

Suicidality in eating disorders: Occurrence, correlates, and clinical implications

Debra L. Franko ^{a,b,*}, Pamela K. Keel ^c

^a Department of Counseling and Applied Educational Psychology, Northeastern University, , 203 Lake Hall, Boston, MA 02115-5000, United States

^b Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School, United States

^c Department of Psychology, University of Iowa, United States

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Abstract

This review summarizes the published studies on suicide and suicide attempts in individuals with eating disorders, highlighting rates of occurrence, clinical correlates, and implications for practitioners. Multiple studies find high rates of suicide in patients with anorexia nervosa (AN) [Standardized Mortality Ratio (SMR) for suicide range from 1.0 to 5.3], whereas suicide rates do not appear to be elevated in bulimia nervosa (BN). In contrast, suicide attempts occur in approximately 3–20% of patients with anorexia nervosa and in 25–35% of patients with bulimia nervosa. Clinical correlates of suicidality in eating disorders include purging behaviors, depression, substance abuse, and a history of childhood physical and/or sexual abuse. Patients with eating disorders, particularly those with comorbid disorders, should be assessed routinely for suicidal ideation, regardless of the severity of eating disorder or depressive symptoms.

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Keywords: Suicide; Suicidality; Anorexia nervosa; Bulimia nervosa; Eating disorders; Mortality; Death

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* Corresponding author. Department of Counseling and Applied Educational Psychology, Northeastern University, 203 Lake Hall, Boston, MA 02115-5000, United States. Tel.: +1 617 373 5454; fax: +1 617 373 8892.

E-mail address: d.franko@neu.edu (D.L. Franko).

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Anorexia nervosa and bulimia nervosa are eating disorders that occur in 1–5% of adolescent and adult women and represent distressing and sometimes life-threatening forms of psychopathology. Anorexia nervosa (AN) is characterized by refusal to maintain a normal weight, misperception of size, and amenorrhea, whereas bulimia nervosa (BN) is defined by episodes of binge eating followed by various forms of compensatory behaviors. In both disorders, self-evaluation is greatly influenced by the perception of weight and shape. Although the disorders share this feature, there are also characteristics that differentiate the two disorders. In AN, the perception of the body is distorted and seen as much larger than is actually the case, whereas, in BN, body size is viewed more realistically. Individuals with AN experience the symptoms as ego-syntonic and thus do not see the need for treatment, while those with BN often recognize that binge eating and purging behaviors are abnormal. Comorbidity of AN and BN with other psychiatric disorders, particularly mood and anxiety disorders, is very high (O'Brien & Vincent, 2003). Rates of substance abuse and cluster B personality disorder psychopathology appear to be higher in BN than in AN (Bulik et al., 2004; Franko et al., 2005; Holderness, Brooks-Gunn, & Warren, 1994; Rosenvinge, Martinussen, & Ostensen, 2000). Although there appear to be few differences in risk factors for the 2 disorders (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004), AN and BN differ in regard to ascertainment setting (inpatient treatment for AN v. outpatient treatment or community-based studies for BN) and the effectiveness of cognitive behavioral therapy and medication, which tend to favor BN. One additional and pertinent difference between the two eating disorders is in mortality rates: AN has the highest mortality rate of any psychiatric disorder (Sullivan, 2002), whereas few individuals die as a result of BN (Keel & Mitchell, 1997). Given that self-starvation is a core feature of AN whereas most patients with BN maintain a normal weight, a difference in associated mortality is expected. However, patients with AN appear to be more likely to die for reasons not directly related to weight compared to patients with BN. In this light, we review studies of suicidality in eating disorders.

Although outcome in eating disorders has been the focus of several reviews (Keel & Mitchell, 1997; Nielsen et al., 1998; Quadflieg & Fichter, 2003; Steinhausen, 2002), to our knowledge a review of suicidality in AN and BN has not yet been published in English. Suicidality represents a cluster of associated thoughts and behaviors, ranging from suicidal ideation, to suicide attempts, to completed suicide. A report on mortality in eating disorders (Keel et al., 2003) found that women with anorexia nervosa have a more than 50-fold increase in risk for completed suicide, and suicide was determined to be the second most common cause of death in anorexia nervosa found in two meta-analyses (Harris & Barraclough, 1998; Sullivan, 1995). Although Harris and Barraclough (1998) reported no deaths due to suicide in bulimia nervosa, Keel and Mitchell (1997) found that two of seven deaths (29%) were due to suicide across a large number of bulimia nervosa outcome studies. Moreover, suicide attempts occur in up to 20% of patients with anorexia nervosa and 35% of patients with bulimia nervosa (Bulik, Sullivan, & Joyce, 1999; Corcos et al., 2002). Thus, a review of suicidality in AN and BN seems both timely and clinically important.

The purpose of this review is to summarize and critique all existing studies on suicidality in AN and BN and to provide a synthesis of the findings in the literature. We do not review studies of binge eating disorder (BED), as it is still a provisional DSM-IV diagnosis and few studies have examined suicide in this group. Clinical correlates of suicidality in AN and BN are described and clinical implications of study findings are highlighted. It is hoped that this review will increase knowledge and awareness of the risk of suicidality in eating disorder populations.

