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DEMOGRAPHIC, PSYCHOLOGICAL, AND WEIGHT-RELATED CORRELATES
OF WEIGHT CONTROL BEHAVIORS AMONG
ACTIVE DUTY MILITARY PERSONNEL

by

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INTRODUCTION

Military Weight and Body Composition Standards

Rationale

A healthy and fit force is necessary for ensuring mission readiness, particularly for duty in operational and deployed settings. In a study examining the assumptions underlying the Army's weight control program, Troumbley and colleagues found that overweight soldiers had greater health risk, lower health status, and lower physical fitness than normal weight soldiers (Troumbley, Rinke, Burman, & Lenz, 1990). Similarly, being overweight was a risk factor for injuries, and having a body mass index (BMI; weight in kg divided by height in squared meters) of 30 kg/m² or greater was a risk factor for both injury and illness among cadets undergoing Basic Cadet Training at the Air Force Academy in 2002 (Billings, 2004). Further, increased BMI is associated with Type 2 diabetes among military members, and the incidence of diabetes in the military is similar to that in the civilian population despite military weight and fitness standards (Paris, Bedno, Krauss, Keep, & Rubertone, 2001). This latter finding suggests that military members are comparably vulnerable to comorbid health conditions associated with overweight and obesity in the general U.S. population (Flegal et al., 2002).

Shortly after the Vietnam war, military service members were perceived as becoming increasingly sedentary with a decline in overall fitness and an increasing tendency toward overweight and obesity (Friedl & Vogel, 1997). In 1981, President Jimmy Carter ordered a review of the fitness of military personnel, which led to the development of Department of Defense (DoD) Directive 1308.1. According to this directive, the purpose of maintaining weight and body composition standards in the

military is to enhance “physical fitness, general health, and military appearance” (U.S. DoD, 1981). Each branch of service subsequently devised its own weight and fitness standards that were at least as stringent as the general guidelines set forth by this directive.

Within ten years after the implementation of DoD Directive 1308.1, the prevalence of obesity significantly decreased among soldiers (Friedl & Vogel, 1997). It remains unknown if this decrease in overweight and obesity among military personnel was the result of 1) the healthy modification of eating and exercise habits, 2) the use of unhealthy dieting and weight control behaviors to meet weight and body fat standards, 3) the discharge of military personnel who were unable to meet and maintain these standards, or 4) some combination of the above factors.

However, with the rising overweight and obesity epidemic in our nation (Flegal et al., 2002; Ogden et al., 2006), many U.S. military members continue to struggle with meeting weight and body fat standards today. The 2002 DoD Survey of Health-Related Behaviors revealed that the prevalence of overweight (i.e., having a BMI ≥ 25) increased from 49.0% in 1995 to 57.2% among active duty military personnel (Bray, Rae Olmsted, Williams, Sanchez, & Hartzell, 2006). Among personnel under age 20, prevalence of overweight increased from 27.6% in 1995 to 36.5% in 2002. Among personnel aged 20 or older, prevalence of overweight increased from 50.2% in 1995 to 58.4% in 2002. Interestingly, the increase in prevalence overweight occurred despite higher self-reported exercise (i.e., percent of personnel who reported running, walking, cycling or other exercise for 20 or more minutes at least three times per week increased from 65.4% in 1995 to 70.2% in 2002). Further, a positive relationship has been found between physical

activity and BMI among military personnel, suggesting that dietary intake and other health behaviors may be more influential in weight gain than lack of exercise per se (Lindquist & Bray, 2001). However, this survey did not assess body composition. Although BMI is correlated with body fat, BMI does not directly measure body fat (Centers for Disease Control and Prevention (CDC), 2007). As a result, some people (i.e., athletes and military personnel) may have a BMI that indicates they are overweight even though they do not have excess body fat (CDC, 2007). Therefore, it is possible that increases in muscle mass may have contributed to the increased prevalence of overweight during this time period in the Bray et al. (2006) study.

In addition to a rise in percent overweight, prevalence of obesity also appears to be on the rise among military personnel. For example, the prevalence of obesity among active duty Army personnel was 5% in 1999 (Pfizer Pharmaceuticals, 1999). However, the more current 2003 report reported a 15.3% prevalence of obesity among active duty Army personnel (National Quality Management Program, 2003). Although the methodology may have differed between these two reports, this increased prevalence of obesity over time is nonetheless alarming. A recent report on the prevalence of obesity among Tricare beneficiaries in the military health care system revealed that approximately 13% of active duty military members are obese (i.e., have a body mass index (BMI) of 30 or greater; National Quality Management Program, 2003). Older (i.e., aged 40-65), African American, male military personnel have been found to be at greater risk of obesity than other soldiers (Pfizer Pharmaceuticals, 1999), which mirrors findings in the general U.S. population that the prevalence of overweight and obesity tends to be higher among African Americans and older people compared with Caucasians and

younger people, respectively (Ogden et al., 2006). Collectively, these reports suggest that the prevalence of overweight and obesity in the military is mirroring the rise of obesity in our nation.

The increase in overweight and obesity in our nation makes recruitment in the military more difficult, particularly because applicants must meet the maximum allowable weight standards in order to be eligible. The CDC administered the Third National Health and Nutrition Examination Survey (NHANES III) to a nationally representative sample of 17-20 year-olds and found that 13-18% of men and 17-43% of women exceeded the military weight standards, with higher percentages among women and ethnic minorities (Nolte, Franckowiak, Crespo, & Andersen, 2002). Therefore, many individuals who are overweight are either ineligible to join the military or must find a way to lose weight in order to attain eligibility. However, overweight and obesity are often chronic, lifelong conditions and overweight in childhood or adolescence has been shown to be predictive of overweight in adulthood (Field, Cook, & Gillman, 2005; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). The NHANES mobile examination center found that cardiorespiratory fitness level was lower among overweight than normal weight children and adolescents, and that 33% of 18-19 year-old men, and 41% of 18-19 year-old women did not meet cardiorespiratory fitness (i.e., VO_2 max) standards (Pate, Wang, Dowda, Farrell, & O'Neill, 2006). Considering that 80% of new recruits who exceed height and weight standards at entry are discharged before the end of their first enlistment (IOM, 2004), individuals who have a history of overweight prior to joining the military may have difficulty maintaining military weight and/or fitness

standards without appropriate education, prevention, and intervention efforts and resources in place.

In addition to negatively impacting health, fitness, mission readiness, and recruitment, overweight and obesity also negatively affect the economy. In 2003, the obesity-attributable costs in the United States totaled an estimated \$75 billion (Finkelstein, Fiebelkorn, & Wang, 2004). These costs also apply to the military healthcare system. The average annual inpatient cost for obesity-related diagnoses among military personnel was \$5.8 million between 1993 and 1998, with each obesity-related inpatient event was \$4,030 annually across all ages (Bradham et al., 2001). Among active duty Air Force personnel in 1997, the estimated weight-attributable costs of obesity totaled \$22.8 million (Robbins, Chao, Russ, & Fonseca, 2002). Annual direct costs (i.e., increased medical care) were estimated to be \$19.3 million, or 6% of annual active duty Air Force medical care expenditures. Estimated indirect costs (i.e., lost workdays) totaled \$3.5 million, or 28,351 workdays per year. Further, a review of Army data of obesity-related problems from 1995 to 1997 revealed that approximately 40% of involuntary discharges from the Army were the result of being overweight (James et al., 1997). In summary, cost-effective overweight and obesity prevention and intervention efforts are needed to help reduce both the health and economic burdens in the military as well as the civilian sector.

The Regulation

The regulation described below reflects the status of military weight management programs in the late 1990's, during which time the majority of research in this area was conducted. Although each service differs in their specific weight requirements and

program implementation, the programs are comparable to one another, as they were all derived from DoD Directive 1308.1 (U.S. Department of Defense, 1981).

Military personnel are required to have their weight and/or body composition assessed at least annually (or semiannually, depending on the branch of service), as well as prior to a promotion, reenlistment, attending professional military education, or a change in duty station. Military personnel who exceed the maximum allowable weight for their branch of service, gender, age, and height undergo a body fat assessment. Additionally, commanders and supervisors can order a body fat assessment for a member who appears to exceed body fat standards, does not present a professional military appearance, or as directed by the unit commander. For example, according to the former Air Force Instruction 40-502, Air Force personnel under age 30 must not exceed a body fat standard (BFS) of 20% for males or 28% for females. Air Force personnel ages 30 and over must not exceed a BFS of 24% for males or 32% for females (U.S. Department of the Air Force, 1994). The body fat assessment involves utilizing the circumferential measurement technique using a Gulick tape measure (U.S. Department of the Air Force, 1994). For men, the circumference value is obtained by subtracting the neck measurement from the abdominal measurement. For women, it is obtained by subtracting the neck measurement from the sum of the waist and buttocks measurements. The circumference value is then compared to the individual's height for his or her gender to obtain body fat percent. No action is taken if a military member exceeds his/her maximum weight but is within body composition standards. Members who exceed the body composition standards and receive a medical clearance (i.e., no underlying

causative condition or disease is found) are enrolled in their service's Weight Management Program (WMP).

