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Consequences of Making Weight: A Review of Eating Disorder Symptoms and Diagnoses in the United States Military

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Abstract

Eating disorders are serious psychiatric illnesses associated with health problems. Such problems may compromise military performance, highlighting the need to establish the level of eating pathology that exists in military samples. This article qualitatively reviews prevalence estimates of eating disorder symptoms and diagnoses in military samples, providing nonmilitary estimates for context. Findings suggest that eating disorder symptoms are prevalent in cadets and active duty service members, especially when using self-report measures. The increased salience of weight in the military and increased exposure to trauma may influence risk for eating disorders. Alternatively, individuals at risk for eating disorders may self-select into the military. Overall, this review suggests that eating disorder symptoms are common in military samples and that further research is warranted.

Keywords

eating disorder symptoms; eating disorders; military; purging; risk factors; veterans

It is well established that factors that increase emphasis on shape and weight increase risk for eating disorders in men and women (e.g., Keel & Forney, 2013). As such, the military may represent one group at risk for eating disorders, given the specific weight requirements for service (United States Army, 2006). Indeed, the main objectives of the Army Weight Control Program are to ensure that all personnel are able to meet physical demands of their duties and present a trim military appearance (United States Army, 2006). These objectives

indicate that excessive body fat “connotes a lack of personal discipline,” “distracts from military appearance,” and “may indicate a poor state of health, physical fitness, or stamina” (United States Army, 2006, p. 1). These objectives not only place a necessary emphasis on health and physicality but also place emphasis on general appearance, which may increase body dissatisfaction and/or concerns about weight and shape. In addition to increased emphasis on shape and weight, exposure to traumatic experiences, such as combat, may increase risk for developing eating disorders. Previous studies have found high lifetime prevalence of traumatic events in women with anorexia nervosa (AN) and bulimia nervosa (BN), with greater posttraumatic stress symptomatology associated with greater severity of eating disorder symptoms (e.g., Tagay, Schlottbohm, Reyes-Rodriguez, Repic, & Senf, 2014).

Eating disorder behaviors, such as self-induced vomiting, are associated with severe health problems (Brown & Mehler, 2013) and psychosocial impairment (Mitchison, Hay, Slewa-Younan, & Mond, 2012) that may be particularly impactful on military performance, given the physical strength and cognitive requirements of the military. Presence of an eating disorder or eating disorder symptoms may limit possibilities for career advancement within the military, further impacting overall quality of life for service members and their families. Importantly, eating disorders themselves are associated with increased risk of suicide, with a recent meta-analysis finding standardized mortality ratios for suicide for AN and BN to be 31 and 7.5, respectively (Preti, Rocchi, Sisti, Camboni, & Miotto, 2011). The military has suffered from increased suicide over the past several years (Kang & Bullman, 2008), and it is possible that eating disorders may contribute additional risk of suicide in this population.

Individuals in the military may be reluctant to disclose information that might influence promotion or deployment or both. Eating disorders are associated with significant stigma (Stewart, Keel, & Schiavo, 2006), and mental health problems in general are stigmatized in the military (Greene-Shortridge, Britt, & Castro, 2007). This stigma may influence responses, and thus prevalence estimates, on surveys and interviews regarding mental health symptoms. In civilian samples, higher eating disorder prevalence is found using questionnaire versus interview assessments (Keel, Crow, Davis, & Mitchell, 2002), which may be a function of an individual’s willingness to disclose information based on the increased anonymity associated with questionnaires (Anderson, Simmons, Milnes, & Earleywine, 2007; Keel et al., 2002; Lavender & Anderson, 2009) or misunderstanding questions being asked or both. Thus, multiple methods of ascertainment are needed to understand prevalence estimates of eating disorders in the military.

