., 2010), multiple logistic regression analyses were conducted in all participants ($n=364$) to examine the independent association between eating disorders and suicidality. First, lifetime histories of eating, mood, anxiety, and substance use disorders were entered as predictor variables and lifetime suicidality (separately for the lower and higher thresholds for defining suicidality) was entered as the dependent variable. Next, to examine the influence of specific eating disorders and comorbid disorders on suicidality, analyses were re-run with lifetime history of AN, BN, EDNOS, mood, anxiety, and substance use disorders entered as simultaneous predictors.

3. Results

Lifetime suicidality using the lower threshold definition (i.e., thoughts of own death, suicidal ideation, plans, and/or attempts) was endorsed by 42.6% of individuals with any eating disorder, 57.7% with AN, 61.9% with BN, and 36% with EDNOS, reflecting significant elevations for any eating disorder, AN, and BN, but not EDNOS. Lifetime suicidality using the higher threshold definition (i.e., suicidal ideation, plans, and/or attempts) was endorsed by 27.9% of individuals with any eating disorder, 34.6% with AN, 45.2% with BN, and 23.5% with EDNOS, reflecting significant elevations for any eating disorder and BN, but not AN or EDNOS (Table 1). Among individuals with lifetime suicidality, six percent endorsed a previous attempt. In terms of comorbidity, over two-thirds of participants with an eating disorder met diagnostic criteria for at least one additional disorder (i.e., mood, anxiety, or substance use disorder). Confidence intervals for suicidality and comorbid disorder prevalence estimates overlapped across eating disorder diagnoses (Table 1), suggesting no significant differences between eating disorder diagnoses in suicidality or comorbidity.

Results from the first multiple regression indicate that eating disorders in general were not associated with suicidality while controlling for comorbid disorders when using the lower threshold to define suicidality (Wald $\chi^2=1.29$, $df=1$, $p=.26$, OR [95% CI]= 1.40 [0.78–2.51]). However, both lifetime mood disorder and BN emerged as significant predictors of lifetime suicidality in the multiple regression examining lifetime AN, BN, EDNOS, mood, anxiety, and substance use disorders as simultaneous predictors (Table 2). When using the higher threshold to define suicidality, again, eating disorders in general were not associated with lifetime suicidality (Wald $\chi^2=2.19$, $df=1$, $p=.14$, OR [95% CI]= 1.71 [0.84–3.50]). However, lifetime BN was significantly associated with lifetime suicidality after controlling for comorbid disorders (Table 3). In addition, lifetime mood and substance use disorders were significantly associated with lifetime suicidality in analyses using the higher threshold to define suicidality.

4. Discussion

The current study sought to determine whether eating disorders are independently associated with suicidality or whether increased suicidality in this population is explained by comorbid disorders. Results provide evidence that the presence of lifetime BN is independently associated with the presence of lifetime suicidality such that associations found between BN and suicidality are not being driven fully by the presence of comorbid psychopathology. These findings are important because the majority of individuals with eating disorders do not seek treatment for their eating disorder (Fairburn et al., 2000; Mond et al., 2007; Hart et

al., 2011), and those who do, often receive treatment from a general practitioner (Mond et al., 2007). Importantly, several studies suggest that suicide risk assessments are often conducted by general practitioners only when patients appear depressed or inquire about medication for depressive symptoms (Hooper et al., 2012; Graham et al., 2011; Feldman, et al. 2007; Williams, et al. 1999). As such, the current study highlights that suicidality may be overlooked in individuals with BN who do not present with comorbid disorders and may be underestimated in those with depression and/or substance use and BN. Current findings suggest that clinicians should be concerned about individuals with BN and mood or substance use disorders because their suicidality risk may be higher than that explained by the mood or substance use disorder alone. Furthermore, findings allude to the potential importance of identifying both current and lifetime psychiatric diagnoses in the assessment of suicide risk.