Implementation

As mentioned above, each military service has its own WMP. Upon enrollment into the Air Force WMP, personnel undergo a 3-month exercise and dietary period before entering the first phase of the program (U.S. Department of the Air Force, 1994). In Phase I of the WMP, members consult with a nutritionist, receive a pamphlet on healthy eating, and maintain a food diary and exercise log to teach self-monitoring. Personnel remain in Phase I until they are at or below their maximum BFS. At this time, members enter Phase II, in which they are weighed monthly and must maintain a BFS within standards for six consecutive months. Once this requirement is met, members have a 1-year probation period in which they can be weighed at any time. Personnel are encouraged, but not required, to return to the nutritionist and follow-up classes during this period.

Consequences

Entrance into the WMP leads to administrative actions that essentially put one's military career on hold, including ineligibility for promotion, reenlistment, change in duty station, or professional military education. Further administrative actions, including discharge or separation from the military, can be taken if the member fails to make adequate progress. For example, Air Force members enrolled in the WMP must decrease their body fat by 1% each month or lose at least 5 pounds per month or 3 pounds per month for men and women, respectively (U.S. Department of the Air Force, 1994). Thus, the ramifications of being enrolled in the WMP may be harmful for one's career. As a

result, some military members engage in extreme dieting and weight loss behaviors in attempt to remain within standards, particularly around times of weigh-ins and physical readiness testing. Chronic dieting and frequent “crash dieting” (i.e., intense use of weight control behaviors in order to lose a large amount of weight rapidly) may compromise one’s nutritional status, fitness level, performance, and operational readiness (Institute of Medicine, 1998), which ironically is in contrast to the intent of the WMP.

Prevalence of Eating Disorders

Prevalence of Eating Disorders in the General U.S. Population

To date, there are no nationally representative data regarding the prevalence and demographic distribution of eating disorders in the United States (Striegel-Moore & Smolak, 2001). The estimated prevalence of eating disorders in the general U.S. female population is 0.5% for Anorexia Nervosa (AN), 1-3% for Bulimia Nervosa (BN), and 0.7-4.0% for Binge Eating Disorder (BED; American Psychiatric Association, 2000). The gender distribution of eating disorders appears to vary depending on the particular eating disorder under investigation (Fairburn & Brownell, 2002). Whereas the female to male ratio for bulimia nervosa and anorexia nervosa is 10:1, the female to male ratio for binge eating disorder is only 2.5:1 (Jacobi, Hayward, Zwaan, Kraemer, & Agras, 2004). The National Comorbidity Replication, which involved administering the World Health Organization Composite International Diagnostic Interview (CIDI) to a nationally representative sample of 9,282 individuals, found slightly lower prevalence rates of eating disorders than described above (Hudson, Hiripi, Pope, & Kessler, in press). The CIDI generates diagnoses according to DSM-IV criteria. According to this study, lifetime prevalence estimates of DSM-IV AN, BN, and BED were 0.9%, 1.5%, and 3.5%

among women, and 0.3% 0.5%, and 2.0% among men (Hudson et al., in press). Eating Disorder Not Otherwise Specified (Eating Disorder NOS) is the most common eating disorder diagnosis, which is given to approximately 25-50% of patients with eating disturbances, as compared to 3-30% of the general U.S. population (McNulty, 2001; Striegel-Moore & Smolak, 2001).

Gender and Age

As mentioned above, the overall prevalence of eating disorders is higher among females than males. In fact, this gender difference has been observed in both clinical and nonclinical populations (Jacobi et al., 2004). In terms of age, the peak onset of eating disorders appears to be during adolescence and early adulthood (Stice, Killen, Hayward, & Taylor, 1998a).

Race/Ethnicity

The prevalence of eating disorders appears to vary by the population being studied. For example, eating disorders have been found to be more prevalent in industrialized societies (where food is abundant and attractiveness is linked to being thin) than in developing countries (American Psychiatric Association, 2000). Additionally, the prevalence of eating disorders varies within each racial/ethnic group. Compared with Caucasians, Native Americans have higher rates, Hispanics appear to have similar rates, and African Americans and Asians have lower rates (Crago, Shisslak, & Estes, 1996; Jacobi et al., 2004). Although eating disorders are more common among Caucasian women than African American women (Striegel-Moore et al., 2003), African Americans have comparable rates of binge eating as Caucasians (Jacobi et al., 2004). Similar to gender, the racial/ethnic distribution of eating disorders appears to vary by type of eating

disorder (Fairburn & Brownell, 2002). For example, BED is more common among racial/ethnic minorities than AN or BN, suggesting that the cultural and biological factors involved in BED may differ from those in AN or BN (Fairburn & Brownell, 2002).

It is important to note that acculturation (i.e., assimilation of a culture different from one's own to the majority culture) is positively associated with eating disorder symptoms among ethnic minorities (Davis & Katzman, 1999; Jacobi et al., 2004). In a study assessing the prevalence and correlates of chronic dieting among an ethnically diverse sample, higher acculturation was associated with chronic dieting (Cachelin & Regan, 2006). In another study, African American women with a greater degree of assimilation of values and beliefs associated with a white identity were more likely to demonstrate dietary restraint, fear of fatness, and drive for thinness, which are risk factors for developing eating disorders (Abrams, Allen, & Gray, 1993). Further, a study by Perez and colleagues found that minorities with acculturative stress (i.e., the stress of adapting to a new culture) strengthened the relationship between body dissatisfaction and bulimic symptoms, whereas the absence of acculturative stress was not predictive of bulimic symptoms (Perez, Voelz, Pettit, & Joiner, 2002). In summary, the prevalence of eating disorders appears to differ by race/ethnicity, acculturation, and type of eating disorder.

Prevalence of Eating Disorders Among Subpopulations

The prevalence of eating disorders within the United States seems to vary depending on the subpopulation being studied. For example, eating disorders are more common among athletes than among the general U.S. population (Lauder, Williams, Campbell, Davis, & Sherman, 1999). Approximately 15-62% of athletes have eating

disorders, with a higher prevalence among athletes in sports that emphasize leanness, such as wrestling, gymnastics, and dancing (Lauder et al., 1999). In addition to the biological, psychological and sociocultural pressures in the general population, athletes may be at increased risk because of additional athletic pressures, including pressures and desires to optimize performance, pressures to meet weight and body fat goals (in sports that emphasize leanness), and expectations of high achievement (Lauder et al., 1999). According to Beals and Manore (1994), chronic dietary restriction and/or inadequate micronutrient intake combined with excessive exercise could decrease athletic performance and oxygen consumption (VO_{2max}) up to 28%, at least in the short term. Further, inadequate caloric intake also may result in chronic fatigue, increased risk of infection, delayed healing and recovery from an injury, anemia, electrolyte imbalances, endocrine abnormalities, cardiovascular changes, and osteoporosis (Beals & Manore, 1994). Finally, chronic dieting may lead to psychological consequences, including depression, increased obsession with food and weight, and may lead to more serious clinical eating disorders.

In addition to athletes, the prevalence of eating disorders has been found to be high among college students (Fairburn & Beglin, 1990). An earlier longitudinal study of bulimic symptoms (i.e., binge eating) within friendship groups and sororities from the beginning to the end of an academic year found that rates of binge eating became 1) more similar within sororities than between sororities, and 2) correlated with rates of binge eating among the participant's friends (Crandall, 1988). This finding supports the social influence model of bulimic behaviors. A more recent study extended these findings by demonstrating that peer influence was greater among selected peers (i.e., friends) than

unselected peers (i.e., housemates) and nonpeers (i.e., the whole college population) over time (Zalta & Keel, 2006). More specifically, the association between bulimia scores and selected peers increased over time, whereas there was no association between 1) bulimia scores and unselected peers, or 2) bulimia scores and nonpeers. Zalta and Keel (2006) concluded that both social influence and social selection processes appear to play a role in the prevalence of bulimic behaviors among college students.

In addition to athletes and college students, military members also may be at greater risk of developing an eating disorder than the general U.S. population. Similar to college and boarding school students, military personnel are often embedded in a peer environment (e.g., during deployment, or when stationed on a ship), which may increase their risk of engaging in bulimic behaviors, depending on the nature of social selection and presence of social influence processes. In addition to any sociocultural pressures experienced as part of the American culture or military culture, military personnel may engage in disordered eating behaviors in order to avoid the consequences for failing to meet weight and body fat standards, which potentially could negatively impact their careers (Manore, 1996).

