

Suicide and attempted suicide in eating disorders, obesity and weight–image concern

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Abstract

Suicide in anorexia nervosa and bulimia nervosa is a major cause of death. Meta-analyses have shown that individuals suffering from anorexia nervosa and bulimia nervosa commit suicide more often than their counterparts in the general population; also a few studies have suggested that suicide is the major cause of death among patients with anorexia nervosa, refuting the assumption that inanition generally threatens the life of these patients. Data concerning suicide in bulimia nervosa, on the other hand, are still scarce but suicide attempts are easily found among cohorts of patients with bulimia nervosa, which constitutes a risk factor for completed suicide. Suicidality in obesity and individuals with disturbed weight status has been reported. Both in the case of bulimia nervosa and obesity more long-term follow-up studies need to be completed before the risk of suicide for such disorders may be compared with that for anorexia nervosa.

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Suicide in eating disorder is a much more serious issue than it is generally considered. There has been the recognition of a very definite increased risk for suicide in individuals with eating disorders compared with the general population. The risk of suicide is associated both with eating disorders as a whole and their partial syndromes (Lewinsohn, Striegel-Moore, & Seeley, 2000). The standardized mortality ratio (SMR) varies from 1.36 to 17.8; the variation can be in part explained by the fact that the SMR always depend on the age and mortality rate of the patient and background population, duration of follow-up, country concerned and study period (Emborg, 1999). This author investigated 2763 eating disordered patients and estimated the total SMR being 6.69 (CI 5.68–7.83) demonstrating a significant excess mortality among eating disordered patients. Nielsen et al. (1998) reviewed ten eating disorders populations using SMR and found a strong evidence for an increase in SMR for anorexia nervosa but no firm conclusions for bulimia nervosa. They observed that weight at presentation had a highly significant effect on SMR, and lower weight at presentation was associated with higher SMR. These authors found more deaths from suicide and other

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unknown causes and fewer deaths related to eating disorders than previously reported in the literature. The overall risk of suicide range from 1.8% (Patton, 1998) to 7.3% (Ratnasuriya, Eisler, Szmukler, & Russell, 1991).

A few studies suggested that suicide is the major cause of death among patients with anorexia nervosa (Patton, 1998; Santonastaso, Pantano, Panarotto, & Silvestri 1991; Tolstrup, Brinch, & Isanger, 1985), refuting the assumption that inanition generally threatens the life of these patients (Pompili et al., 2003).

Theander (1985) stressed that great importance can be placed upon the course of the illness and the follow-up period considered for a correct evaluation of the suicidality among this class of patients. It would appear that suicide occurs not only in the late phases of the illness but above all in periods of symptomatic remission. Frequent hospitalizations and, in the case of the anorexic patients, a lower weight at the first consultation are two predictive factors of suicidal behavior (Hsu, Crisp, & Harding, 1979; Morgan & Russell, 1975; Patton, 1998); also, an important risk factor is a later onset of illness (Patton, 1998).

Eating disorders as a whole, and anorexia nervosa and bulimia nervosa in particular, share the disturbance in the way in which one's body or shape is experienced. The body is experienced with intense fear because it may gain weight or become fat and self-evaluation is unduly influenced by body shape and weight. Pompili et al. (in press), and Pompili, Girardi, Ruberto, and Tatarelli (2005) investigated suicide risk and body uneasiness and found a linear relationship between uneasiness linked to body image and suicide risk. Orbach, Stein, Shan-Sela, and Har-Even (2001) pointed out that the body is a source of satisfaction and pleasure that enhances the tendency for life preservation and attraction to life and serves as a shield against self-destruction, while bodily dissatisfaction may increase suffering and intensify self-destructive attitudes. Suicidal tendencies and body image and experience have been investigated in a sample of patients with anorexia nervosa and compared to suicidal female adolescent inpatients (Stein et al., 2003). The authors found that female anorexia inpatients with no evidence of overt suicidal behavior demonstrated elevated suicidal tendencies that are similar to those of suicidal psychiatric inpatients.