The purpose of this article is to review studies examining the prevalence of eating disorder symptoms and diagnoses in military samples. To examine the hypothesis that emphasis on weight for fitness tests is associated with increases in eating disorder symptoms, we also reviewed studies specifically examining presence of eating disorder symptoms during fitness testing periods. We include findings from similar studies in civilian samples to provide a context for interpreting military findings. Implications and future directions are discussed.

METHODS

Articles were identified by electronic searches of Psyc-INFO and PubMed databases using a combination of the search terms “eating disorders,” “anorexia nervosa,” “bulimia nervosa,” “eating disorder symptoms,” “disordered eating,” “military,” “army,” “navy,” “air force,” “marines,” and “veterans.” References of articles were scanned to include any additional relevant articles. When more than one study using similar methods (e.g., self-report) provided prevalence estimates of eating disorder diagnoses or symptoms (i.e., self-induced vomiting, laxative use, diet pill use, and binge eating), weighted averages were calculated for prevalence estimates across studies. Given sex differences in the prevalence of eating disorders and symptoms (American Psychiatric Association, 2013), weighted averages were calculated separately in women and men. To provide context for estimates found in military samples, prevalence estimates in nonmilitary samples are presented. Nonmilitary samples were identified by electronic searches using search terms based on information obtained from the military articles (e.g., “eating disorder inventory,” “prevalence,” and “anorexia nervosa”). Articles in nonmilitary samples were then scanned to identify ones that used similar assessment measures (i.e., specific questionnaires or wording on surveys) and demographic information (i.e., age) as studies conducted in the military. College samples were used as comparisons for recruit samples due to their similarity in age, when eating disorders commonly develop (Hudson, Hiripi, Pope, & Kessler, 2007), and the nature of their social/peer environment.

As this review focuses on eating disorder symptoms and diagnoses in the United States military, articles were excluded if authors solely examined overweight, obesity, changes in food intake and body weight, or only included non-United States samples. All articles were independently reviewed to determine relevance to the current manuscript. Seventeen articles on eating disorders in the military were identified. Of these articles, one was excluded because it did not report demographic information or prevalence of individual symptoms (Sweeny & Bonnabeau, 1990), and one was excluded because it only included dieting prevalence (Haddock et al., 1999), resulting in review of 15 articles. Seven articles from nonmilitary samples are included along with prevalence estimates from population-based studies (Hudson et al., 2007).

RESULTS

Eating Disorder Risk

Studies conducted in cadets or active duty military personnel suggest high risk of eating disorders in these groups (see Table 1 for women; Table 2 for men). The percentage of female cadets at risk for eating disorders ranged from 20 to 29.6% across samples. Similarly, 33.6% of a sample of active duty females scored in the at-risk range (Lauder, Williams, Campbell, Davis, & Sherman, 1999). Studies conducted in nonmilitary female college samples have found estimates ranging from 10 to 16% (Forney & Ward, 2013; Klemchuk, Hutchinson, & Frank, 1990), with estimates in female collegiate athletes ranging from 25 to 58% (Johnson, Powers, & Dick, 1999). Fewer studies have examined the prevalence of males at risk for eating disorders. The percentage of male military cadets at risk for developing eating disorders ranged from 2 to 7% across two independent samples, which

does not exceed those found for nonmilitary college males (e.g., Forney & Ward, 2013; see Table 3).

Purging Behaviors

Self-report surveys also indicate high prevalence of purging behaviors (i.e., vomiting, laxative use, and diet pill use) in female military samples. Across three studies, prevalence estimates of vomiting ranged from 3% in active duty females up to 5.2% in female cadets. Prevalence estimates for laxative use in women ranged from 3.9 to 9.7%, and prevalence estimates for diet pill use in women ranged from 8.5 to 18%. Only one study examined purging behaviors in active duty men (McNulty, 1997a), which found approximately 3.7% endorsed self-induced vomiting, 3.5% endorsed diet pill use, and 3.4% endorsed laxative use. In contrast, prevalence estimates from a community-based study in men in their 30s were 0.5%, 0%, and 0% for vomiting, laxative use, and diet pill use, respectively (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997). Importantly, the time frame across which prevalence estimates were determined is not consistent or reported in all studies, making comparisons across studies very difficult. Furthermore, limited information was provided on laxative and diet pill use, so it is unclear whether reported prevalence reflects use that was excessive or inappropriate.