1. Method

Reviewed studies were obtained by searching the databases of both Medline and PsychInfo using the key words mortality, suicide, suicidality, eating disorders, anorexia nervosa (AN), and bulimia nervosa (BN). Additional articles were obtained from reference lists in the publications found in the initial search. Only English language articles that reported data on suicidality and were published between 1985 and 2004 (inclusive) were included in this review. Where meta-analyses or mortality studies have been published, we examined and included the studies used in those reviews that provided data on suicide.

This paper is organized by first reviewing studies of completed suicide and second, by summarizing the studies that compare suicide attempts in mixed samples of eating disorders (AN and BN). Studies of clinical correlates are then reviewed, followed by a synthesis of the findings.

2. Results

2.1. *Anorexia nervosa*

Data on completed suicide in AN come from a number of outcome studies (Fisher, 2003; Steinhausen, 2002). Although medical complications of the eating disorder have most often been found to be the primary cause of death in AN, suicide was determined to be the second most common cause of death in a meta-analysis of 42 published studies of mortality of anorexia nervosa (Sullivan, 1995). Cause of death was obtained for 164/178 deaths, out of which 54% occurred due to complications of AN and 27% due to suicide. Replicating these findings, a second meta-analysis (Harris & Barraclough, 1998) found that 46% of deaths in anorexia nervosa were due to the effects of starvation and 32% of deaths were due to suicide. Harris and Barraclough provided Standardized Mortality Ratios (SMRs) for suicide across a number of psychiatric disorders. SMR is the observed number of deaths divided by the expected number of deaths and thus provides the risk of death in a given diagnostic group compared to the general population of similar age and gender. For females, SMR for suicide for AN was 32.4 and for BN was determined to be zero. For purposes of comparison to females with other psychiatric disorders, the SMR for major depressive disorder was 27.8, for alcohol dependence and abuse was 18.2, and for schizophrenia was 8.0. Rates of suicide in AN are clearly elevated relative to the general population, as also documented by Sullivan (1995) who reported that the suicide rate in AN is more than 200 times greater than the suicide rate in the general population. A recent comparison of 9 studies of suicide in AN indicated that the expected mean number of suicides in a population with AN was 24, compared to the expected 3 in a general population of females ages 14–25 (Pompili, Mancinelli, Girardi, Ruberto, & Tatarelli, 2004).

2.1.1. *Suicides in AN inpatient samples*

Longitudinal studies that followed patients after discharge from psychiatric inpatient settings will now be reviewed (see Table 1 for specific details of each study). Assessment of suicide in these studies was done by record review and/or clinical interview. In an early study, Theander (1985) followed 94 women with AN who were admitted to the hospital between 1931 and 1960. An average of 24 years later, follow-up assessments indicated that 17 of these 94 patients had died; 5 deaths were by suicide (Crude Mortality Rate (CMR) due to suicide=5.3%). Moller-Madsen, Nystrup, and Nielsen (1996) studied 853 inpatients approximately 8 years after admission. Of the 50 deaths, 46 had known causes. Among these 46, 22 were “unnatural deaths,” 18 of which were suicides (Suicide CMR=2.1%). In 10 of the 18 cases, the suicides were of a violent nature; the remaining 8 were due to alcohol and/or drug overdoses. Eckert, Halmi, Marchi, Grove, and Crosby (1995), in a 20-year follow-up of 76 severely ill patients with DSM-III-R anorexia nervosa, found that none of the 5 subjects who died did so by committing suicide. Instead, all deaths were due to complications of anorexia nervosa (e.g., severely low weight, electrolyte imbalance), likely related to the very low weights at discharge. In sum, based on inpatient samples, CMRs due to suicide ranged from 0% to 5.3%.

Three studies have followed up adolescent inpatients with AN. A study of 60 adolescent patients (Steinhausen & Seidel, 1993) followed nearly 5 years after initial presentation found 4 deaths, 2 of which were from suicide or complications following a suicide attempt (CMR=3.3%). Strober, Freeman, and Morrell (1997) found no suicides in their longitudinal study of 95 adolescent (ages 11–15) AN inpatients followed 10–15 years post-discharge (ages 22–33 at follow-up). Of note, this study reported no deaths (due to any cause) in their cohort (Strober et al., 1997). In the third adolescent outcome study of 49 inpatients followed an average of 80 months after admission, one death occurred, and

Table 1
 Characteristics of studies of suicidality in eating disorders

Author and date	Suicide attempts ^a	Crude Mortality Rate in studies of completed suicides ^b	Study design/duration of follow up	Sample size	Type of sample	Assessment method
Bulik et al., 1999	27% (19 attempted suicides/70 AN patients) 31% (47 attempted suicides/152 BN patients) 36% (21 attempted suicides/59 MD patients)	N/A	Cross sectional	<i>N</i> =70 AN <i>N</i> =152 BN	Case-control investigation, clinical trial	Clinical interview, Self-report measures, Records review
Corcos et al., 2002	28.2% (57 suicide attempts/202 purging patients) 26.4% (18 suicide attempts/68 nonpurging patients) 28% (7suicide attempts/25 ANBP patients)	N/A	Cross sectional	<i>N</i> =295 women BN only	Multi-site outpatient clinical sample	Clinical interviews, Self-report measures
Coren and Hewitt, 1998	1.4% (8 suicides/571 total deaths)	N/A	Cross sectional	<i>N</i> =8 women (out of 571) who had both suicide and AN on death certificate	U.S. database of deaths	Death certificate records review
Crisp et al., 1992		0.9 (1/105) 6.3 (4/63)	Longitudinal mean=21.8 years mean=22.1 years	<i>N</i> =105, women, <i>N</i> =63 women AN only	Longitudinal Study of hospital admissions at two hospitals	Records review, Database inquiries, Letters to patients and physicians
Deter and Herzog, 1994		2.4 (2/84)	Longitudinal-12 year follow up	<i>N</i> =84 AN	Outpatients	Global clinical ratings, Standardized psychometric measurements, Self-report questionnaires, Interviews of family members and physicians
Eckert et al., 1995		0 (0/76)	Longitudinal-10 year follow up	<i>N</i> =76 women AN	35-day hospital treatment study group	Clinical interviews with participants and parents
Emborg, 1999		1.7 (46/2763)	Longitudinal-23 years	<i>N</i> =2763	Mixed ED Inpatients	Case registry
Favaro and Santonastaso, 1996	Note: Study has many categories—see text	N/A	Cross sectional	<i>N</i> =398 Both AN/BN and EDNOS	Consecutive referrals to outpatient ED unit	Clinical interviews Self-report measures