Prevalence of Eating Disorders Among Military Members

The prevalence of eating disorders among military members has been found to exceed that of the general U.S. population. McNulty (2001) conducted a descriptive, correlational study of the prevalence of AN, BN, and Eating Disorder Not Otherwise Specified (EDNOS) among 1,278 active duty service women in the Navy ($N = 443$), Air Force ($N = 355$), Marines ($N = 245$), and Army ($N = 235$). McNulty assessed eating and purging behaviors during semiannual body fat measurement and fitness testing periods

using an anonymous survey. It should be noted that participants were categorized as having AN, BN, Eating Disorder NOS (including BED) or no eating disorder according to the DSM-IV (American Psychiatric Association, 1994) criteria using only the survey answers; no clinical interview was administered. For example, a diagnosis of BN was given if the individual endorsed purging at least twice a week and binge eating at least once per week. Prevalence rates for eating disorders among female military members as defined by the survey and DSM-IV criteria are as follows: 1.1% AN, 8.1% BN, 62.8% EDNOS, and 28% no eating disorder (McNulty, 2001). These estimated prevalence rates are likely inflated because no diagnostic interview was conducted to minimize the occurrence of false positives (Fairburn & Beglin, 1994; Wilfley, Schwartz, Spurrell, & Fairburn, 1997).

A study by Lauder and colleagues (1999) improved on McNulty's (2001) methodology by incorporating a clinical interview by a board-certified psychiatrist using DSM-IV criteria for individuals scoring in the at-risk range of the Eating Disorder Inventory (EDI; Garner, 1991). One hundred forty-two (8%) of the 423 active duty Army women who completed the survey met EDI screening criteria for being at risk for an eating disorder (Lauder et al., 1999). The at-risk portion of the sample was defined as participants who 1) reported using weight control behaviors more than once a month for at least three months, 2) reported using weight control behaviors more than two times per week at their worst in the last two years, or 3) receiving a drive for thinness EDI subscale score of 14 or higher, a bulimia EDI subscale score of 10 or higher, or a body dissatisfaction EDI subscale score of 16 or greater with a BMI less than 21. Members found to be at-risk then underwent diagnostic interviews with a board-certified

psychiatrist. Based on the interview, participants were diagnosed with one of the following disorders, according to DSM-IV criteria: 1) no eating disorder, 2) AN, 3) BN, 4) BED, 5) EDNOS, or 6) Situational Eating Disorder (SITED; i.e., eating behaviors that were practiced intermittently in response to external stressors or pressures, including anticipation of military weigh-ins, physical fitness testing or deployment). A total of 142 out of the 423 participants (33.6%) were determined to be “at risk” for an eating disorder and underwent an interview. Among the 142 women interviewed, 33 (8% of the total sample) were diagnosed with an eating disorder, which exceeds the rate in the general population. Among the subgroup of participants who met criteria for an eating disorder, the distribution was as follows: 2% AN, 9% BN, 15% BED, 33% EDNOS, and 39% SITED.

Although no service-wide study to date has examined the prevalence of eating disorders of male military members, McNulty (1997b) conducted a survey with 4,800 Navy men (76.3% enlisted) assigned overseas on ships and within the continental U.S. hospitals and clinics. The results yielded the following prevalence rates: 2.5% AN, 6.8% BN, 40.8% Eating Disorder NOS, and 49.9% no eating disorder (McNulty, 1997b). These rates are comparable to McNulty’s study on the prevalence of eating disorders of female Navy nurses (1.1% AN, 12.5% BN, 36% EDNOS, and 50.4%; (McNulty, 1997). Interestingly, the prevalence of eating disorders among males and females were found to be comparable, with about 50% of Navy personnel not exhibiting eating disorder behavior. It is possible that pressure for both sexes to meet weight requirements may explain the similar rates in use of weight control behaviors. Although larger scale and more methodologically rigorous studies regarding the prevalence of eating disorders in

the military are needed, it appears that male and female military members are engaging in at least occasional disordered eating behaviors that are in excess of that in the general U.S. population.

Prevalence of Weight Control Behaviors Among Military Members

Military members have been found to engage in binge/purge behaviors in order to attempt weight reduction, including fasting, binge eating, diet pills, exercise, laxatives, diuretics, and self-induced vomiting. McNulty (2001) found a 37.2% prevalence of routine use of various binge/purge behaviors among female military personnel, including, 22.7% fasting, 12% binge eating, 14.7% diet pills, 4.5% laxatives, 3.8% diuretics, and 2.8% self-induced vomiting. The prevalence of binge/purge behaviors among military members has been found to increase prior to the annual or semiannual physical readiness test (PRT) to the following: 32.6% fasting, 22% binge eating, 18% diet pills, 9.7% laxatives, 7.1% diuretics, and 3.3% self-induced vomiting.

Another study examined the prevalence and distribution of weight control behaviors used by 423 active duty Army women. The distribution of weight control behaviors endorsed by the sample were: 54.5% binge, 42.4% diet pills, 24.2% laxatives, and 21.2% diuretics, and 28.1% self-induced vomiting. Individuals classified as “at risk” of an eating disorder primarily engaged in diet pills (34.3%) or binge eating (20.8%) behaviors. Fifty-nine percent of individuals diagnosed with an eating disorder and 29% of “at-risk” individuals reported a moderate to extreme amount of pressure from a pending physical fitness test influencing their eating behaviors.

An estimate of service-wide prevalence of weight control behaviors among male military members is currently unknown. According to McNulty’s (1997b) survey of

4,800 male Navy personnel, the prevalence of current weight control behaviors was 14.7% fasting, 3.5% diet pills, 3.4% laxatives, 2.1% diuretics, 3.7% self-induced vomiting, and 58.6% none. Again, these prevalence rates increased prior to a PRT to 30.1% fasting, 14.9% diet pills, 14.4% laxatives, and 15% diuretics, and 15% self-induced vomiting. Interestingly, only 5% of the sample reported exceeding the 22% body fat standard (63% reported less than 18% body fat, and 32% reported an 18-22% body fat). This latter statistic suggests that many of these men are either 1) unnecessarily engaging in weight control behaviors, or 2) successful in meeting weight standards by engaging in these behaviors. According to the basic learning principle of positive reinforcement (Skinner, 1953), members who are successful in meeting standards by engaging in these behaviors are likely to engage in them in the future.

A recent anonymous survey completed by 489 active duty personnel assigned to the Naval Medical Center in Portsmouth, New Hampshire in 2002 corroborated the above findings (Carlton, Manos, & Van Slyke, 2005). The respondents were mostly Caucasian (70%), male (57%) officers (74%), with an average age of 35. Ten percent of the sample endorsed binge eating at least twice a week for the past three months and 11% reported experiencing a loss of control over eating. The prevalence of purging behaviors were as follows: 25% fasting, 18% diet pills, laxatives, or diuretics, 5% self-induced vomiting, and 15% exercising more than once a day. Twenty-four percent of the respondents reported undergoing a strict diet within two months prior to physical fitness testing, and 67% of individuals who had endorsed purging behaviors reported using them in those two months prior to the physical fitness testing. Eighteen percent of the sample reported a minimum of a 10-pound weight change around physical fitness testing.

The Role of Demographic Factors

Given that the role of demographic factors in the prevalence of eating pathology varies depending on the subpopulation being studied (Fairburn & Beglin, 1990; Jacobi et al., 2004), it is important to examine the demographic factors associated with eating disorders and/or the use of weight control behaviors among military personnel. Identifying potential demographic risk factors may assist in prevention efforts by detecting characteristics of personnel who may be at increased risk for developing and engaging in disordered eating and weight control behaviors.

Gender

The demographic distribution of disordered eating and weight control behaviors in the military appears to differ from the general population by gender. As demonstrated in the McNulty (1997b) study, disordered eating and weight control behaviors are much more prevalent among men in the military compared to men in the general population. In fact, Navy men in this study had a higher prevalence of a diagnosis of AN and Eating Disorder NOS than Navy women in McNulty's (1997a) study. This high prevalence of disordered eating and weight control behaviors among men suggests that the culture of the military (i.e., occupational pressures created by weight standards and occupational stress of being in the military) may put personnel at a higher risk for developing these problems.

Service

It should be noted that with the exception of self-induced vomiting, Marine women had higher rates of all types of eating disorders and engaged in more weight control behaviors than the other services in the McNulty (2001) study. Thirty-eight

percent (49.3% during PRT cycles) of female Marines regularly practice fasting as a means of weight reduction, compared to about 20% in the other services. Exercise rates were also higher among Marine women. Half of Marine women exercise daily (versus 30% in the other services) and 13% exercised twice daily (compared to 2-4% in the other services). These differences may be due to more stringent weight and fitness standards in the Marine Corps than any other service. Additionally, it is important to note that the Marine Corps participants were younger on average than participants from the other branches of service in this study. This age difference may partially explain the higher prevalence of eating disorders among the Marine Corps participants, given that the onset of eating disorders tend to peak in late adolescence and early adulthood (Jacobi et al., 2004).