Mazza and Reynolds (2001) investigated self-reported psychopathology in a school-based sample of 456 suicidal and non-suicidal adolescents. They found that females who engaged in suicidal behavior reported experiencing significant levels of symptomatology associated with anorexia nervosa; this led the authors to suggest that body- and self-image may be important factors for clinicians and mental health professionals to examine when working with suicidal female adolescents. Owing to the dissatisfaction with their bodies, many children and adolescents not only try to lose weight and are concerned about what they should and should not eat, but also engage in high risk behaviors, which underline their inner struggle with the body. Even minimal manifestations of the continuum indirect–self-destructive behavior–suicide, such as drug or alcohol exposure, unprotected sex, and risky driving, displayed to comply with peer pressure, should not be disregarded, as they could give rise to successful suicide attempts or impair the organism's defenses and render the individual more vulnerable to various noxae (Pompili et al., 2005). The evaluation of suicidality using tools that aim to recognize the possibility of committing suicide may contribute to the definition of a suicidal spectrum among people with eating disorders (Pompili & Tatarelli, 2005).

This paper reviews articles dealing with suicidality in patients with eating disorders, obesity and weight concern. To our knowledge, the issue of suicide in patients with eating disorders has still to be addressed through a systematic review. Obesity and weight concern are also conditions that have only been superficially investigated in relation to suicide.

1. Materials and methods

We performed careful MedLine, Excerpta Medica and PsycLit searches to identify papers and book chapters in English during the period 1966–2005 and the Index Medicus and Excerpta Medica prior to 1966. The following search terms were used: “suicid*” (which comprises suicide, suicidal, suicidality, and other suicide-related terms), “anorexia nervosa”, “bulimia nervosa”, “eating disorders”, “obesity”, “binge eating disorder”, “eating disorder not otherwise specified”, “follow-up”. In addition, each category was cross-referenced with the others using the MeSH method (Medical Subjects Headings). Using the same databases and methods, we also cross-referenced the above mentioned terms with key words such as “weigh-gain”, “weigh-status”, “body-image”, “self-esteem”, “impulsivity”. We also performed careful search of the Cochrane Database of Systematic Reviews, but no previous review was performed on the subject of this paper or exploring the connection between suicide and above mentioned search words. Overviews have been performed on mortality in anorexia nervosa and bulimia nervosa which mentioned data on suicide but did not address the subject in details.

A total of 320 papers were located and reviewed. The principal reviewer (MP) inspected all reports. Then, three reviewers (MP, PG, RT) independently inspected all citations of studies identified by the search and grouped them according to topic of the papers. Reviewers acquired the full article for all papers located. Where disagreement occurred this was resolved by discussion with AR who also with double-blind features inspected all articles located and grouped them following the major areas of interest identified by all authors. If doubt remained, the study was put on the list of those awaiting assessment, pending acquisition of more information.

Included were all studies with data on suicide and attempted suicide among patients with anorexia nervosa, bulimia nervosa, obesity and weight status. We excluded from our analysis any studies vaguely reporting on suicide in the above mentioned disorders or using inadequate or unclear diagnostic criteria for such disorders or those inappropriately assessing suicide. A separate search was performed to locate articles with data regarding treatments for patients with eating disorders that in turn may be effective in reducing suicidality among these patients. Results of this search are presented in the paragraph regarding the prediction and prevention of suicide.

2. Results

The eating disorders are characterized by severe disturbance in eating behavior. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) includes in the eating disorders section: anorexia nervosa, bulimia nervosa and eating disorder not otherwise specified (NOS). Obesity is not included in DSM-IV as there is still lack of evidence that it is associated with a psychological or behavioral syndrome. Nevertheless, there is agreement among scholars that psychological factors are important in the etiology of obesity. A growing number of evidence also point to the role of weight status and quality of life. In this review we have identified major areas of interest related to the topic of the paper. We therefore report results of our analysis in the following paragraphs.