Binge Eating

Binge eating, defined as the consumption of an unusually large amount of food and feeling a sense of loss of control while eating, is a common feature in eating disorders and appears prevalent in military samples as well. Across three studies in female military personnel and cadets, the average prevalence of binge eating was 19.3%. Estimates of current binge eating in community and college-based samples of women range from 12 to 16.2% (Heatherton et al., 1997; Johnson et al., 1999). The only study conducted in male sailors found 24.8% of the sample endorsed binge eating over the preceding three-month period (McNulty, 1997a). Reports of binge eating in community-based samples of men have been estimated around 9.9% (Heatherton et al., 1997). Thus, binge eating in military samples may be elevated; however, prevalence should be interpreted with caution, as none of the military studies specifically reported how binge eating was assessed. As such, participants' endorsement of binge eating may not be defined in accordance with the diagnostic criteria in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013), which could lead to over- or underestimates of prevalence.

Eating Disorder Diagnoses

Weighted prevalence estimates using self-report surveys for active duty females found a prevalence of 1.6% for AN and 9.7% for BN (McNulty, 1997b, 2001; Table 1). Furthermore, a longitudinal military population-based study found 5.5% of women at baseline (predeployment) met diagnostic criteria for an eating disorder, including BN, subclinical BN, binge eating disorder (BED), or subclinical BED (Jacobson et al., 2009). An additional 3.3% of women developed an eating disorder (new onset) at 1–5-year follow-up. In community-based samples, 5% of women in their 30s met criteria for a bulimic syndrome, a term that encompasses BN, subthreshold BN, BED, and purging disorder (i.e.,

vomiting in the absence of binge eating; Keel & Heatherton, 2010). Prevalence estimates of AN and BN among women were 0.9% and 1.5%, respectively, in a nationally representative population-based study (Hudson et al., 2007).

Jacobson et al. (2009) found 4.0% of military men met criteria for an eating disorder at baseline, and 2.6% developed an eating disorder (new onset) at 1–5-year follow-up. Only one study specifically reported prevalence estimates for AN and BN in active duty men (2.5% and 6.8%, respectively; McNulty, 1997a). In contrast, estimates in civilian and population-based samples range from 0.8 to 4% across diagnoses (Hudson et al., 2007; Keel & Heatherton, 2010; Keel, Heatherton, Dorer, Joiner, & Zalta, 2006). Although McNulty (1997a, 1997b, 2001) provides prevalence estimates of eating disorder not otherwise specified (EDNOS) ranging from 35.8 to 62.8%, heterogeneity in EDNOS groups, low response rates (e.g., 28–54%), and failure to report diagnostic algorithms make all prevalence estimates difficult to contextualize with noncivilian samples and should be interpreted cautiously.

Approximately 15.6% of a sample of female veterans reported a lifetime eating disorder using a phone interview (Forman-Hoffman, Mengeling, Booth, Torner, & Sadler, 2012). This prevalence may be elevated compared to lifetime prevalence estimates in civilian samples (i.e., 5.9%; Hudson et al., 2007). Importantly, diagnostic criteria were not specifically assessed in the study by Forman-Hoffman et al. (2012); an eating disorder was determined by positive responses to the questions “have you ever been diagnosed with an eating disorder” or “have you ever suffered from an eating disorder.” Furthermore, the authors do not report whether the female veterans had an eating disorder before, after, or during military involvement, making it unclear whether serving in the military increases risk for developing eating disorders.