Age

Research examining the relationship between age and eating disorders among military members has been mixed. McNulty (2001) found that prevalence of BN decreases among military women as age increases, which supports Stice's research that found peak onset of eating disorders occurs among younger women (i.e., older adolescents and young adults; (Stice et al., 1998)). However, age was not significantly associated with prevalence of AN or EDNOS, which is contrary to the civilian literature (Jacobi et al., 2004; Stice et al., 1998a). McNulty (1997a) did not find any significant age differences among Navy men. Older military personnel are more likely to develop EDNOS than any other eating disorder (McNulty, 2001, 1997b). Given the high prevalence of EDNOS among older military personnel, it is possible that older personnel may engage in weight control behaviors in order to meet weight standards, given the

higher prevalence of overweight and obesity among older military personnel than younger military personnel (Bray et al., 2006; Carlton et al., 2005) and the positive association between BMI and purging behaviors (Carlton et al., 2005).

Rank

Similar to age, the association between rank and disordered eating and weight control behaviors is mixed in the literature. McNulty (2001) found that AN and BN were more common among enlisted members than officers. However, no significant differences in weight control behavior use by rank were found in the McNulty (1997a) study. Interestingly, a study of Army reservists, more enlisted (12%) than officers (3.8%) report being denied attendance to military schools due to excess body weight (Sweeney & Bonnabeau, 1990). Therefore, it is possible that differences in how enlisted and officer personnel are treated partially account for differences in weight control behaviors by rank.

Race/Ethnicity

Only one study to date has examined the racial/ethnic distribution of risk factors for disordered eating (i.e., frequent weight concerns and dieting) in the military. Haddock and colleagues administered a 53-item questionnaire to 32,144 Air Force recruits who completed basic military training between August 1995 and August 1996 (Haddock et al., 1999). The average age of the sample was 19.9 years (SD = 2.3). Most of the participants were single (82.8%), male (74.4%), and Caucasian (68%). Caucasian and Hispanic women were the most frequent dieters and African American women reported dieting the least. This finding supports eating disorder research conducted in the general U.S. population suggesting that Hispanics appear to have similar rates of eating

disorders to Caucasians and African Americans tend to have high rates of BED (Jacobi et al., 2004; The McKnight Investigators, 2003). Haddock et al. (1999) also found that African American men dieted less frequently than all other ethnic groups. Interestingly, Hispanic American men and male participants who labeled their ethnic identity “Other” dieted more than all ethnic groups, including Caucasian men. It is not known how this demographic distribution compares to recruits in other services. Further, the question remains as to whether weight concerns and dieting behaviors increase over time across all racial/ethnic groups as a result of the unique pressures of military culture. Prospective, longitudinal studies are needed to answer this question.

Personal and Family History of Eating Disorder

McNulty (2001) examined the association between previous history of an eating disorder and current diagnosis of AN, BN, or EDNOS. Only 4.1% of the women in the sample reported having a preexisting diagnosis of AN or BN. She found that 52% of the women who met the criteria for AN had no family history of AN or BN and 20% of women who met the criteria for AN were uncertain of their family history. Sixteen percent of the women who met criteria for BN had a positive family history of an eating disorder, and no significant correlation was found between women in the Eating Disorder NOS category and family history. Among individuals who currently met criteria for AN or BN, only 14% had a history of an eating disorder during adolescence. McNulty’s (1997a) study found that whereas 48% of the nurses sampled currently reported using one or more weigh control behaviors, only 5.7% had an eating disorder during adolescence, and only 3.3% entered active duty with a pre-existing eating disorder. Carlton et al. (2005) found that even though about 33% of a naval hospital active duty sample endorsed

abnormal eating and weight-loss behaviors, only 2% had been previously diagnosed with an eating disorder. These rates of having a pre-existing eating disorder are lower than that found in the civilian literature. In a study of adult women diagnosed with either BN ($n = 138$) or subclinical BN ($n = 57$), the women who were diagnosed with BN had a greater lifetime history of AN (26.8%) than women who were diagnosed with subclinical BN (12.3%; le Grange et al., 2006). Among a sample of 333 patients with AN, 7% had a history of BN (Santonastaso, Zanetti, De Antoni, Tenconi, & Favaro, 2006). It is possible that the lower rates of prior history of an eating disorder in the McNulty (2001) study are partially due to the fact that the majority of participants diagnosed with an eating disorder were diagnosed with EDNOS. Even still, the rates of a previous eating disorder in McNulty's study appear to be lower than that found in the civilian literature (le Grange et al., 2006).

Unfortunately, the prevalence of general psychiatric history in families and the prevalence of personal psychiatric history were not assessed in the McNulty (1997a, 2001) or Carlton et al. (2005) studies. Research in the general U.S. population has found that in addition to eating disorders, affective disorders and certain anxiety disorders (i.e., general anxiety disorder, obsessive compulsive disorder, and panic disorder) are elevated among individuals with an eating disorder as well as relatives of people with AN and BN (Jacobi et al., 2004). Had McNulty (2001) and Carlton et al. (2005) assessed general family psychiatric history and personal psychiatric history, it is possible that the association between family and personal psychiatric history and presence of an eating disorder would have been stronger. Nonetheless, the data of these two studies suggest

that aspects of the military culture may put both women and men at increased risk for developing an eating disorder, even in the absence of a pre-existing eating disorder.

Behavioral and Psychosocial Factors Associated with Eating Disorders

McNulty's (1997a) study of female Navy nurses revealed that current and past behaviors of binge eating, skipping meals, excessively exercising, and laxative use were associated with a diagnosis of AN, BN, or EDNOS. In terms of psychosocial correlates, poor body perception, poor body satisfaction, being taller (for AN) and weighing more (for BN) were associated with an eating disorder diagnosis among female Navy nurses (McNulty, 1997a). Additionally, working in an undesired area, working in an intensive care unit, rotating shifts, and being a staff nurse were associated with multiple episodes of eating disorder behaviors (McNulty, 1997a). Among Navy men, prior history of AN or BN, family history of AN or BN, current laxative use, failure to be selected for military school or a particular job, and vomiting for weight and fitness evaluations were associated with an eating disorder diagnosis after controlling for age and rank (McNulty, 1997b). Collectively, these findings suggest that occupational stressors may play a role in the development and/or maintenance of eating pathology. Further prospective research conducted among more representative samples with different job types should be conducted to further explore the role of occupational stressors unique to the military.

The Role of Military Stressors

Several studies have examined the association between military stressors and disordered eating behaviors. Lauder and colleagues (1999) found that a pending weigh-in, physical fitness test, or deployment were associated with disordered eating behaviors. Among Navy men surveyed, being assigned to a ship or submarine, rotating shifts,

nonavailability of low-fat meals, and no time for exercise during duty hours were associated with disordered eating behaviors (McNulty, 1997b). In a survey administered to a medical Army reserve unit (Sweeney & Bonnabeau, 1990), participants reported engaging in weight control behaviors prior to 1) an upcoming biannual unit weight measurement (71.4%), 2) monthly weigh-ins in the weight control program (28.6%), and 3) reporting to a military school (40.7%). Interestingly, few individuals were actually denied access to school due to exceeding military weight standards (9.4%). Further, although most respondents reported being within weight standards (83.3%), nearly half of these individuals (42%) expressed a desire to lose weight, sometimes as much as 20 pounds.

Themes of Self-Regulation and Eating: What Leads to Dysregulation?

Restraint Theory

Restraint is defined as a cognitive effort to resist the physiological urge to eat (Ruderman, 1986). The degree to which people exercise restraint varies from one individual to the next along a continuum. At one end of the continuum are restrained eaters, who constantly worry about what they eat and struggle to diet and resist food. At the other end of the continuum are unrestrained eaters, who eat freely as desired (Ruderman, 1986). According to restraint theory (Polivy & Herman, 1985), cognitive factors (i.e., cognitive controls) play a more important role in determining food intake than physiological factors (i.e., physiological hunger). However, in the presence of a cognitive disinhibitor (e.g., the perception that a dietary rule has been violated or is about to be violated), physiological controls can take over, which results in counter-regulatory eating (i.e., overeating or binge eating). In addition, weight loss and starvation result in

an increased preoccupation with food, which is believed to lead to dichotomous thinking (i.e., discriminating “good” diet foods from “bad” diet-breaking foods). This dichotomous thinking may manifest dichotomous behavior (i.e., dieting or binge eating; Polivy & Herman, 1985). In support of the relationship between dieting and binge eating among military members, research has shown that the frequency of binge eating increases around times of weigh-in or physical readiness testing, which is when military members tend to increase their dieting and weight control behaviors (McNulty, 199b, 2001). In summary, restraint theory proposes that the relationship between dieting and binge eating is mediated by the dieter’s use of cognitive controls (i.e., dietary restraint; Polivy & Herman, 1985).