2.1. Suicide and attempted suicide in anorexia nervosa

Sullivan (1995) derived a crude rate of mortality due to all causes of death of 5.9% for individuals with anorexia nervosa. This author analyzed 42 studies (178 deaths in 3066 individuals). In the 38 studies in which the cause of death was specified ($N=164$), 89 (54%) of the deaths could be attributed to the complications of an eating disorder, 44 (27%) to suicide, and 31 (19%) to unknown or other causes. In a nation-wide register linkage study, Möller-Madsen, Nystrup, and Nielsen (1996) investigated mortality in anorexia nervosa in Denmark during the period 1970–1987; they estimated the standardized mortality rate being 9.1 in both sexes. Suicide was the dominant cause of death among subjects who died from unnatural causes (18 of 22 cases). Patton (1998) reported that suicide is the main cause of death among individuals with anorexia nervosa. Norring and Sohlberg (1993) have pointed out that death in anorexia is very often caused by a self-inflicted act rather than inanition typically performed with drug overdose and alcohol. Suicide was significantly higher than expected in Herzog, Greenwood, and Dorer's (2000) sample who found that anorexia nervosa carries a substantial risk of premature death. Keel et al. (2003) investigated predictors of mortality in eating disorders. In their sample comprising 246 women, 136 had anorexia nervosa. Of these patients, four committed suicide and the SMR associated with suicide for anorexia nervosa was 56.9 (95% CI, 15.3–145.7); none of them had been hospitalized for an affective disorder before intake, including 1 woman with a diagnosis of bipolar I affective disorder with had a suicide attempt during a previous major depressive episode. In Harris and Barraclough's (1997) meta-analysis thirteen cohorts of anorexic and bulimic patients are reported. They found that the suicide risk was 23 times that expected for the combined group, ranging between zero and 100 times. The suicide risk for anorexia nervosa increased 23 times. Pompili, Mancinelli, Girardi, Ruberto, and Tatarelli (2004) also performed a meta-analytic investigation of cohorts of patients with anorexia nervosa. These authors selected 10 studies and identified suicides which occurred in the follow-up period of each cohort. The meta-analysis showed that suicide in anorexia nervosa was, except in one study (Crisp, Callender, Hallek, & Hsu, 1992 — St. George's cohort), a more frequent phenomenon than their counterparts in the general population. Anorexia nervosa has been identified by Apter et al. (1995) as an illness associated with suicidality. These authors found that 10% of their adolescent inpatients met the diagnostic criteria for anorexia nervosa and that suicidal behavior scores were significantly higher in those with anorexia nervosa (and conduct disorder) compared to those with anxiety disorders and schizophrenia (Tables 1 and 2).

Sub-groups of anorexics present different suicidal features. Patients who binge eat and purge usually have a weak control over impulsivity. Among these individuals alcohol and drug abuse is also common. Also, mood disorders seem

Table 1
Suicides among various cohorts of patients with anorexia nervosa

Study	Sample	Follow-up	Suicides
Patton, 1998 (UK)	332	10	6
Eckert, Halmi, Marchi, Grove, & Crosby, 1995 (USA)	76	10	0
Herzog et al., 2000 (USA)	136	11	3
Tolstrup et al., 1985 (Denmark)	151	16	6
Deter and Herzog, 1994 (Germany)	84	12	2
Coren & Hewitt, 1998 (USA)	571	5	8
Crisp, Callender, Halek, & Hsu, 1992 (St George's)	105	20	1
Crisp et al., 1992 (Aberdee) (UK)	63	20	4
Emborg, 1999 (Denmark)	47	23	5
Kreipe, Churchill, & Strauss, 1989 (USA)	49	6	1
Keel et al., 2003 (USA)	136	9	4

to affect those who manifest such behavior more than they do restrictive anorexics (Vandereycken & Pierloot, 1983). In literature, anorexics with purging behavior are described as those more vulnerable to affective disorders and poor outcome compared with individuals without purging behavior (Garner, Garner, & Rosen, 1993; Vandereycken & Pierloot, 1983). Pryor, Wiederman, and McGillley (1996) reported that in their sample binge/purging anorexics were more likely than restricters to have attempted suicide or stolen items related to weight or food.