Results are consistent with previous findings that individuals with BN have high rates of suicidal behavior (Corcos et al., 2002; Crow et al., 2009; Preti et al., 2011), and this is the first study to demonstrate that increased suicidality in BN is independent of additional psychopathology. Interestingly, although BN was associated with suicidality while controlling for lifetime AN, the reverse was not true. Additionally, eating disorders in general and lifetime EDNOS were not independently associated with suicidality. These findings may reflect the diagnostic heterogeneity across eating disorder diagnoses and the importance of purging and/or bingeing behaviors in associations between eating disorders and suicidality. This interpretation is consistent with previous studies finding suicide attempts to be more common in the binge/purge subtype of AN (Favaro & Santonastaso, 1997; Bulik et al., 2008; Foulon et al., 2007). Importantly, a recent meta-analysis found higher rates of suicide in AN compared to BN (Preti et al., 2011), so it is also possible that AN is independently associated with completed suicide, but not suicidality more broadly. Indeed, only six percent of individuals who endorsed lifetime suicidality reported having had a suicide attempt in the current sample. Differences between measuring suicidality more broadly and suicide attempts or completed suicide more specifically may reconcile differences between findings from the current study and the high suicide rates reported for individuals with AN.

Similar to reports on suicide attempts rather than completed suicide (Franko and Keel, 2006), we found no differences between AN and BN on lifetime suicidality despite evidence of differences in completed suicide (Preti et al., 2011). We found higher comorbidity estimates for AN and lower comorbidity estimates for BN compared to findings from the NCS-R (Hudson et al., 2007). These differences may reflect the nature of the samples (college versus population-based, respectively), differences in interview assessments or number of eating disorder cases (80 versus 36 cases of AN and BN), inclusion of men in analyses (absent versus present) and addition of impulse control disorders in count of any disorders (absent versus present). Although some methodological differences favor findings from the NCS-R (e.g., its population-based sample increases generalizability), others favor findings from the current report (e.g., larger sample of individuals with eating disorders would provide more stable estimates).

There are some limitations to the current study, including use of cross-sectional data and lifetime diagnoses. We cannot make any causal claims regarding associations between eating disorders and suicidality and results should be interpreted with caution. Furthermore, Axis II personality disorders were not examined. Indeed, the majority of individuals with Axis II disorders have comorbid Axis I disorders (Lenzenweger, et al. 2007; Oldham, et al. 1995), thus, controlling for lifetime mood, anxiety and substance use disorders may have controlled for the majority of Axis II disorders. However, it is still highly plausible that Axis II disorders, in particular, borderline personality disorder (BPD), are contributing to the

association found between suicidality and BN. Indeed, BN and BPD are highly comorbid (Cassin & von Ranson, 2005), and individuals with BPD experience high rates of suicidal behavior (Zanarini et al., 2008). Thus, the inability to specifically control for BPD in analyses represents a limitation to the current study. Additionally, due to small sample sizes of specific disorders (e.g., only five individuals endorsed a lifetime history of generalized anxiety disorder), specific comorbid diagnoses were collapsed across broader diagnostic categories, which may have resulted in our inability to replicate findings of unique associations between specific anxiety disorders and suicidality (Cougle, et al. 2009; Nock, et al. 2010). Furthermore, due to the nature of the sample, we examined suicidality broadly, rather than suicide attempts or completed suicide more specifically. Although examination of suicidality is important, suicidality may be distinct from more serious suicidal behavior. As such, comparison of current findings with those of studies examining suicide attempts or suicide should be made with caution. Lastly, use of a college-based sample may limit generalizability to other populations. Despite these limitations, the current study adds important information to the literature regarding the relationship between eating disorders and suicidality and thus contributes to two important areas of research.

There are a number of strengths to the current study, including the use of standardized interview assessments with high interrater reliability and inclusion of a sufficient number of individuals with eating disorders to adequately power analyses of unique associations with suicidality. Additionally, this is the first study to evaluate suicidality, rather than suicide attempts or completed suicide. Examination of suicidality in community samples is important because suicidality is a predictor of serious suicidal behavior (Fawcett, et al. 1990) and may provide information to decrease risk of lethal and non-lethal suicide attempts. Finally, the ability to examine associations for AN, BN, and EDNOS separately allowed us to detect a significant association for BN that would have been missed had the disorders been combined into a single “eating disorder” category. This represents a significant advance over prior attempts to study the association between eating disorders and suicidality while controlling for comorbidity.

Although it is clear that a lifetime eating disorder diagnosis precedes increased rates of completed suicides, the temporal order of suicidality and eating disorders requires further study using longitudinal designs. Additionally, studies may benefit from taking a symptom-based, rather than diagnosis-based, approach to identify the configuration of features that may confer greatest risk for suicide or serious suicidal behavior. For example, it may be specific symptoms (e.g., purging in eating disorders), personality features (e.g., affect dysregulation), or their interaction that increases risk for suicide rather than the disorders themselves. In these cases, identification of these specific features may be more informative than the diagnosis for tracking suicide risk during treatment. Similarly, future studies should be conducted to better understand why individuals with BN or purging and/or bingeing behavior more broadly are associated with increased risk of suicidality. Overall, the current study has some important clinical implications, including evidence of a unique association between BN and suicidality that highlights the importance of incorporating questions about suicidality in standardized assessments of eating disorders.