However, more recent research proposes that the influence of restraint on eating behavior depends on dieting status. Lowe and Timko (2004) observed that restrained dieters (i.e., restrained eaters who were currently dieting) actually decreased their eating behavior following a preload, even though they had higher restraint scores than unrestrained dieters and unrestrained nondieters. This finding opposes restraint theory, which would predict that all restrained eaters would engage in counter-regulatory eating behavior following a preload. Instead, it appears that restrained eaters who are currently dieting may have a lower vulnerability to counter-regulatory eating behavior (at least for a short period of time) compared to restrained eaters who are not currently dieting (Lowe & Timko, 2004).

A Definition of Dieting

The term dieting can take on numerous meanings (Brownell & Rodin, 1994). Therefore, it is important to define the term when conducting research. Stice (2001)

defines dieting as “intentional efforts to achieve a desired weight by effecting a negative energy balance between calorie intake and expenditure.” He distinguishes dieting from dietary restraint by explaining that dietary restraint refers to “a tendency to oscillate between periods of caloric restriction and overeating” (Stice, 2001).

However, it is possible that this definition of dieting is not specific enough. Brownell and Rodin (1994) point out that dieting approaches differ from one another and that dieting encompasses many combinations of behavioral changes in food intake, physical activity, and lifestyle. In addition to behaviors, dieting can include cognitions, such as preoccupation with shape and weight, perceived deprivation, and dysfunctional beliefs about food and exercise (Brownell & Rodin, 1994). Importantly, various measures of restraint (i.e., dieting cognitions) have been shown to be uncorrelated with caloric intake (Stice, Fisher, & Lowe, 2004). Thus, it is important to specify and evaluate behaviors and cognitions when operationally defining and conducting research on dieting (Brownell & Rodin, 1994). One study assessing differences in food preferences, dietary intake and physical activity in dieters and nondieters found that the measures of dieting were only weakly related to behaviors thought to indicate dieting, suggesting that more precise measures of dieting are needed (French, Jeffery, & Wing, 1994).

Lowe and colleagues have proposed three subtypes of dieting: current dieting (i.e., people who are currently dieting in order to lose weight), former dieting (i.e., people who have dieted to lose weight in the past but who are not currently dieting), and weight suppression (i.e., significant diet-induced weight loss, operationalized as the discrepancy between a person’s highest weight and current weight) (Lowe, 1993). Recent studies have demonstrated that type of dieting prospectively predicts different amounts of weight

re-gain over time, suggesting that there are differences in eating behavior/caloric intake depending on type of dieting (Lowe et al., 2006).

There has been disagreement in the literature as to whether or not dieting leads to bulimic pathology (Stice, 2002). In a recent study, a sample of female adolescents who underwent a healthy weight maintenance diet experienced a decrease in bulimic symptoms (Stice, Presnell, Groesz, & Shaw, 2005). Similarly, in his 1998 meta-analysis described above, Stice concluded that dieting attenuates overeating tendencies and is therefore not a risk for eating pathology. It is possible that unhealthy dieting behaviors (e.g., meal skipping and laxative use) lead to more severe bulimic pathology whereas healthy dieting behaviors (i.e., exercise and eating in moderation) do not. Alternatively, some researchers have proposed that engaging in bulimic behaviors may lead to restraint, as opposed to restraint leading to bulimic behaviors (Lowe & Kral, 2006). Lowe and Kral (2006) posit that restraint may be a response to a positive energy balance (i.e., weight gain) as opposed to a cause of overeating or weight gain.

Dieting and Weight Gain

Dieting has been shown to predict weight gain in adulthood (French et al., 1994). In a prospective community study that followed 692 female adolescents for four years, elevated dieting and radical weight loss efforts predicted greater growth in relative weight and an elevated hazard for the onset of obesity compared with adolescents who did not report using these efforts (Stice, Cameron, Killen, Hayward, & Taylor, 1999). More specifically, after controlling for baseline BMI, elevated incidental exercise, use of appetite suppressants and laxatives, vomiting and binge eating predicted an increased growth in weight over the study period. Similarly, in a study of children ages 6-12 who

were at risk for obesity, binge eating and self-reported dieting predicted increases in body fat mass over an average of 4.2 years (Tanofsky-Kraff et al., 2006). In another prospective study, Field and colleagues found that dieting predicted weight gain over a two-year period among both boys and girls ages 9-14, whereas binge eating predicted weight gain only among boys (Field et al., 2003). Collectively, these findings suggest that unhealthy dieting efforts may lead to weight gain whereas healthy weight loss efforts do not. Other factors shown to be associated with weight gain include having a history of weight loss dieting and higher weight suppression (i.e., discrepancy between highest and current weight) among a sample of 72 college females during freshman year (Lowe et al., 2006). Current dieters gained twice as much as former dieters and three times as much as women who had never dieted. However, this latter finding must be interpreted with caution and requires replication, given the small sample ($n = 7$) of current dieters.

There appear to be differences in factors associated with weight gain. Whereas weight and body mass have been shown to be related to weight gain in men, weight and higher restraint scores appear to be associated with weight gain in women (Klesges, Isbell, & Klesges, 1992). However, dieting status may impact the association between restraint and weight gain among women, in that restrained eaters who are not currently dieting gain weight while restrained eaters who are currently dieting do not gain weight (Lowe & Timko, 2004). In fact, dieting status may impact the association between restraint and weight gain among military women, given the external pressure to meet and maintain weight standards. More specifically, restrained military women who are currently dieting may lose weight, while restrained military women who are not currently

dieting may gain weight. Alternatively, dieting may simply be a marker of overweight among military personnel (i.e., dieting comes along with being overweight).

The Dual-Pathway Model of Bulimic Pathology

One model that has attempted to explain the onset of bulimic behaviors is the Dual-Pathway Model of Bulimic Pathology depicted in Figure 2 (Stice, Nemeroff, & Shaw, 1996). This model posits that thin ideal internalization and elevated pressure to be thin (from family, peers and the media) produces body dissatisfaction. In turn, body dissatisfaction fosters dietary restraint and negative affect. Dietary restraint is believed to lead to negative affect due to caloric deprivation and feelings of failure from weight control efforts. The presence of dietary restraint, negative affect, or both can then increase the risk for bulimic symptoms (Stice, 2001). Dietary restraint is believed to increase the risk for bulimic symptoms through binge eating because 1) individuals may binge eat in order to counteract the effects of caloric deprivation from dieting and 2) individuals may binge eat because breaking a strict dietary rule(s) can lead to disinhibited eating, known as the abstinence-violation effect (described below). Similarly, negative affect may lead to bulimic symptoms because binge eating may provide comfort and distraction from negative emotions. The model was later revised (see Figure 3) by excluding body mass, and substituting “ideal-body internalization” with “thin-ideal internalization” (i.e., using a more current version of the measure). He also substituted “dietary restraint” (i.e., reflecting an oscillation between periods of caloric restriction and overeating and measured using the diet factor of the Eating Attitudes Test and the weight control subscale from the BULIT-R) with “dieting” (i.e., intentional efforts to lose weight

by creating a negative energy balance and measured using the Dutch Restrained Eating Scale; Stice, 2001).

Empirical Support for the Dual-Pathway Model

To garner empirical support for the Dual-Pathway Model of Bulimic Pathology, Stice (2002) conducted a meta-analysis of relevant prospective and experimental studies. The analysis revealed support for body mass as a risk factor for pressure to be thin, body dissatisfaction and dieting, but not for negative affect or eating pathology. He concluded that body mass may promote the risk factors for eating pathology as opposed to fostering disordered eating itself (Stice, 2002). However, the findings did implicate perceived pressure to be thin and internalization of the thin ideal as risk factors for body dissatisfaction, dieting, negative affect and bulimic pathology. Body dissatisfaction emerged as one of the most consistent and robust risk and factors for bulimic pathology and also as a risk factor for dieting and negative affect. Negative affect was found to be a risk factor for eating pathology, body dissatisfaction, caloric intake, and binge eating among individuals with an eating disorder. Although prospective studies suggested that self-reported dieting is a risk factor for negative affect and bulimic behavior, Stice (2002) concluded that dieting was not a risk factor for eating pathology. In contrast to this finding, three prospective, independent studies of adolescent girls found that perceived pressure to be thin, thin-ideal internalization, body dissatisfaction, dieting, and negative affect predicted the onset of bulimic pathology (Stice & Agras, 1998; Stice et al., 1998a; Stice, Presnell, & Spangler, 2002). Other prospective studies by Killen and colleagues found that weight concerns (i.e., fear of weight gain, worry over weight and shape, importance of weight, diet history, and perceived fatness) predicted the onset of eating

disorder symptoms among young adolescent females over a three-year period (Killen et al., 1994) and among 9th grade females over a four-year period (Killen et al., 1996). A prospective study that followed a multiethnic sample of 1,103 girls in grades 6-9 found that thin body preoccupation and social pressure (i.e., media modeling, concern with weight/shape, peer concern with thinness, social eating, dieting behaviors, and weight teasing by peers) predicted the development of a partial or full-syndrome eating disorder within a three-year period (The McKnight Investigators, 2003).