Milos, Spindler, Hepp, and Schnyder (2004) found a lifetime prevalence of suicide attempts of 26%, which is four times higher than the lifetime prevalence found in the general female population in Western countries (ca. 6%) (Weissman et al., 1999) and is comparable to rates previously reported for eating disorder samples (Bulik, Sullivan, & Joyce, 1999; Corcos et al., 2002; Viesselman & Roig, 1985). Participants with a purging type disorder (anorexia nervosa and bulimia nervosa) were more represented in the sample which is also consistent with the result of the study by Favaro and Santonastaso (1997). The same study outlined the fact that anorexia nervosa participants were more likely to engage in suicidal ideation than bulimia nervosa participants. Patients included in Favaro and Santonastaso's (1997) study, who had attempted suicide were older than non-attempters, had a longer duration of illness and a greater number of previous failed treatments. These patients seemed to have a more serious form of anorexia, with lower body mass index, higher levels of obsessionality and more frequent drug and/or alcohol abuse than non-attempters.

Recently, Carter, Blackmore, Sutander-Pinnock and Woodside (2004) examined the rate, timing and prediction of relapse in anorexia nervosa following restoration in a specialized inpatient treatment programme. They observed 35% rate of relapse and with regard to the timing of relapse the highest risk period for relapse was from 6 to 17 months after discharge and the mean survival time was 18 months. A history of suicide attempt(s) emerged as a main predictor of relapse.

Favaro, Caregaro, Di Pascoli, Brambilla, and Santonastaso (2004) reported that cholesterol levels are significantly predictive of suicidal ideation, impulsive self-injurious behavior, and depressive symptoms in anorexic patients.

2.2. Suicide and attempted suicide in bulimia nervosa

According to Keel and Mitchell (1997) suicide is one of the main causes of death among individuals with bulimia nervosa. These patients have an extraordinarily high rate of suicide (Favaro & Santonastaso, 1999). Several studies

Table 2
Attempted suicides (A.S.) among cohorts of patients with anorexia nervosa

Study	Sample	Follow-up	A.S
Viesselman & Roig, 1985 (USA)	13		3
Favaro & Santonastaso, 1997 (Italy)	167	6	15
Favaro & Santonastaso, 1996 (Italy)	164		13
Bulik et al., 1999 (USA)	70	3	19
Wiederman & Pryor, 1996a (USA)	59		6
Kreipe et al., 1989 (USA)	49	6	2
Franko et al., 2004 (USA)	106	8.6	30

The table shows the number of patients that attempted suicide at least once during the follow-up period or the number of patients that attempted suicide at least once in their clinical histories (ascertained by scales or questionnaires).

Table 3
Attempted suicides (A.S.) among cohorts of patients with bulimia nervosa

Study	Sample	Follow-up	A.S.
Viesselman & Roig 1985 (USA)	36		7
Garfinkel et al., 1980 (Canada)	155	8	36
Favaro & Santonastaso, 1997 (Italy)	210	6	38
Favaro & Santonastaso, 1996 (Italy)	161		28
Bulik et al., 1999 (USA)	152	3	47
Wiederman & Pryor, 1996a (USA)	58		18
Favaro & Santonastaso, 1998 (Italy)	125	2	23
Favaro & Santonastaso, 1999 (Italy)	175		29
Weiss & Erbert, 1983 (USA)	15		6
Franko et al., 2004 (USA)	110	8.6	12

The table shows the number of patients that attempted suicide at least once during the follow-up period or the number of patients that attempted suicide at least once in their clinical histories (ascertained by scales or questionnaires).

have reported a lifetime frequency of suicide attempts in bulimics between 15% and 40% (Bulik et al., 1999; Favaro & Santonastaso, 1997; Lewinsohn et al., 2000) (Table 3).