Favaro and Santonastaso, 1997	9% (15 suicide attempts/166 AN patients) 18% (37 suicide attempts/205 BN patients)	N/A	Cross sectional	N=495 Both AN/BN	Consecutive referrals to ED outpatient unit	Clinical interviews Self-report measures
Franko et al., 2004	22.1% (30 suicide attempts/136 AN patients) 10.9% (12 suicide attempts/110 BN patients)	N/A	Longitudinal—8.6 years	N=136 AN N=110 BN	Outpatients	Clinical interview
Harris and Barraclough, 1998		AN: 1.8 (12/660) BN: 0 (0/96)	Meta-analysis	A N=660 B N=96	Inpatients and outpatients	Meta-analysis of 152 English language reports on the mortality of mental disorders Interviews
Hentze and Engel, 1991* (Article in German)		4.8 (5/105)	Longitudinal—mean of 13.5 years	N=105 AN	Outpatients	Interviews
Herzog et al., 1999	12% (6 suicide attempts/51 ANR patients) 13.8% (12 suicide attempts/85 ANBP patients) 9.0% (10 suicide attempts/110 BN patients)	N/A	Longitudinal—Every 6 months during follow-up	N=246 women AN/BN	Outpatients	Clinical interviews, National Death Index records
Johnson et al., 2002	12% (5 suicide attempts/40 adolescents with ED)	N/A	Longitudinal—1985–1986 and 1991–1993	N=717 youths and their mothers N=136 AN women N=110 BN women	Representative community sample Outpatients	Psychosocial and psychiatric interviews National Death Index search, Clinical interviews
Keel et al., 2003		2.9 (4/136) 0	Longitudinal—8 years after presentation			Review of 88 studies
Keel and Mitchell, 1997		.001 (2/2194)	Mixed	N=2194 BN	Outpatients	Clinical interviews
Kreipe et al., 1989		2.0 (1/49)	Longitudinal—80 months	N=49 AN	Inpatient adolescents	Records review
Korndorfer et al., 2003		0.9 (2/208)	Longitudinal—up to 63 years during study period	N=208 patients presenting with AN	Clinical sample	
Milos et al., 2004	10.5% ANR (4 attempts/38 patients) 34.7% ANBP (17/49) 29.9% BN–P (43/144) 14.3% BN–NP (2/14)	N/A	Cross sectional	N=38 ANR N=49 ANBP N=144 BN–P N=14 BN–NP	Inpatients and outpatients	Clinical interviews

(continued on next page)

Table 1 (continued)

Author and date	Suicide attempts ^a	Crude Mortality Rate in studies of completed suicides ^b	Study design/duration of follow up	Sample size	Type of sample	Assessment method
Moller-Madsen et al., 1996		0.9 (18/853)	Cross sectional	<i>N</i> =853 AN only	Psychiatric hospital admissions	Records review
Norring and Sohlberg, 1993		4.1 (2/48)	Longitudinal—1, 2, 3, and 6 years later	<i>N</i> =48 patients AN/BN and EDNOS	Referrals to university psychiatric clinic	Clinical interviews
Patton, 1988		1.8 (6/332)	Jan. 1985–Feb. 1986	<i>N</i> =332 AN and 96 BN	Consecutive patients at tertiary referral center for EDs	Clinical interviews, Records review National Health Service records Death Certificates
Steinhausen and Seidel, 1993		3.3 (2/60)	Longitudinal—Follow up mean—58 months	<i>N</i> =60 AN	Adolescent patients	Questionnaires, Semi structured interviews
Strober, et al., 1997		0 (0/95)	Longitudinal—Semi-annually for 5 years and annually thereafter over 10–15 years	<i>N</i> =95 AN	Inpatient adolescents	Comprehensive interview
Sullivan, 1995		1.4 (44/3006)	Cross sectional	42 AN mortality studies published	Review of mortality studies	Study comparison
Theander, 1985		5.3 (5/94)	Longitudinal—1966, 1982	<i>N</i> =94 AN patients	Psychiatric clinics	Records review
Tolstrup et al., 1985		4.0 (6/151)	Longitudinal—4–22 years later (1981–1982)	<i>N</i> =151 AN only	University hospital admissions	Clinical interview, Records review
Viesselman and Roig, 1985	23% (3 suicide attempts/13 AN patients) 19.4% (7 suicide attempts/36)	N/A	Cross sectional	<i>N</i> =95 AN/BN	Inpatients	Clinical interviews

^a Attempts are characterized as number of suicide attempts out of the total sample size.