The Application of the Dual-Pathway Model to Other Populations

Most of the support for the Dual-Pathway Model has been obtained with samples predominantly consisting of white, female adolescents. The application of this model to other populations (e.g., minority females, white males, and older persons) remains to be tested. Given 1) the high prevalence of disordered eating and weight control behaviors among both women and men in the military described above, and 2) the unique pressures of maintaining a military appearance and weight and fitness standards, it is possible that this model can be tailored and applied to a military population. Whereas BMI has been shown to be a risk factor for pressure to be thin, body dissatisfaction, and dieting, it has not received much support as risk factor for eating pathology or negative affect (Stice, 2002). However, BMI may be a risk factor for bulimic behaviors among military personnel who are subjected to meeting weight and body fat standards. In support of this hypothesis, Carlton et al. (2005) found a positive correlation between higher BMI and weight control behaviors purging in a Navy sample consisting of primarily Caucasian (79%) officers (74%) with a mean age of 35.9 and an average of 11 years time in service. Abnormal eating patterns and anxiety about the physical fitness assessment increased

significantly at a BMI of 27.7. Further, military members with a higher BMI were more likely to be dissatisfied with their body image (as measured by the Body Dissatisfaction EDI subscale), which supports the potential application of the Stice (1996) model to a military population. While 53% of the sample reported being dissatisfied with their body appearance, women had a higher body dissatisfaction score than men (5.8 ± 5.4 vs. 4.1 ± 4.1 , $p < .001$), and women were more likely to report they were not satisfied with their appearance than men (61% vs. 46%, $p = .001$). Body dissatisfaction was correlated with both abnormal eating behaviors and worrying about passing their physical fitness assessment. Among respondents who were worried about passing their physical fitness assessment, 28% percent were worried about failing due to excess body weight.

Another study of 310 Army Reserve Officer Training Corps (ROTC) female cadets undergoing a summer training at Fort Lewis, Washington found that 20% of the cadets practiced abnormal eating behaviors and were at risk for developing an eating disorder (Lauder & Campbell, 2001). These cadets had significantly higher Body Dissatisfaction, Bulimia, and Drive for Thinness EDI subscale scores compared to cadets not at risk. The results of this study add further support for the potential application of the Stice (1996) model to a military population.

Summary and Future Directions

Research has demonstrated that disordered eating and bulimic behaviors are prevalent in the military and may in fact exceed the rates in the general U.S. population (McNulty, 1997a, 1997b, 2001). As many as 37.2% of military women and 50% of military men routinely engage in bulimic behaviors, and these percentages increase at times of weigh-ins and physical fitness testing (McNulty, 1997b, 2001). Research on

eating disorder pathology in the military has almost exclusively focused on prevalence rates of eating disorders and weight control behaviors. These excessive prevalence rates suggest that some military personnel may be engaging in these unhealthy behaviors in order to meet military weight and fitness standards.

Because research has primarily focused on prevalence rates, little is known about factors associated with engaging in maladaptive weight control behaviors. Although a handful of factors may be shown to be associated with weight control behaviors among military personnel, research to date has not proposed or tested an existing theoretical model in attempt to understand how weight control behaviors are developed and maintained among military members. It would be important for future research to test an existing model, such as the Dual-Pathway Model of Bulimic Pathology (Stice, 2001; Stice et al., 1996), in a military population, which would help identify common and unique mechanisms underlying eating pathology in this population. Furthermore, it is crucial to examine potential demographic, psychological, and weight-related predictors of weight control behaviors among military personnel in order to inform prevention and intervention efforts.

Study Purpose and Rationale

Although the use of maladaptive weight control behaviors appears to be highly prevalent in the military, no study to date has attempted to empirically identify personnel at risk for engaging in such behaviors. Further, no study involving a military sample has formulated or tested a theoretical model to examine predictors for engaging in weight control behaviors. The purpose of this study is to identify demographic, psychological, and weight-related correlates of maladaptive weight control behaviors as well as describe

the extent to which use of these behaviors may be considered pathological. Findings from this project may be useful in informing prevention and intervention efforts to decrease maladaptive eating and weight control behaviors among military personnel.

Specific Aims and Hypotheses

This study has three specific aims. First, to examine demographic, psychological, and weight-related factors associated with the use of maladaptive weight control behaviors among active duty military personnel prior to weigh-in/physical readiness testing. Second, to determine the goodness of fit of an adapted version of the Dual-Pathway Model of Bulimic Pathology (Stice et al., 1996). Finally, to describe the extent to which the use of weight control behaviors among military members may be considered pathological. These aims and corresponding hypotheses are described below.

Aim One: Psychosocial correlates of weight control behaviors.

1A. Demographic correlates of weight control behaviors. Based on prior research, several demographic variables are expected to be associated with engaging in maladaptive weight control behaviors.

1. *Gender.* Military women will be more likely than military men to engage in weight control behaviors.

2. *Age.* Given military research findings of positive associations between 1) age and BMI, and 2) BMI and weight control behaviors, age will be positively associated with use of weight control behaviors.

3. *Race/Ethnicity.* Racial/ethnic minority military personnel will be less likely than Caucasian personnel to engage in weight control behaviors.

4. *Body mass index.* BMI will be positively associated with weight control behaviors.

5. *Branch of service.* Marine Corps personnel will be more likely than Navy personnel to engage in weight control behaviors.

6. *Rank.* Enlisted military personnel will be more likely than officers to report engaging in weight control behaviors. This hypothesis is based on McNulty's (2001) finding that AN and BN were more common among enlisted members than officers, as well as Sweeney & Bonnaneau's (1990) finding that more enlisted (12%) than officers (3.8%) report being denied attendance to military schools.

1B. Psychological correlates of weight control behaviors.

7. *Disordered eating cognitions.* It is hypothesized that disordered eating cognitions will be positively associated with maladaptive weight control behaviors among military personnel. Disordered eating cognitions will be operationalized as the dietary restraint subscale of the Three Factor Eating Questionnaire (Stunkard & Messick, 1985), and drive for thinness, body dissatisfaction, and bulimia subscales of the Eating Disorders Inventory (Garner, 1991).

1C. Weight-related risk factors for weight control behaviors. Several self-reported weight-related factors are expected to be associated with increased risk for weight control behaviors. It is predicted that key weight-related risk factors will remain significant predictors of weight control behavior use after adjusting for demographic and psychological risk factors.

8. *Last weigh-in.* Given that the prevalence of weight control behavior use appears to increase at time of weigh-in/physical readiness testing (e.g., McNulty, 2001),

it is predicted that individuals who report trying to lose weight at last weigh-in will be more likely to use weight control behaviors than individuals who do not report trying to lose weight at last weigh-in.

9. *Worry.* It is hypothesized that worry about meeting weight standards at last weigh-in will be positively associated with weight control behavior use among military personnel. This hypothesis is based on the work of Carlton et al. (2005), which found a correlation between the use of weight control behaviors and worry about passing the physical fitness assessment.

10. *Exercise.* It is hypothesized that individuals who do not exercise consistently will be more likely than individuals who exercise consistently to engage in weight control behaviors.

Data Analytic Strategy for Aim One.

Point-biserial correlations and chi-squared analyses will be used to determine the initial association between each demographic factor (independent variables) and use of weight control behaviors (dichotomous dependent variable). To decrease the probability of making a Type I error, significance level for each chi-squared and correlation analysis of each demographic characteristic and the dependent variable will be adjusted downward as appropriate using the Bonferroni correction. For all other analyses, alpha level will be set at .05. A binary logistic regression will be conducted for each group of risk factors (i.e., demographic risk factors, psychological risk factors, and weight-related risk factors) and the dependent variable (i.e., weight control behaviors) in order to examine odds ratios when each risk factor is adjusted for by all the other risk factors in that group. A binary logistic regression that includes both demographic and psychological risk factors

(independent variables) and use of weight control behaviors (dependent variable) will be conducted to determine the extent to which psychological factors remain associated with weight control behaviors after adjusting for demographic factors. Finally, a binary logistic regression that includes all predictors (demographic, psychological, and weight-related risk factors) and the dependent variable (weight control behaviors) will be conducted to determine the extent to which weight-related factors remain associated with weight control behaviors after adjusting for demographic and psychological risk factors.