In contrast to self-report methods, diagnostic interviews have the benefit of ensuring that symptoms co-occur over the same time period to form a syndrome and that participants understand what is meant by certain diagnostic features (e.g., that binge episodes involve an objectively large amount of food and a loss of control over eating). To combine the benefits of increased sensitivity of self-report assessments with increased specificity of interview assessments, studies often employ a two-stage design in which individuals are screened for a possible eating disorder with self-report questionnaires and then interviewed to confirm diagnoses. This two-stage design has yielded point prevalence estimates of 0.2% for AN, 0.07–1.2% for BN (Beekley et al., 2009; Lauder et al., 1999), and 1.2% for BED (Lauder et al., 1999); 12-month estimates in the general population are 0% AN, 0.5% BN, and 1.6% BED (Hudson et al., 2007). Furthermore, Beekley et al. (2009) found prevalence over a seven-year period in male military cadets to be 0% for AN and 0.02% for BN. No methodologically similar studies were found for college men.

Finally, three studies have reported prevalence of eating disorders in the military using medical records data (Antczak & Brininger, 2008; Maguen et al., 2012; Striegel-Moore, Garvin, Dohm, & Rosenheck, 1999). The weighted prevalence estimates for women were 0.22% and 0.71% for AN and BN, respectively; however, the range was large (Table 1). The weighted average prevalence of any eating disorder in women was 0.55% (Table 1). For

men, weighted average prevalence estimates based on two studies were 0.008% for AN and 0.0015% for BN (Table 2). Additionally, two studies reported prevalence estimates for eating disorder diagnoses broadly, with weighted prevalence estimated to be 0.03% (Table 2). In contrast, Striegel-Moore et al. (2008) examined rates of eating disorders in a civilian outpatient sample based on diagnostic codes from patients' charts from a large healthcare organization and found 0.32% of women and 0.02% of men were diagnosed with an eating disorder.

Eating Disorder Symptoms and Fitness Testing Periods

As described previously, military weight standards and fitness tests may contribute to eating disorder symptoms in the military by increasing the salience of weight and shape. If so, estimates collected during fitness testing periods, when weight is more salient, may be elevated compared to other times. Supporting this idea, McNulty (1997a) found approximately three times as many male sailors endorsed eating disorder symptoms, including self-induced vomiting and laxative use, prior to military fitness testing periods compared to nonfitness testing periods. In another study, 279 male and 210 female service members completed self-report surveys prior to a physical fitness assessment, and a large percentage reported engaging in purging behaviors, including self-induced vomiting (5%) and use of laxatives, diuretics, or diet pills (18%) in order to lose weight prior to the fitness test (Carlton, Manos, & Van Slyke, 2005). Notably, the response rate for the surveys was low (i.e., 30%), which may have biased results (Carlton et al., 2005). Purging behaviors during nonfitness assessment periods were not reported, making it unclear whether the fitness assessment period was associated with an increase in reported symptoms. In another study, Peterson, Talcott, Kelleher, and Smith (1995) examined military weight standards as a risk factor for eating disorder symptoms by comparing overeating episodes and extreme weight control behaviors in women and men enrolled in a military weight management program to both a civilian weight management program and a normal weight military group. To our knowledge, this is the only study that has included specific comparison samples in the examination of eating disorder symptoms in the military. The military weight management group was more likely to engage in diuretic use compared to the nonweight management military group and was four times as likely to report vomiting compared to both groups; however, this finding was not statistically significant. These results were found despite the civilian comparison group having a greater proportion of women than the military weight management group (87% versus 35%). Given that sex is a robust risk factor for eating disorder symptoms (Keel & Forney, 2013), findings suggest that the impact of the weight management group may be beyond that of gender.

DISCUSSION

Overall, findings suggest that a high prevalence of women and men in the military is at risk for eating disorders, engage in purging behaviors to lose weight, and may have eating disorder diagnoses. However, similar to findings from nonmilitary samples, there is a large discrepancy between prevalence estimates based on self-report versus interview or medical records data or both, highlighting the importance of further examining eating disorders in the military as well as understanding the best methods for accurate assessment.