^b Crude mortality rate is only available for studies of completed suicide and is calculated by number of suicides/total sample size.

the single death was due to suicide (CMR=2.0%) (Kreipe, Churchill, & Strauss, 1989). Thus, similar to results for adult inpatient samples, CMR for these studies ranged from 0% to 3.3%.

2.1.2. *Suicides in AN outpatient samples*

A number of studies have recruited AN patients from outpatient psychiatric clinics and followed them longitudinally. Suicide in these studies was assessed either by record review or clinical interview. Hentze and Engel (1991) assessed 105 AN patients for a mean duration of 13.5 years and reported that 25 died, 5 due to suicide (CMR=4.8%). Deter and Herzog (1994) observed 84 patients 12 years after initial presentation and found that two deaths out of 9 occurred by suicide (CMR=2.4%). In a 12.5-year follow-up study of 151 anorexic patients, 6 of 9 patient deaths occurred by suicide (CMR=4.0%; Tolstrup et al., 1985). Finally, in a study of two samples of combined inpatients and outpatients, Crisp, Callender, Halek, and Hsu (1992) recorded a total of 5 suicides out of 12 deaths in a total of 168 patients followed for 20 years (CMR=3.0%). Thus, in longitudinal studies of outpatients with AN, CMR due to suicide ranged from 2.4% to 4.8%. Of interest, this range is not lower than that reported for inpatient samples. Indeed, the one study that combined inpatient and outpatient AN samples (Crisp et al., 1992) produced a CMR that fell within the range of those reported for outpatient samples.

2.1.3. *Suicides from non-psychiatric settings*

Two studies of completed suicide in AN differ from the others with regard to sampling methodology. Korndorfer et al. (2003) examined all 208 residents of Rochester Minnesota who presented for treatment in medical clinics between 1935 and 1989 for whom symptoms of AN were present in medical charts. Diagnoses of anorexia nervosa were based on chart review, and medical records of 96% of the patients were reviewed for a 10-year period. Seventeen of the 208 anorexic patients died, 2 due to suicide (CMR=1.0%). Coren and Hewitt (1998) attempted to determine whether there was an increased risk of death by suicide in individuals who died as a result of AN. Subject selection was limited to 5,467,451 deaths that occurred in the female US population between 1986 and 1990. Data were generated from the death certificates in the US registered with the National Center for Health Statistics (NCHS), which list all conditions that may have contributed to death, as well as any other medical conditions present at time of death. Any death record that listed AN as primary cause of death or as a condition present at the time of death was included. A control group ($n=1713$), matched on age, race, and gender, was also extracted. Death certificates from 571 women listed AN as the underlying cause of death or present at time of death; 8 of these deaths were also listed as suicides. In the matched control sample of 1713, there were 70 suicides, leading the authors to conclude that the relative risk of suicide was higher in the control sample than in the ANs. However, it is important to note that once suicide was listed as a cause of death on a death certificate, no further inquiry may have occurred to determine whether death was related to AN. For example, if a death was due to an intentional overdose or self-induced gunshot wound, it is probable that suicide would be reported as cause of death. It does not seem likely that even if someone appeared to be at low weight that a diagnosis of AN would “trump” the more obvious cause of the suicide death; thus it is unlikely that AN would even appear on the death certificate. Indeed, in a recent study on mortality and eating disorders (Keel et al., 2003), none of the patients who had died had “anorexia nervosa” listed on their death certificate although half weighed less than 85% of that expected for height at the time of death and all had confirmed histories of AN.

2.1.4. *Conclusions about AN*

Across studies of AN from inpatient and outpatient settings, CMR due to suicide ranges from 0% to 5.3%. Aggregating suicides across these studies (Crisp et al., 1992; Deter & Herzog, 1994; Eckert et al., 1995; Hentze & Engel, 1991; Kreipe et al., 1989; Moller-Madsen et al., 1996; Steinhausen & Seidel, 1993; Strober et al., 1997; Theander, 1985; Tolstrup et al., 1985), a total of 44 deaths by suicide in 1735 AN patients occurred with a CMR due to suicide equal to 2.5%. The SMR based upon suicide rates in the general population has been reported to be 32.4 (Harris & Barraclough, 1998).

2.2. *Bulimia nervosa*

The occurrence of deaths due to suicide in bulimia nervosa (BN) is substantially lower in number. Keel and Mitchell (1997) reviewed 88 follow-up studies with 2194 bulimic subjects and reported only 7 deaths, 2 of which were by suicide (CMR due to suicide=0.1%). Subsequent to the review by Keel and Mitchell (1997), no deaths due to suicide

have been reported in other long-term outcome studies of BN (Fairburn et al., 2003; Fichter & Quadflieg, 1999; Keel, Mitchell, Miller, Davis, & Crow, 1999; Keel et al., 2003). The relatively low number of deaths that occur in bulimia nervosa (compared to anorexia nervosa) indicates no apparent elevation in risk of death by suicide in bulimia nervosa. However, it is not possible to make valid comparisons in suicide rates for AN and BN by comparing results across studies as methodological features that differ between studies may account for different results. For example, some studies of AN samples indicate no deaths due to suicides (Eckert et al., 1995; Strober et al., 1997), while others suggest substantially elevated rates of suicide in AN patients (Hentze & Engel, 1991; Theander, 1985). Such discrepancies likely reflect the influence of duration of the illness, length of follow-up, and discharge weights. Instead, comparisons in rates of completed suicide for AN and BN can be drawn from studies that include both groups.