Aim Two: The Dual Pathway Model of Bulimia Nervosa in a military sample

The second aim of this study is to determine the goodness of fit of an adapted version of the Dual Pathway Model in a military sample (see Figure 4). Many of the indices used for the constructs in this model are modified from Stice's (2001) model based on measures that have been associated with disordered eating behaviors in military samples.

BMI. Stice (2001) removed BMI from his original model because it was not predictive of bulimic behaviors. However, BMI was used in the modified model, given the positive correlation between higher BMI and weight control behaviors in the military (Carlton et al., 2005).

Perceived pressure to be thin. Stice's (2001) construct of "perceived pressure to be thin" (i.e., pressure perceived from family, friends, dating partners, and the media to be thin) was substituted with "worry about meeting weight standards." The latter construct is believed tap into perceived pressures from military supervisors, commanders, and the organization as a whole, to lose weight in order to meet weight standards. Further, "worry about meeting weight standards" is believed to be an appropriate

substitution in the model because it readily applies to both men and women (regardless of race/ethnicity) in a military context, whereas “perceived pressure to be thin” primarily has been tested and applied to primarily Caucasian females (Stice et al., 1996; Stice, 2001).

Thin ideal internalization. Stice’s (2001) construct of “Thin-ideal internalization” (i.e., degree to which participants agree with 10 statements regarding what attractive women look like, as measured by the revised Ideal-Body Stereotype Scale) was substituted by the drive for thinness EDI subscale (which taps more into one’s desire to be thin or one’s fear of fatness; Garner (1991)). One could argue that both of these measures examine the extent to which an individual has a positive attitude toward thinness. Drive for thinness EDI subscale scores have been associated with weight control behaviors in military samples (Carlton et al., 2005; Lauder & Campbell, 2001; Lauder et al., 1999). Further, some research has shown that drive for thinness scores were higher for in-season than off-season high school male wrestlers (Dale & Landers, 1999), which suggests that this measure may be appropriate to use for males who are striving to lose weight (e.g., in order to make a lower weight category in wrestling, or to meet military weight standards).

Body dissatisfaction. Stice’s (2001) measure of body dissatisfaction (i.e., level of satisfaction with nine body parts as measured by an adapted version of the Satisfaction and Dissatisfaction with Body Parts Scale) was substituted with the Body Dissatisfaction EDI subscale. This measure of body dissatisfaction has been shown to be associated with disordered eating behaviors in military samples (Carlton et al., 2005; Lauder & Campbell, 2001; Lauder et al., 1999).

Dieting and dietary restraint. Stice's (2001) construct of dieting (i.e., frequency of dieting behaviors as measured by the Dutch Restrained Eating Scale) was substituted with a single question to assess dieting behavior prior to weigh-in (i.e., "At your most recent weigh-in, did you try to lose weight?" – yes or no). Lowe and colleagues propose that a single question (i.e., "Are you currently dieting to lose weight?" or "Have you ever been on a diet to lose weight?") to be a simple and valid means of determining the presence of current or past dieting behavior (Lowe et al., 2006). Additionally, both dietary restraint (as measured by the Revised Subscale of the Three Factor Eating Questionnaire) and dieting were included in the revised model in order to capture both the cognitive and behavioral aspects of dieting, respectively (Brownell & Rodin, 1994), especially considering that restraint scores are not necessarily correlated with caloric intake (Stice et al., 2004).

Negative affect. Because no measure of negative affect was included in the current study, the construct of negative affect was not included in this modified model.

Outcome measure: Bulimic symptoms. Stice (2001) used the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994) to measure bulimic symptoms (i.e., overevaluation of weight and shape, frequency of binge eating, and frequency of compensatory behaviors over the past 28 days). Because this study 1) does not have a measure of binge eating, and 2) is primarily concerned with discriminating between people who do and do not engage in weight control behaviors prior to a weigh-in, a dichotomous outcome measure (use of weight control behaviors prior to weigh-in – yes or no) was used.

The purpose of the second aim of this study is to determine the extent to which psychological factors (i.e., drive for thinness, body dissatisfaction and dietary restraint) and weight-related factors (i.e., BMI, dieting at last weigh-in, and worry about meeting weight standards at last weigh-in) are associated with weight control behavior use among military personnel. It is predicted that this modified version of the Dual Pathway Model of Bulimia Nervosa will fit a military population.

Data Analytic Strategy for Aim Two.

A binary logistic regression will be conducted to determine the goodness of fit of a modified version of the Dual Pathway Model of Bulimia Nervosa in a military population. The independent variables will be BMI, worry about meeting weight standards, drive for thinness, body dissatisfaction, dietary restraint, and dieting. The dependent variable will be weight control behaviors. Goodness of fit will be determined by the significance of the Hosmer and Lemeshow Test for which a non-significant finding indicates that the model is a good fit for the data. Because the Stice (2001) Dual Pathway Model for Bulimia Nervosa was originally intended for a female sample, another binary logistic regression adjusting for gender will be conducted to determine whether or not the goodness of fit of the model improves.

Aim Three: Is the use of weight control behaviors among military personnel pathological?

The third aim of this study is to describe the prevalence of pathological weight control behaviors among active duty military personnel.

3A. Problem Weight Control Behavior. First, a behavioral definition will be used to determine the percentage of personnel who endorse engaging in weight control behaviors

prior to weigh-in that approximates the duration and frequency requirements for an eating disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; APA, 2000). It should be noted that the way the duration was assessed in the Weight Management Study Questionnaire (see Appendix A), categories for duration of weight control behavior use included “two to three months,” as opposed to the ideal “three months” that would directly correspond with the DSM-IV-TR criteria for an eating disorder (APA, 2000).

3B. Self-Reported Eating and Weight Related Pathology. Second, a psychological definition will be used to determine the percentage of personnel who have EDI profiles similar to an eating disordered sample (i.e., number and percent of personnel who have at least two elevated drive for thinness (≥ 13), bulimia (≥ 9) and body dissatisfaction (≥ 16) subscale scores). These cut-offs are based on the general eating disorder profile in Gardner’s (1991) sample.

3C. Combined Behavioral and Psychological Definition of Eating Pathology. Finally, a combined behavioral (i.e., participants who report engaging in one or more weight control behaviors with sufficient duration and frequency to meet eating disorder criteria) and psychological definition (two or more elevated EDI subscale scores) will be used to determine the proportion of military members classified as “subthreshold” for an eating disorder. This requirement of at least two elevated EDI scores (as opposed to only one) in order to be classified as “subthreshold” for an eating disorder was selected in order to compensate for the possible increased risk of making a Type I error due to not being able to verify the diagnosis with a clinical interview.

Data Analytic Strategy for Aim Three.

To determine the percent and characteristics of individuals behaviorally subthreshold for an eating disorder, the file will be split by this dependent variable (individuals behaviorally at-risk of an eating disorder – yes or no). Frequencies and/or means and standard deviations will be examined and described as appropriate for the following independent variables: gender, age, race/ethnicity, branch of service, BMI, TFEQ restraint subscale score, EDI subscale scores (i.e., drive for thinness, bulimia, body dissatisfaction), and total EDI score. Dietary restraint and EDI subscale means and standard deviations will be reported for individuals who report engaging in weight control behaviors prior to weigh-in/physical fitness testing vs individuals who deny engaging in weight control behaviors prior to weigh-in/physical fitness testing.

To determine the percent and characteristics of individuals psychologically subthreshold for an eating disorder (i.e., have two or more EDI subscale elevations), the file will be split by this dependent variable (individuals psychologically at-risk of an eating disorder – yes or no). Frequencies and/or means and standard deviations will be examined and described as appropriate for the following independent variables: gender, age, race/ethnicity, branch of service, and BMI. This procedure will be repeated for determining the percent and characteristics of individuals psychologically and behaviorally subthreshold for an eating disorder.

Power Analysis

The data set consists of data on 4,324 participants. Based on the Lauder et al. (1999) study, the effect sizes range from 0.29 to 0.767 to 0.899 for the bulimia, drive for thinness, and body dissatisfaction subscales of the Eating Disorders Inventory

respectively. With the probability of Alpha set at 0.05, and a sample size of 3,000 (allowing for the exclusion of cases with missing data), the statistical analysis will allow testing of the major dependent variable (use of weight control behaviors – yes or no) with over 80% power for main effects of demographic, psychological, and weight-related independent variables.