The discrepancy in prevalence estimates in military samples may be due to either overreporting on self-report surveys or underreporting on interviews. Individuals may overreport on self-report surveys if they do not understand the questions asked, resulting in false positives. Alternatively, it is possible that eating disorder symptoms are being underreported during interview formats or that eating disorders are being underdiagnosed due to individuals in the military not seeking treatment for their eating problems. Although many individuals with eating disorders do not seek treatment for their symptoms (Hart, Granillo, Jorm, & Paxton, 2011; Mond, Hay, Rodgers, & Owen, 2007), this phenomenon may be exaggerated in members of the military due to perceived stigmatization associated with an eating disorder diagnosis (Greene-Shortridge et al., 2007; Roehrig & McLean, 2010; Stewart et al., 2006) and perceived consequences of being deemed unfit to serve, especially in a male-dominated career (Department of Defense, 2012). In turn, individuals may be more willing to report eating disorder symptoms on surveys than during a medical visit, potentially due to greater feelings of anonymity with survey questions (Keel et al., 2002). Although there are differences in prevalence estimates based on methodology, these differences may also reflect differences in military involvement (e.g., different branches of the military, college-aged ROTC students, veterans). For example, the three studies examining prevalence estimates from medical records data were based on participants in the VA healthcare system, a group who is likely older and thus beyond the peak age of onset for eating disorders. More work is needed to understand which groups within the military are most at risk.

Given that eating disorder symptoms appear prevalent in the military, it is important to understand why this may be. As previously mentioned, increased salience of shape and weight or external pressures to lose weight in the military may influence eating behavior or development of eating disorders. Supporting this interpretation, some studies suggest increased eating pathology during fitness testing periods or in specific groups of the military (e.g., weight management programs; Carlton et al., 2005; Peterson et al., 1995). Importantly, eating disorder risk factors such as extreme dieting and eating disorders themselves often begin prior to age 18 (Vohs, Heatherton, & Herrin, 2001), suggesting some symptoms observed in service members may have existed prior to entering the military. Individuals who might be vulnerable to eating disorders may self-select into the military. For example, individuals who overexercise or have high shape and weight concerns may be drawn to the military, given the training environment and emphasis on physicality. Consistent with this idea, Garber, Boyer, Pollack, Chang, and Shafer (2008) found that a large proportion of their female sample endorsed symptoms of eating disorders prior to joining the military.

Increased exposure to stress and trauma has also been linked to the development of eating disorders both in civilian and military samples (Brewerton, 2007; Forman-Hoffman et al., 2012; Rayworth, Wise, & Harlow, 2004). Indeed, women who were deployed and experienced combat were almost twice as likely to develop an eating disorder as women who were deployed but did not have combat exposure (Jacobson et al., 2009). Although many of the studies reviewed were conducted in recruits who have not been deployed, findings from Jacobson et al. (2009) highlight the importance of assessing the potential emergence or exacerbation of an eating disorder after trauma. Furthermore, these findings

suggest that targeted intervention for eating problems may be beneficial for service members who have been deployed and exposed to combat.

Overall, findings suggest that screening for and prevention of eating disorders and symptoms across the military may be warranted. In particular, the use of assessment methods with greater perceived anonymity may be more beneficial than face-to-face interviews for identifying individuals at risk for eating disorders or other mental health problems. It is important to make such procedures or interventions accessible given the stigma associated with such problems. One model to increase accessibility and reduce stigma is that used by the Man Therapy Program™, an interactive web-based program designed to reach out to men most at risk for suicide and least likely to seek help on their own (Spencer-Thomas, Hindman, & Conrad, 2014). This program attempts to use humor to decrease stigma and confront important issues such as depression and suicide. A recent evaluation of the program found high rates of satisfaction and increased likelihood of seeking help after visiting the site (Spencer-Thomas et al., 2014). Tailoring this type of program to service members and focusing on problematic eating may be one approach to reduce stigma and increase accessibility of early intervention or prevention programs.