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Table 1
Lifetime Co-morbidity of Eating Disorders with Suicidality and Mood, Anxiety, and Substance Use Disorders

	Any Eating Disorder (n=197-220)			Anorexia Nervosa (n=26-30)			Bulimia Nervosa (n=42-50)			Eating Disorder NOS (n=136-148)		
	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)	%	OR	(95% CI)
Suicidality ^a (n=115-116)	27.9	2.74 ^{***}	(1.44-5.20)	34.6	2.07	(0.87-4.92)	45.2	3.53 ^{***}	(1.78-7.02)	23.5	1.16	(0.68-2.01)
Mood Disorder (n=159-160)	54.5	2.37 ^{***}	(1.52-3.71)	67.9	2.70 [*]	(1.18-6.15)	59.6	1.82	(.97-3.42)	51.6	1.41	(.92-2.17)
Anxiety Disorder (n=74-75)	27.3	2.41 ^{**}	(1.35-4.32)	34.5	2.06	(.91-4.64)	21.3	.942	(.44-2.00)	27.1	1.72 [*]	(1.03-2.90)
Substance Use Disorder (n=81-83)	28.1	2.56 ^{***}	(1.45-4.52)	16.7	.645	(.24-1.75)	26	1.35	(.67-2.71)	30.4	2.14 ^{**}	(1.29-3.53)
Any Disorder (n=224-226)	71.6	2.42 ^{***}	(1.55-3.78)	72.4	1.55	(.67-3.61)	69.4	1.36	(.71-2.60)	72.2	1.93 ^{**}	(1.22-3.04)

Note.

p<.001,

**
p<.01,

*
p<.05,

All analyses controlled for age; however, percentages are not age-adjusted.

^a Suicidality was defined as suicidal ideation with or without a specific plan and suicide attempts. When the definition of suicidality includes thoughts of own death, the association between lifetime anorexia nervosa is significant at p<.05.

Table 2

Influence of Lifetime Psychiatric Disorders and Specific Eating Disorder Diagnoses on Lifetime Suicidality Defined as Thoughts of Own Death, Suicidal Ideation with or without a Specific Plan, and Suicide Attempts

	B(S.E.)	Wald (χ^2)	Exp(B)	(95% CI)	p
Anorexia Nervosa	0.84(0.52)	2.55	2.31	(0.83–6.43)	0.11
Bulimia Nervosa	0.99(0.43)	5.20	2.69	(1.15–6.28)	0.02
Eating Disorder NOS	0.12(0.32)	0.14	1.13	(0.60–2.10)	0.71
Mood Disorders	1.83(0.29)	38.83	6.23	(3.50–11.10)	<.001
Anxiety Disorders	0.62(0.32)	3.68	1.85	(0.99–3.48)	0.06
Substance Use Disorders	0.37(0.34)	1.14	1.44	(0.74–2.82)	0.29
Age	–0.001(.02)	0.004	1.00	(0.97–1.03)	0.95

Table 3

Influence of Lifetime Psychiatric Disorders and Specific Eating Disorder Diagnoses on Lifetime Suicidality Defined as Suicidal Ideation with or without a Specific Plan and Suicide Attempts

	B(S.E.)	Wald (χ^2)	Exp(B)	(95% CI)	p
Anorexia Nervosa	0.66(0.54)	1.50	1.93	(0.67–5.58)	0.22
Bulimia Nervosa	1.24(0.46)	7.25	3.44	(1.40–8.44)	0.007
Eating Disorder NOS	0.49(0.39)	1.61	1.64	(0.76–3.51)	0.21
Mood Disorders	1.98(0.40)	24.85	7.28	(3.33–15.88)	<.001
Anxiety Disorders	0.06(0.36)	0.03	1.06	(0.53–2.12)	0.87
Substance Use Disorders	0.77(0.37)	4.47	2.17	(1.06–4.44)	0.04
Age	–0.01(.02)	0.67	0.99	(0.95–1.02)	0.41