2.3. *Suicides in studies of anorexia nervosa and bulimia nervosa*

With regard to deaths due to suicide in mixed eating disorder samples, 4 studies have been published, all of which have used longitudinal data (Emborg, 1999; Keel et al., 2003; Norring & Sohlberg, 1993; Patton, 1988). However, only two studies have distinguished between AN and BN in reporting suicide rates (Keel et al., 2003; Patton, 1988). Keel et al. (2003) examined mortality in 136 women with intake diagnoses of anorexia nervosa and 110 women with intake diagnoses of bulimia nervosa approximately 8 years after presentation by clinical interview and death certificates. In anorexia nervosa, 4 of 10 deaths occurred by suicide (CMR=2.9%; Keel et al., 2003). In contrast, the one death observed in a woman with bulimia nervosa was not attributable to suicide (Keel et al., 2003). In a 10-year follow-up, Patton (1988) interviewed 428 patients with AN ($n=332$) and BN ($n=96$) who were admitted to the hospital between 1971 and 1981. Vital status was ascertained for 96% of patients, and 14 deaths (11 AN and 3 BN) had occurred. Within the group of 11 anorexic patients who died, 6 deaths occurred by suicide due to overdose (suicide CMR= 1.8%) and the remainder died due to complications related to low weight. None of the deaths in BN were due to suicide. Thus, results from both Keel et al. (2003) and Patton (1988) indicate that the risk of death by suicide is greater in AN than in BN, and these results cannot be attributable to methodological inconsistencies.

2.4. *Conclusions regarding suicide in AN v. BN*

Thus far, our review indicates that suicide is a common cause of death in anorexia nervosa and that the actual number of suicides in bulimia nervosa is quite small relative to anorexia nervosa, based both on studies of single diagnostic group and mixed groups. The evidence is fairly conclusive that the likelihood of completed suicide is higher in AN than in BN.

2.5. *Suicide attempts in mixed eating disorder samples*

The following section examines suicide attempts in samples that include more than one eating disorder diagnosis in order to address the following issue. The clear difference in suicide rates between AN and BN begs the question of whether there are differences in the occurrence of suicide attempts, which can only be addressed by studies that include both individuals with AN and individuals with BN in their samples. Such studies are important for examining cross-diagnostic similarities and differences and may help explain what about having an eating disorder elevates risk for making a suicide attempt. It should be noted that each of studies reviewed meeting this criterion is based on cross-sectional data.

A number of clinical studies have compared the frequency of suicide attempts among diagnostic groups. Bulik et al. (1999) conducted clinical interviews with 70 AN, 152 BN, and 59 outpatients with major depressive disorder (MD). The prevalence of history of suicide attempts did not differ across the three groups (AN 27%; BN 31%; MD 36%), although the AN and MD groups endorsed more serious intent to die than the BN group. In a small sample, 95 inpatients with eating disorders were interviewed and suicide attempts were reported in 3/13 (23%) patients with AN, 7/36 (19%) patients with binge eating only, and 5/25 (20%) of patients with bulimia nervosa defined by both binge eating and vomiting/laxative/diuretic use (Viesselman & Roig, 1985). Herzog et al. (1999) reported on 246 treatment-seeking outpatients with AN-Restricting type ($N=51$), AN-Binge/Purge type ($N=85$) and BN ($N=110$) who, at the time of intake into a longitudinal study, were assessed for history of suicide by clinical interview. Nearly 12% of ANRs, 13.8% of the ANBPs, and 9.0% of BNs reported at least one suicide attempt (with intent to die) at study entry. None of

these differences were statistically significant. [Corcos et al. \(2002\)](#) examined 295 women with bulimic symptoms who were referred over a 2-year period from 12 outpatient clinics in France, Belgium, and Switzerland (202 purging, 68 nonpurging, 25 with binge-purging subtype of anorexia nervosa). Clinical interviews were conducted to assess the lifetime frequency of suicide attempts. Overall, 27.8% of bulimic patients ($n=82$) reported at least one suicide attempt and among these, a substantial minority (37%) reported between 2 and 4 suicide attempts. With regard to the subgroups, 57/202 (28.2%) purging, 18/68 (26.4%) nonpurging, and 7/25 (28%) ANBP patients reported suicide attempts. The majority (79%) of attempts occurred by drug overdose, with wrist cutting being the second most common method.

[Favaro and Santonastaso \(1996, 1997\)](#) explored the prevalence of lifetime suicide attempts in two separate studies through clinical interviews. In the first study, 13 of 164 AN (7.9%) and 28 of 161 BN (17.3%) patients made suicide attempts. In the second study, 9% of AN (15/166) and 18% of BN (37/205) patients had a lifetime history of suicide attempts. Thus in both studies, there were significantly more suicide attempts in BN patients than in AN patients.