Although the current evidence suggests eating disorders and symptoms are common in the military, more rigorous research is needed to make any strong conclusions. For example, studies conducted in the military suggest high prevalence of binge eating; however, none of the studies included specific information regarding how the episodes were assessed. It is possible that individuals in the military, particularly active duty personnel, may go without food based on surrounding circumstances and then feel as though they binged, which may greatly overestimate occurrence of binge eating episodes. Similarly, extreme physical activity may lead individuals to eat a large amount of food and endorse overeating, although the amount of food may be appropriate given the circumstance. Furthermore, many of the studies did not report average body mass index or percentage of participants who were overweight. The military's weight selection criteria may have contributed to high prevalence estimates simply due to higher base rates of AN and BN in nonover-weight samples. The small number of studies and paucity of longitudinal designs do not allow conclusions about the temporal relationship of eating disorder symptoms and military service. Many of the studies have poor response rates or limited information regarding ascertainment of diagnoses, increasing concerns about interpretation and generalizability of findings. We were unable to conduct a meta-analytic review of the current studies or include meaningful prevalence estimates of EDNOS. In particular, BED has been defined as a distinct diagnosis in the *DSM-5*, highlighting the importance for future studies of eating disorders in the military to specifically examine BED. Nonetheless, studies that have been conducted suggest that further examination of eating disorders in the military is warranted.

Future research should use longitudinal designs to better understand the temporal development of eating disorders within the military as well as more specific risk factors associated with eating disorders in this population. Similarly, researchers should examine which specific populations are more at risk for eating disorder symptoms, such as recruits, who fall within the peak age range for eating disorder onset, or those trying to "make weight" in military weight management programs. It would also be interesting to examine

potential gender differences in eating disorder symptoms in the military and whether differences are comparable to those in nonmilitary settings. For example, research should examine whether men in the military are more prone to certain types of eating disorder symptoms, such as excessive exercise, compared to either men not in the military or women in the military.

In summary, the military represents one group of individuals in which examination of eating and other psychiatric disorders is crucial. It is important for military personnel to increase awareness of eating disorder risk in the military and decrease stigma associated with these illnesses to minimize barriers to treatment to reduce the burden from these serious mental disorders. Better understanding of risk factors associated with eating disorder symptoms and diagnoses in the military may help foster appropriate prevention and treatment approaches to decrease additional risk of injury and death in service members.

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Table 1

Eating disorder symptoms and diagnoses in female service members

Study	N	Age	Sample Type	BMI kg/m ² (Range)	% at Risk	Measure	Vomiting	Laxative Use	Diet Pill Use	Binge Eating	Frequency Criterion Used	AN Diagnosis	BN Diagnosis	BED Diagnosis	Combined ED Diagnosis
Self-report data															
Beekley et al. (2009)	1,455	95% 18–22	Cadets	Not reported	20.5% (mean)	EAT-26	–	–	–	–	–	–	–	–	–
Garber et al. (2008)	1,985	19 ± 2.1	Recruits	(18.5–21.9)	–	–	25% (vomiting, pills, binging)	–	–	–	Not reported	–	–	–	–
Jacobson et al. (2009)	12,641	(<20–40+)	Active duty	Not reported	–	Survey-based diagnose	–	–	–	–	–	–	–	–	5.5% (baseline); 3.3% (new onset)
Lauder et al. (1999)	423	27.5 ± 7.7	Active duty	23.5 ± 3.13 (16.3–42.6)	33.6%	EDI	–	–	–	–	–	–	–	–	–
Lauder and Campbell (2001)	310	21.5 ± 1.9	Cadets	22.72 ± 0.3 (18.1–33.3)	20%	EDI	5.2%	3.9%	14.5	8.7%	1 X per month in last 3 months or 2x per week at worst point in last 2 years	–	–	–	–
McNulty (1997b)	706	21–58	Active duty	Not reported	–	DSM-III-R	3%	7.1%	8.5%	19.2%	Not reported	1.1%	12.5%	–	–
McNulty (2001)	1,278	18–55	Active duty	Not reported	–	DSM-IV	3.3%	9.7%	18%	22%	“During the past few months”	1.8%	8.1%	–	–
Warner, Matuszak, Rachal, Flynn, and Grieger (2007)	135	21.03 ± 0.8	Cadets	33% 25; 1.5% 30	29.6%	EAT-26	–	–	–	–	–	–	–	–	–
Weighted averages across studies	–	–	–	–	23.3%	–	3.4%	8.3%	14.6%	19.3%	–	1.6%	9.7%	–	–
Interview or two-stage (self-report and interview)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Beekley et al. (2009)	1,872	18–22	Cadets	Not reported	20.5% (mean)	EAT-26 DSM-IV	–	–	–	–	–	0.2%	1.2%	–	–
Forman-Hoffman et al. (2012)	1,004	68% 20–44	Veterans	33.6% BMI ₃₀	–	Interview	–	–	–	–	–	–	–	–	15.6%