Among these patients a number of clinical variables have been linked to a greater risk of suicide, such as late onset, purging behavior, affective disorders, substance and alcohol abuse and borderline personality characteristics including impulsiveness. Patients with purging behavior seem to have more severe suicidality and show a greater number of suicide attempts and self-injurious acts compared with bulimic patients who do not purge (Mitchell, 1992; Shearer, Peter, Quaitman, & Wadman, 1988; Viesselman & Roig, 1985). Viesselman and Roig (1985) found that 20% of the bulimic patients analyzed who had attempted suicide also had a diagnosis of major depressive disorder; 11% of these individuals were drug and alcohol abusers. Higher frequency of attempted suicide has been reported in bulimic women with alcohol dependency (Bulick, Sullivan, Carter, & Joyce, 1997; Suzuki, Higuchi, Yamada, Komiya, & Takagi, 1994). Shearer et al. (1988) found that suicide attempts were more serious in those patients who had a borderline personality disorder comorbid with the eating disorder.

Favaro and Santonastaso (1997) investigated 205 bulimic patients, 25% of those that attempted suicide also had at least one past suicide attempt. Corcos et al. (2002) presented a sample of 295 women with bulimia nervosa (202 with BN purging type, 68 with BN non-purging type and 25 with anorexia nervosa binge eating purging type). This study highlighted that bulimics who had attempted suicide reported suicidal ideation more often during adolescence and had made their first attempt at this period. In this sample more than two-thirds had suicidal ideation during adolescence and their age at onset of the first eating disorder had been, on average, one and a half years younger than for subjects with no history of suicide attempts. Depressive symptoms, as in the case of anorexia nervosa, are secondary, rather than primary phenomena in patients with bulimia nervosa (Cooper & Fairburn, 1986). It has been suggested that low self-esteem associated with poor body image and occurring independently of depression is the factor associated with increased levels of internally directed irritability (Kent et al., 1997). In bulimic patients with a history of suicide attempts, the onset of psychopathology seemed to have been particularly precocious.

Stein, Lilienfeld, Wildman, and Marcus (2004) investigating factors contributing to a history of parasuicide, that is suicide attempts and/or other self-injurious behaviors in patients with eating disorders. They found that the parasuicidal patients had an elevated lifetime history of impulse control problems as well as substance use disorder. They also reported that a great proportion of parasuicidal patients, all with binge eating/purging symptomatology, could be classified as multi-impulsive. Hatsukami, Mitchell, Eckert, and Pyle (1986) compared patients with a diagnosis of bulimia nervosa only, bulimia with a history of affective disorder and bulimia with a history of substance abuse. They found that both the substance abuse group and affective disorder group showed a higher incidence of attempted suicide, more social problem, and greater overall treatment rate than the bulimia only group.

Recently, Franko et al. (2004) investigated suicide attempts in women with eating disorders. They found that more suicide attempts occurred in women with anorexia nervosa than in women with bulimia nervosa. These authors found that neither individual bulimic symptoms such as binge eating, vomiting, use of diet pills/laxatives/diuretics, nor the bulimia symptoms ratings measured over the course of the study were found to significantly predict suicide attempts in subjects with anorexia nervosa at intake. These authors reported that what predicted suicide attempts in bulimic subjects was a history of drug use disorder at intake and laxative abuse; in this study depression was not found to

predict time to suicide attempt. Mitchell, Boutacoff, Hatsukamy, Pyle, and Eckert (1986) reported that patients who abused laxatives were found to have greater likelihood of self-induced injury and having attempted suicide.

Favaro and Santonastaso (1997) pointed out that suicide attempts among bulimic patients did not appear to be linked to the severity of bulimic symptoms in terms of frequency of binge eating and vomiting, but rather to the presence of purging behavior. Suicide attempts were associated with more serious psychiatric symptoms and with higher levels of obsessionality. Various scholars underlined that patients with purging behavior have a more serious course of illness, as they more frequently experience depressive symptoms, weight and shape of body preoccupations and have a history of suicide attempts, drug and alcohol abuse and self-injurious behavior (Da Costa & Halmi, 1992; Dulit, Fyer, Leon, Brodsky, & Frances, 1994; Favaro & Santonastaso, 1997; Mitchell, 1992; Viesselman & Roig, 1985). Suicidality among these patients seems to be increased by the number of compensatory behaviors that the patients engage in order to reduce weight; the more strategies utilized, the greater the risk of suicide (Favaro & Santonastaso, 1996).