2.6. Conclusions about suicide attempts

The data on suicide attempts are somewhat mixed. Although more studies find no differences between frequency of suicide attempts for individuals diagnosed with AN v. BN ([Bulik et al., 1999](#); [Corcos et al., 2002](#); [Herzog et al., 1999](#); [Viesselman & Roig, 1985](#)), two studies report lower rates of suicide attempts in AN than BN ([Favaro & Santonastaso, 1996, 1997](#)). The source of this discrepancy may be in whether or not AN patients were divided into restricting v. binge/purge subtype. When this distinction is made, it appears that suicide attempts are more likely to occur in the binge/purge than the restricting subtype of AN, in rates comparable to BN ([Favaro & Santonastaso, 1997](#)).

2.7. Correlates of suicide attempts

Although it is of clinical interest to study correlates of suicidality, it has been difficult to do so for completed suicide because few studies have a large enough number of suicides to have adequate power. Instead, researchers have focused on examining the correlates of suicide *attempts* in anorexic and bulimic groups in cross-sectional studies. The primary correlates studied are psychiatric comorbidity, substance abuse, sexual abuse, and personality characteristics.

Comorbid psychiatric disorders have been found to correlate with suicidality in multiple studies. In a small Japanese study of 39 AN, 11 BN, and 1 Eating Disorder, Not Otherwise Specified (EDNOS) patients, 16 eating disorder patients with a history of suicide attempt were compared to 35 without such a history ([Yamaguchi et al., 2000](#)). More of the suicidal subjects had a mood disorder (94%) and a personality disorder (63%), relative to the nonsuicidal subjects. [Anderson, Carter, McIntosh, Joyce, and Bulik \(2002\)](#) reported that suicide attempters were more likely than the control group to have a history of alcohol dependence and major depression. Similarly, [Corcos et al. \(2002\)](#) established that lifetime history of depression, substance use, and “disordered conduct” (defined as risk-taking behaviors, stealing, running away, etc.) was significantly higher in the BN group with a history of suicide attempts relative to the group with no suicidal history. [Bulik et al. \(1999\)](#) also found higher rates of depression in BN attempters, but *not* AN attempters, and [Favaro and Santonastaso \(1997\)](#) reported that within their bulimic group, attempters had more comorbid psychiatric symptoms than non-attempters. Recent studies have found higher rates of Axes I and II disorders, particularly affective disorders (both depression and bipolar disorder), impulse control problems, drug use disorder, and Cluster B personality disorders ([Milos, Spindler, Hepp, & Schnyder, 2004](#); [Stein, Lilienfeld, Wildman, & Marcus, 2004](#)) in eating disorder patients who have made suicide attempts.

That several studies find substance abuse to be a significant correlate and predictor of suicide attempts for both AN and BN should be highlighted ([Anderson et al., 2002](#); [Corcos et al., 2002](#); [Franko et al., 2004](#)). The literature indicates that substance abuse is more likely to occur in bulimia nervosa than anorexia nervosa. For example, lifetime prevalence of DSM-III-R alcohol abuse in women with BN ranges from 2.9% to 48.6%, whereas the prevalence rate is only 6% in women with AN ([Braun, Sunday, & Halmi, 1994](#); [Bulik et al., 2004](#); [Holderness, Brooks-Gunn, & Warren, 1994](#); [John, Meyer, Rumpf, & Hapke, 2006](#); [von Ranson, Iacono, & McGue, 2002](#)).

Sexual abuse appears to be a robust correlate of suicidality in eating disorder samples ([Favaro & Santonastaso, 1997](#); [Yamaguchi et al., 2000](#)). In a study of the clinical characteristics of 712 eating disorder patients who reported

abuse, subjects who had been both physically and sexually abused were more likely to report suicide attempts than those who had not been abused (52% v. 13%). This relationship held for both anorexic and bulimic subjects (Fullerton, Wonderlich, & Gosnell, 1995). Furthermore, there is increasing evidence that very impulsive forms of self-destructive behavior in bulimia nervosa are associated with increased probabilities of having experienced childhood abuse (Favaro & Santonastaso, 1998; Wonderlich et al., 2001).

Certain personality characteristics also appear to be associated with suicidality in eating disorder samples (Grilo et al., 2003). Bulik et al. (1999) examined the relationship between temperament, character variables, and suicide attempts in eating disordered women. They found that high persistence (a tendency to continue behavior that is no longer rewarded), low self-directedness (little initiation by the self), and high self-transcendence (tendency to rise above immediate needs) were more likely in eating disorder subjects who had a history of suicide attempts than those who did not. This study was the first, and to our knowledge the only one, that has linked personality characteristics to suicide behavior in an eating disorder sample.

Several studies indicate that suicide attempts are more likely to occur in eating disorder patients who purge than in those who do not. For example, Milos et al. (2004) found that 26% of 288 women with eating disorders reported a past suicide attempt and attempts were more likely to have occurred in purging than nonpurging eating disorders. In an initial study of 398 consecutively referred outpatients (Favaro & Santonastaso, 1996), they divided the 155 AN and 161 BN patients each into 4 groups: nonpurging, vomiting only, laxative only, and both vomiting and laxative use. Within the anorexic group, 2.7% of nonpurgers, 20% of vomiters, 18.8% of laxative users, and 18.2% of the combined group reported suicide attempts. The frequency in the latter three groups was statistically different from the first group. Within the bulimic group, lifetime suicide attempts were reported by 5.7% of nonpurgers, 14.1% of vomiters, 16.7% of laxative users and 41.4% of patients who reported both vomiting and laxative use. For the bulimic patients, the latter group was statistically different from the other three groups. In a second study (Favaro & Santonastaso, 1997), 166 AN and 205 BN patients were evaluated. Of the anorexic patients who made attempts, 5% were restrictors and 16% were binge-purge subtype; of the bulimic patients, 7% were non-purgers and 21% were purgers. Thus, in both diagnostic groups and in both studies, purging was associated with significantly greater frequency of suicide attempts. The conclusions from both studies were that suicide attempts were more likely to occur in eating disorder patients who purge by vomiting, laxatives, or both.