Study	N	Age	Sample Type	BMI kg/m ² (Range)	% at Risk	Measure	Vomiting	Laxative Use	Diet Pill Use	Binge Eating	Frequency Criterion Used	AN Diagnosis	BN Diagnosis	BED Diagnosis	Combined ED Diagnosis
Lauder et al. (1999)	423	27.5 ± 7.7	Active duty	23.5 ± 3.13 (16.3–42.6)	33.6%	EDI DSM-IV	–	–	–	–	–	0.2%	0.7%	1.2%	–
Weighted averages across studies	–	–	–	–	23.4%	–	–	–	–	–	–	0.2%	1.1%	1.2%	15.6%
Medical records data															
Antezak and Brininger (2008)	201,607	18–40+	Veterans	Not reported	–	ICD-9	–	–	–	–	–	0.25%	0.79%	–	–
Maguen et al. (2012)	71,248	31 ± 8.9	Veterans	Not reported	–	ICD-9	–	–	–	–	–	–	–	–	0.65%
Striegel-Moore et al. (1999)	24,041	51.4 ± 17.2	Veterans	Not reported	–	ICD-9	–	–	–	–	–	0.04%	0.08%	–	0.3%
Weighted averages across studies	–	–	–	–	–	–	–	–	–	–	–	0.22%	.71%	–	0.55%

Note. AN = anorexia nervosa; BED = binge eating disorder; BMI = body mass index; BN = bulimia nervosa; EAT = Eating Attitude Test; ED = eating disorder; EDI = Eating Disorder Inventory. Frequency criterion used refers to the specific criterion used by each study for endorsement of disordered eating behaviors.

Table 2

Eating disorder symptoms and diagnoses in male service members

Study	N	Age	Sample Type	BMI kg/m ² (Range)	% at Risk	Measure	Vomiting	Laxative Use	Diet Pill Use	Binge Eating	Frequency Criterion Used	AN Diagnosis	BN Diagnosis	Combined ED Diagnosis
Self-report														
Jacobson et al. (2009)	33,578		Active duty	Not reported	-		-	-	-	-	-	-	-	6.6%
McNulty (1997a)	1,425	67.7% 18-34	Active duty	Not reported	-	DSM-IV	3.7%	3.4%	3.5%	14.0%	Current use	2.5%	6.8%	-
Warner et al. (2007)	955	20.9 ± 3.5	Cadets	37.6% 25; 4.2% 30	7%	EAT-26	-	-	-	-	-	-	-	-
Two-stage (self-report and interview)														
Beekley et al. (2009)	10,859	95% 18-22	Cadets	Not reported	2%		-	-	-	-	-	0.0%	0.02%	-
Medical records data														
Antczak and Bringer (2008)	1,179,181	18-40+	Veterans	Not reported	-		-	-	-	-	-	0.01 %	0.02%	-
Magnen et al. (2012)	522,491	31 ± 8.9	Veterans	Not reported	-		-	-	-	-	-	-	-	0.04%
Striegel-Moore et al. (1999)	466,590	60.16 ± 14.2	Veterans	Not reported	-		-	-	-	-	-	0.005%	0.004%	0.02%
Weighted averages across studies	-	-	-	-	-	-	-	-	-	-	-	0.008%	0.015%	0.03%