Bulimia nervosa is without doubt linked to self-injury (Dulit et al., 1994; Favazza, De Rosear, & Conterio, 1989; Hertz, 1995). A typical symptom of bulimia nervosa is self-injuring and self-mutilation; to some extent purgative behavior might be considered a sort of self-wounding action. This behavior is often experienced by patients as an invincible impulse to self-inflict punishment. It is noteworthy what has been reported by Van der Kolk, Perry, and Herman (1991) who considered eating disorders a form of self-destructive behavior similar to suicide attempts and self-cutting. However, according to Root and Fallon (1989) self-mutilation should not be considered a feature of suicide behavior but a way to reduce tension and induce relief; this behavior has also been linked to a number of dissociative symptoms (Everill, Waller, & MacDonald, 1995). Demitrack, Putnam, Brewerton, Brandtm, and Goldm (1990) studied dissociative psychopathology among patients with eating disorders and found that those affected by severe dissociative experience appeared to be specifically related to a propensity for self-mutilation and suicidal behavior. It would appear that patients have the chance to experience their body and look for a sense of reality and their own identity.

A higher frequency of death wishes and suicidal feelings in the bulimarexic group may be due to their feeling more out of control because of the vomiting behavior and its attendant fear of discovery, shame, secret, or disgust; or it may be a clinical consequence of the possible increase of bipolar and secondary depression in this group. Also, among patients of this sample, there was a higher frequency of conduct, antisocial, and hysterical diagnosis. Patients had planned and carefully thought out their suicide attempts and they told no one of their plans (Viesselman and Roig, 1985).

Although in some studies suicide seems to be the main cause of death (Mitchell et al., 1988; Vandereycken & Pieters, 1992), evidence on suicide in bulimia nervosa is still scarce, as more long-term follow-up studies need to be completed before the risk for bulimia nervosa may be compared with that for anorexia nervosa (Table 4).

2.3. Suicide risk related to obesity and weight status

Obesity is an increasingly prevalent public health problem. Overeating is a behavior that begins for many during adolescence when weight concerns also arise (Koff & Rierdan, 1991; Raymond, Mussell, Mitchell, de Zwaan, & Crosby, 1995; Woodside & Garfinkel, 1992). Weight-based teasing, body uneasiness and weight and image concerns have been found in suicidal individuals. Table 5 reports key issues of such field that emerged from the literature review.

3. Conclusions

People with eating disorders usually evoke the idea of self-wounding features, aiming at destroying the body slowly rather than through a suicidal act. This misconception often leads to ignoring or underestimate the risk of suicide. In fact, few studies analyzed suicidal behavior in-depth among patients with eating disorders. It would appear that what has been refuted by recent studies, namely the assumption that inanition generally threatens the life of these patients often prevails and leads to the factitious conclusion that suicide risk is low among these patients. A survey conducted by the first author led to the conclusion that even among mental health professionals that are deeply involved in the caring of patients with eating disorders, suicide risk is most often not taken into serious consideration.

Individuals with anorexia nervosa and bulimia nervosa show a very peculiar attitude toward their bodies. In one way, they believe that their body is the most precious and important thing that surrounds them, in another, they fear their body and struggle with it as an ominous enemy that has to be killed, which deserves a suicidal gesture.

Strengths of the present study include its large sample of articles reviewed and the inclusion of all major eating disorders. In fact, they are often identified with anorexia nervosa and bulimia nervosa only. This is the first systematic