Although these studies point to important correlates of suicide attempts, these factors represent features that were in place at the time that the suicide attempt occurred or even recalled after the suicide attempt. Effective interventions to reduce the risk of suicide attempts require awareness of prospective risk factors for suicide attempts in eating disorder patients.

2.8. Predictors of suicide attempts

In a longitudinal study, women diagnosed with either DSM-IV anorexia nervosa ($n=136$) or bulimia nervosa ($n=110$) were interviewed and assessed for suicide attempts and suicidal intent every 6–12 months over 8.6 years (Franko et al., 2004). Fifteen percent of subjects reported at least one suicide attempt over the course of the longitudinal study. Significantly more anorexic (22.1%) than bulimic subjects (10.9%) made a suicide attempt based on diagnoses made at intake into the study. Although a majority of anorexic subjects reported some binge eating over the course of the study, bulimic symptoms were not found to predict suicide attempts in this group. Instead, the unique predictors of suicide for anorexia nervosa included the severity of both depressive symptoms and drug use over the course of the study. For bulimia nervosa, drug use disorder at intake into the study, as well as laxative use during the study were significant predictors of suicide attempts. Severity of depression or mood disorders did not prospectively predict suicidality in BN.

In a population-based prospective study of adolescents ($n=717$; ages 13–22), 10% of females and 1% of males were determined to have DSM-IV eating disorder diagnoses. Specifically, 36 out of 366 adolescent girls (13 BN, 2 BED and 21 EDNOS) and 4 out of 351 adolescent boys (1 AN, 1 BN, 2 EDNOS) had an eating disorder based on the Diagnostic Interview Schedule for Children (Costello, Edelbrock, Duncan, & Kalas, 1984). Having an eating disorder diagnosis in adolescence increased the risk for a suicide attempt in young adulthood five-fold (Johnson, Cohen, Kasen, & Brook, 2002). Moreover, the specific symptoms of fasting and self-induced vomiting elevated the risk for a later suicide attempt (OR's 4.29 and 6.46, respectively), which appears to be prospective risk factors for suicide in young adults.

Thus, based on only 2 studies it appears that the risks for suicide attempts may vary between diagnostic groups and may be different for adolescents (Johnson et al., 2002) than for adults (Franko et al., 2004). Future research is needed before any definitive conclusions can be drawn concerning risk factors for suicide in eating disorders.

3. Discussion

Our findings regarding suicide are consistent with previously published work (Harris & Barraclough, 1998; Sullivan, 1995). While studies of suicidal deaths indicate that ANs are more likely to die as a result of suicide than BNs, findings are mixed when comparing AN and BN groups with regard to frequency of suicide attempts. Although the largest studies have found a higher frequency in BN groups (Favaro & Santonastaso, 1996, 1997), a number of smaller studies reported no differences across diagnostic groups (Bulik et al., 1999; Herzog et al., 1999; Viesselman & Roig, 1985), and the only longitudinal study published found more suicide attempts reported by AN subjects than BN subjects over a 9-year time period (Franko et al., 2004). One explanation for the mixed findings may be that the sample size in the smaller studies may have precluded finding differences between groups. Further, when there is no true difference between groups, one would expect to find a combination of nonsignificant results and contradictory results (as some significant differences would emerge by chance). The overall conclusion appears to be that suicide attempts are no more common in AN than BN across most studies, but that completed suicides are much more likely in AN than in BN.

Conceptually, one can understand the difference between AN and BN with regard to completed suicide in several ways. First, the goal of a suicide attempt may differ substantially between the two groups. For women with AN who attempt suicide, the desired outcome may, in fact be death, due to the chronic nature of the disorder, the multiple medical complications, and the poor quality of life, all of which are well documented in patients with anorexia nervosa (Hay, 2003; Steinhausen, 2002; Sullivan, 2002). Indeed, in a comparison of non-suicidal AN patients, suicidal psychiatric patients, non-suicidal psychiatric patients, and controls, Stein et al. (2003) found that even *non-suicidal* AN patients were most similar to suicidal patients with regard to attitudes towards life and death. For women with bulimia nervosa, on the other hand, the goal of a suicide attempt may have more to do with affect regulation, as has been observed in patients with personality disorders (Fritsch, Donaldson, Spirito, & Plummer, 2000; Yen, Zlotnick, & Costello, 2002). In this vein, the suicide attempt may serve as an attempt to soothe the negative affect, “transfer” pain away from the bulimic symptoms onto the resulting wound or medical complications of the attempt, or re-focus the attention of others toward the seriousness of the pathology. Studies of multi-impulsivity (Lacey, 1993), which appears to be more frequent in BN than AN, support this proposition. Based on these proposed distinctions, treatment for AN and BN in regard to addressing suicidality may differ. For AN, interventions might focus more on quality of life and efforts at finding meaning in one’s life. For BN, clinical work might be targeted on teaching affect regulation skills and interventions that emphasize ways to address impulsivity (Palmer et al., 2003).