Note. AN = anorexia nervosa; BED = binge eating disorder; BMI = body mass index; BN = bulimia nervosa; EAT = Eating Attitude Test; ED = eating disorder. Frequency criterion used refers to the specific criterion used by each study for endorsement of disordered eating behaviors.

Table 3
Eating disorder symptoms and diagnoses in college and community-based samples of men and women

Study	N	Sample Type	Age	BMI	% at Risk	Method	Purging (Vomiting, Laxatives, Diet Pills)	Binge Eating	Frequency Criterion Used	AN Diagnosis	BN Diagnosis	Combined ED Diagnosis
Self-report												
Forney and Ward (2013)	211 women 65 men	College	20.70 ± 1.40	22.42 ± 3.18 (women) 24.46 ± 3.68 (men)	16.1% (women) 8.5% (men)	Self-report survey	-	-	-	-	-	-
Heatherton et al. (1997)	509 women 206 men	10-year follow-up of college sample	30 ± 2	<10% of sample overweight or obese	-	Self-report survey	1.3%, 0.6%, 1.3% (women: vomiting, laxatives, diet pills) 0.5%, 0%, 0% (men: vomiting, laxatives, diet pills)	12% (women) 9.9% (men)	Current use	-	-	-
Johnson et al. (1999)	562 women 883 men	Collegiate athletes	19.9	21.1 (women) 25.7 (men) ~12% BMI 30	25-58% (women) 9.5-38% (men)	Self-report survey	5.2% (women) 2.04% (men)	8.36% (women) 8.6% (men) *loss of control not included	1 x per week over past 3 months	0% (women and men)	1.1% (women) 0% (men)	-
Keel and Heatherton (2010)	968 women 369 men	10-year follow-up of college sample	30 ± 2	22.45 ± 3.61 (women) 24.44 ± 2.88 (men)	-	Self-report survey	-	-	-	-	-	5% (women) 3% (men)
Keel et al. (2006)	548 women 244 men	College	20 ± 1.6	22.5 ± 3.1	-	Self-report survey	4.3% (women) 0% (men)	14.8% (women) 3.8% (men)	Current use	-	-	11.7% (women) 1.8% (men)
Klemchuk et al. (1990)	1,506 women	College	17-31	Not reported	10.1%	Self-report survey	-	-	-	-	-	-
Weighted averages across studies	-	-	-	-	22.47% (women) 35.86% (men)	-	4.2% (women) 1.43% (men)	11.67% (women) 7.88% (men)	-	-	-	7.39% (women) 2.45% (men)
Medical records data	-	-	-	-	-	-	-	-	-	-	-	-

Study	N	Sample Type	Age	BMI	% at Risk	Method	Purging (Vomiting, Laxatives, Diet Pills)	Binge Eating	Frequency Criterion Used	AN Diagnosis	BN Diagnosis	Combined ED Diagnosis
Striegel-Moore et al. (2008)	101,130 women 93,628 men	Medical records data	18-55	Not reported	-	ICD-9	-	-	-	0.02% (women)	0.07% (women)	0.32% (women) 0.02% (men)

Note. AN = anorexia nervosa; BMI = body mass index; BN = bulimia nervosa; ED = eating disorder. Frequency criterion used refers to the specific criterion used by each study for endorsement of disordered eating behaviors. *Loss of control criterion for binge eating was not assessed/included in definition of binge eating in this sample.