Table 4
Issues related to suicide risk in anorexia nervosa and bulimia nervosa

Findings	Studies
Eating disorders as a form of affective disorder:	Cantwell, Sturzenberger, Burroughs, Salkin, & Green, 1977; Hudson, Pope, Jonas, & Yurgelun-Todd, 1983; Winokur, March, & Mendels, 1980.
Eating disorders independent of affective disorder:	Viesselman and Roig, 1985.
Depression secondary to anorexia nervosa:	Ivarsson, Rastam, Wentz, Gillberg, & Gillberg, 2000; Cooper, 1995; Halmi et al., 1991.
Depression in anorexia nervosa related to personality disorders:	Braun, Sunday, & Halmi, 1994; Halmi, 1995; Herzog, Keller, Lavori, Kenny, & Sacks, 1992; Gartner, Marcus, Halmi, & Loranger, 1989; Kennedy et al., 1990; Skodol et al., 1993; Wonderlich, Swift, Slotnick, & Goodman, 1990; Braun et al., 1994; Gillberg, Rastam, & Gillberg, 1995; Halmi, Kleifield, Braun, & Sunday, 1999; Piran, Kennedy, Garfinkel, & Owens, 1985.
History of sexual abuse:	Sullivan, Bulik, Carter, & Joyce, 1995; Fullerton, Wonderlich, & Gosnell, 1995; Tobin and Griffing, 1996.
Comorbidity with Axis I disorders:	Russell, 1979; Viesselman and Roig, 1985; Milos et al., 2004; Bulik et al., 1999.
Comorbidity with personality disorders:	Spindler and Milos, 2004; Milos et al., 2004; van Hanswijck de Jonge, Van Furth, Lacey, & Waller, 2003; Karwautz, Troop, Rabe-Hesketh, Collier, & Treasure, 2003; Matsunaga, Kiriike, Nagata, & Yamagami, 1998; Wonderlich and Swift, 1990; Youssef et al., 2004.
Low self-esteem in adolescence:	Guillon, Crocq, & Bailey, 2003; Pinto and Whisman, 1996.
Substance abuse:	Wiederman and Pryor, 1996b.
Cholesterol levels are significantly predictive of suicidal ideation, impulsive self-injurious behavior, and depressive symptoms in anorexic patients.	Favaro et al., 2004.
Bulimics with a borderline personality disorder resembled recurrent suicide attempters both on the side of psychological and biochemical characteristics than bulimics without a borderline personality disorder	Verkes, Pijl, Meinders, & Van Kempen, 1996
Abnormal serotonin function in bulimia nervosa	Steiger et al., 2001; Coccaro and Siever, 1995; Mann, 1995; Kaye et al., 1998; Jimerson, Lesem, Kaye, & Brewerton, 1992; Demitrack et al., 1993; Jimerson, Wolfe, Metzger, Levine, & Cooper, 1994
Multi-impulsive bulimia (alcohol or drug abuse, suicide attempts, repeated self-mutilation, sexual disinhibition, shoplifting). Viesselman and Roig, 1985	Fichter, Quadflieg, & Rief, 1994; Lacey, 1993; Fahy and Eisler, 1993
Impulsivity not predictive of suicidal behavior	Nagata, Kawarada, Kiriike, & Iketani, 2000; Favaro and Santonastaso, 1998

review of suicide in eating in the English literature. Previous approach to the subject lacked systematic search of sources and the inclusion of only those papers devoted to the most common eating disorders.

This study has a number of limitations. It does not provide meta-analytic results or comparisons between the studies. It presents findings in a tutorial fashion, lacking extrapolations of figures that may be useful for a better estimation of the problem. Also, more literature might be available other than the one located with our search strategy. We stress the

Table 5
Features associated with suicide risk in patients with obesity and weight-based concern

Weight dissatisfaction associated with binge eating	French et al., 1997
Increased body mass index	Carpenter, Hasin, Allison, & Faith, 2000; Falkner et al., 2001
Underweight in male adolescents	Falkner et al., 2001
Overeating and binge eating among youths	Ackard, Neumark-Sztainer, Story, & Perry, 2003
Weight-based teasing	Eisenberg, Neumark-Sztainer, & Story, 2003
Weight and image concern	Devaud, Jeannin, Narring, Ferron, & Michaud, 1998; Story et al., 1997; Mitchell, Pyle, Eckert, Hatsukami, & Soll, 1990; Pompili et al., in press; Pompili et al., 2005
Bariatric surgery	Hsu et al., 1998; Rosen and Aniskiewicz, 1983

need of further research in this field. Future studies should address the issue of comorbid conditions with eating disorders and the risk of suicide, how to assess suicidality in these patients (most studies report retrospective analysis) especially through the development of reliable instruments and the evaluation of the impact of effective public health strategies both for the prevention of eating disorders and suicide.

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