An alternative explanation for the difference in rates of completion for the two groups has to do with the often medically compromised state of anorexic patients. Low weight in AN may increase the risk of a suicide attempt resulting in death without any difference in intentions. Compared to patients with AN, patients with BN tend to be healthier, which may result in a less than fatal consequence from the attempt (e.g., ingestion of pills or alcohol, blood loss). It would be of interest to investigate the reasons given by eating disorder patients who attempt suicide in order to expand our understanding of this pernicious aspect of eating disorders.

3.1. Clinical implications

A number of clinical implications can be gleaned from the results of this review. One, suicide attempts and completed suicides are not an infrequent occurrence in patients with eating disorders. Ongoing assessment of suicidality would thus seem to be a prudent clinical intervention throughout the treatment of someone with AN or BN. Two, because suicide appears to be the second leading cause of death in women with AN, an assessment of lethality should be conducted if any suicidal ideation is detected. Three, clinicians may not be as sensitive to or aware of the perniciousness of substance abuse in AN when it does occur and may need to be particularly vigilant to the risk of suicide in anorexic patients when substance misuse or abuse is present. Substance abuse should be considered an important correlate of suicidal behavior in eating disorder groups, including those who do not meet strict diagnostic

criteria, those who achieve partial remission, and particularly for patients with AN. Thus, the risk for suicidality should be assessed routinely in eating disorder patients who abuse substances. Finally, trauma histories should be obtained during assessment of eating disorders, and suicidality should be carefully assessed whenever current or past physical and/or sexual abuse is reported or suspected.

3.2. Limitations

Variability in length of follow-up, diagnostic definitions and assessment of suicidality occur in the literature. Specifically, length of follow-up ranges from 5 (Steinhausen & Seidel, 1993) to 24 years for AN patients (Eckert et al., 1995), and 2 (Corcos et al., 2002) to 12 years for BN patients (Keel et al., 1999). For AN, longer length of follow-up generally correlates with more deaths due to suicide, though two long-term (10–20 years) follow-up studies (Eckert et al., 1995; Strober et al., 1997) reported low rates of suicide. Diagnostic criteria from both DSM-III-R and DSM-IV have been used to categorize patients, making cross-study comparisons problematic. Specifically, DSM-III-R criteria allowed dual diagnosis of AN and BN while DSM-IV criteria stipulate a hierarchy. Given apparent differences in completed suicide and suicide attempts between AN and BN, these inconsistencies could have a profound impact on the understanding of suicidality from previous research. Additionally, few studies of completed suicide report whether participants had an eating disorder diagnosis at time of death, thus it is possible that the suicides observed in these studies reflect the impact of other disorders that have a shared risk with eating disorders, such as depression and personality disorders. Of interest, rates of completed suicide in BN fall below what would be expected given the high comorbidity between BN and major depressive disorder (Rush et al., 2005). Finally, researchers have used a variety of ways to assess suicide, including self-report questionnaires, clinical interviews, and medical records or death certificate review. Such variability in assessment techniques is likely to affect the prevalence estimates in studies that examine rates of suicide attempts in eating disorder populations; however, the majority of studies used trained clinical interviewers to assess suicidality or reviewed official records (medical records or death certificates). Although the assessment methods varied some, very few studies used the less reliable questionnaire method resulting in a fair degree of confidence in regard to these results.

3.3. Conclusions

High rates of death occur in anorexia nervosa and a substantial number are due to suicide, leading to the conclusion that suicide is the second leading cause of death in AN. Results from studies of AN indicate crude mortality ratios that range from 0% to 5.3%, with an aggregate CMR of 2.5%. It is possible that the reported suicide rates are underestimates because of reluctance to report suicide as a cause of death. Three percent to 20% of patients with anorexia nervosa report suicide attempts. Although the rate of completed suicide is low in bulimia nervosa, the percentage of patients who attempt suicide is high, ranging from 25% to 35% in outpatient samples. Clinical correlates of suicidality include purging behaviors, comorbid disorders (e.g., depression, substance abuse), a history of physical and/or sexual abuse, and certain personality features. In a population-based study of adolescents, the presence of an eating disorder was found to substantially increase the risk of a suicide attempt, suggesting that this risk is heightened not only in clinical, but also in community samples. We conclude that a thorough suicide assessment should be conducted routinely for individuals with past and current eating disorders much as would be done for patients with mood disorders, and that clinicians should be aware that this risk may be ongoing and occur throughout treatment, even after eating disorder symptoms appear to be remitting.

Many research questions remain to be addressed. Since suicidality is sometimes an exclusion criterion for treatment outcome studies (Pike, Walsh, Vitousek, Wilson, & Bauer, 2003), little is known about clinical strategies that might be useful for anorexic or bulimic patients who may have suicidal ideation or histories of suicide attempts. More research is needed to understand the predictors of suicidal behavior and interventions that reduce the occurrence of multiple suicide attempts. It would also be of interest to assess whether decreasing depression in eating disorder patients lowers the likelihood of suicidal behavior. Approaches such as dialectical behavior therapy (Linehan, 2000) adapted for eating disorder patients might be undertaken in an effort to decrease suicidal thoughts and behaviors. Studies that attempt to answer such questions will potentially extend the lives of individuals with eating disorders.

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