General Data Analytic Strategy

SPSS (v.12) is a statistical software package used for analyses in the social sciences and will be used to analyze the data. As described in more detail above, the general statistical procedures that will be used to analyze the data in this project are chi-squared analyses, point-biserial correlations, and binary logistic regressions. Even though the sample consists of primarily Navy personnel (78%), all active duty participants, regardless of branch of service, were retained in the present study as long as they did not meet the exclusion criteria described below.

METHOD

Participants

The original respondents consisted 4,346 service members (3,075 Navy, 872 Army, 277 Air Force, 99 Marine Corps, and 3 Coast Guard). Twenty respondents did not indicate their branch of service. Participants were excluded from the present study if they were not active duty ($n = 345$) and if their duty status ($n = 25$) or branch of service ($n = 20$) were unknown. Because this study focuses on the weight control behavior use among active duty military personnel, participants who reported they were in the Reserves ($n = 342$), National Guard ($n = 3$) or Coast Guard ($n = 3$) were excluded. Participants also were excluded if they had data missing on any of the demographic,

psychological, or weight-related predictor variables of interest in the study. The only exception to excluding cases due to missing data is with rank because such large number of participants ($n = 1,081$) did not report their rank, and rank was not found to be associated with the use of weight control behaviors. As a conservative measure, participants who were missing data for a particular weight control behavior were assumed to have not engaged in that behavior and were retained in the sample. The following participants were excluded due to possible errors in self-report and/or data entry on primary variables in the study: 1) participants who were less than 50 inches tall ($n = 7$) or weighed over 320 pounds ($n = 3$), 2) individuals who had a BMI greater than 51 ($n = 8$), and 3) respondents under age 18 ($n = 2$). In summary, a total of 3,391 cases from the original sample were included in the current study (2,644 Navy, 426 Army, 237 Air Force, and 84 Marine Corps).

Procedure

An anonymous survey was administered to service members at several U.S. military installations. Completion of the survey was voluntary. The original project was conducted under an intramural grant from the Department of Defense and was reviewed and approved by the Uniformed Services University Institution Review Board in 1997. Data were collected between August 1998 and January 1999 at various U.S. military installations. All participants consented prior to entering the study. The cover letter on the survey and the instructions on the first page of the survey constituted the informed consent form (i.e., the participants did not have to sign a consent form; see Appendix A). The cover letter contained the names and e-mail addresses of the principal investigators, should a participant have any questions. Service members were offered a certificate of

appreciation for their participation (see Appendix B). Additionally, service members received one extra point on their annual enlisted/officer performance report for their participation (which required submitting their name, signature, and social security number after they turned in their survey). Both the original study described above and the current study, which using the existing data from the original project, were approved by the Uniformed Services University Institution Review Board.

Measures

The USUHS Weight Management Study Questionnaire. This questionnaire contains 50 items in six areas: demographics (i.e., age, gender, ethnicity, rank, branch of service, job, and education), weight-related history, eating and exercise habits, past use of weight control behaviors, attitude toward military weight standards, and tobacco use.

Weight Control Behavior. For the purposes of this study, a weight control behavior is operationally defined as reporting engaging in one or more of the following behaviors prior to weigh-in/physical readiness testing: self-induced vomiting, laxatives, diuretics, fasting, skipping meals, dieting pills (over-the-counter or prescription pills), chewing and spitting out food, rubber suit, or sauna. Caloric restriction and exercise were excluded from this operational definition because they are typically considered to be healthy means of dieting as opposed to maladaptive, unhealthy approaches to weight loss.

Body Mass Index. Given that the military generally uses height and weight tables to determine whether or not a person is over weight standards, the height and weight variables obtained in this study via self-report were used to calculate each participant's body mass index, defined as the individual's weight (kg) divided by his or her height (m^2), in order to take both height and weight into consideration (as opposed to just

weight, which can differ substantially by gender). Unfortunately, body mass index tends to overestimate overweight among individuals who are muscular, because it does not distinguish between body fat and muscle mass. Because no measure of body fat was available for this study, BMI was used as an indicator of body composition.

The Eating Disorders Inventory-2. The Eating Disorders Inventory (Garner, 1991) is a 64-item self-report measure used to assess cognitive and behavioral symptoms of anorexia nervosa and bulimia nervosa. The EDI contains 8 subscales. Three subscales (i.e., Drive for Thinness, Bulimia, and Body Dissatisfaction) assess attitudes and behaviors regarding eating, weight, and shape. The other five subscales assess psychological traits pertaining to eating disorders (ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, and maturity fears). The EDI has been found to be a reliable and valid instrument with good internal consistency. The coefficient alphas for the original scales ranged from .69 to .93 (Allison, 1995). Test retest reliabilities for all subscales except for the interoceptive awareness scale were above .80 over a one-week period (Allison, 1995). The EDI can be used to screen for populations at-risk for an eating disorder as well as provide a probable diagnosis of anorexia or bulimia nervosa (Allison, 1995). It assesses severity of eating pathology and is frequently used as a treatment outcome measure (Allison, 1995). Further, the EDI has been found to be a valid measure of anorexic and bulimic symptomology for both women and men, although the subscales may be less reliable for men than women (Spillane, Boerner, Anderson, & Smith, 2004). Research has also supported the use of the EDI in non-clinical as well as clinical samples (Joiner & Heatherton, 1998). The EDI-2 is a revised version that added an additional 27 items and three subscales

(asceticism, impulse regulation, and social insecurity). Only the original 64 items and the Drive for Thinness, Bulimia, and Body Dissatisfaction subscales of the EDI-2 were used in this study (see “Attitudes Toward Eating and Dieting,” questions 1-64 in the survey in Appendix A).

The Three-Factor Eating Questionnaire. The Three Factor Eating Questionnaire (Stunkard & Messick, 1985) assesses an individual’s level of cognitive restraint, disinhibition, and susceptibility to hunger as they relate to eating behaviors. Only the cognitive restraint factor (restraint subscale) was used in this study, which includes 20 of the 51 total questions (see “Attitudes Toward Eating and Dieting,” questions 65-84 in survey in Appendix A). The TFEQ restraint scale has good internal consistency ($\geq .80$) and test-retest reliability (.91 over a two-week span and .93 over a one month span; Allison, 1995). The restraint scale correlates significantly with body dissatisfaction and drive for thinness scales of the EDI (Allison, 1995).

RESULTS

Participant Characteristics

The majority of the participants were enlisted (92.2%), Navy (78.0%), Caucasian (59.2%) men (79.7%) (see Table 1). For a breakdown of the sample characteristics for each branch of service, see Figure 1. Age of participants ranged from 18 to 61 ($M = 29.91 \pm 7.06$). Most of the respondents had either a high school diploma (34.8%) or some college (38.3%). Participants had an average BMI of $26.32 \pm 4.03 \text{ kg/m}^2$.

Preliminary Data Inspection

Nearly 23% of the respondents reported previously engaging in one or more weight control behaviors in preparation for weigh-in/physical fitness testing. Table 2 provides a breakdown of the prevalence of weight control behaviors by type and gender.

Aim 1A: Demographic correlates of weight control behaviors.

1. *Gender.* There was a significant relation between gender and use of weight control behaviors, $\chi^2_{(1, N = 3,391)} = 35.58, p < .001, \Phi = .10$. Specifically, women (31.20%) were more likely than men (20.54%) to engage in weight control behaviors prior to weigh-in/physical readiness testing. However, the effect size was small (see Table 13 for a listing of the effect sizes for each predictor of weight control behavior use).

2. *Age.* There was a significant positive correlation between age and use of weight control behaviors, $r_{pb}(3,389) = .13, p < .001, 95\% \text{ CI} = 0.10 - 0.16$, suggesting that the risk of engaging in a weight control behavior increases as age increases. However, similar to gender, the effect size for age was small.

3. *Race/Ethnicity.* A chi-squared analysis comparing the racial/ethnic majority group (Caucasians) to the racial/ethnic minority group (i.e., African Americans, Hispanics, Asians, and Other) revealed that racial/ethnic minorities were just as likely as Caucasians to engage in weight control behaviors, $\chi^2_{(1, N = 3,391)} = 0.101, p = .750, \Phi = .005$. However, after adjusting for BMI in a binary logistic regression analysis, minorities had lesser odds of engaging in weight control behaviors than Caucasians (OR = 0.75, 95% CI = 1.20 – 1.26). It is important to note that the effect size of the association between ethnicity and weight control behavior use was small.

4. *Body Mass Index.* There was a significant positive association between BMI and weight control behavior use, $r_{pb}(3,389) = .33, p < .001, 95\% \text{ CI} = 0.30 - 0.36$, suggesting that as BMI increases, risk of engaging in weight control behaviors increases. BMI had a medium effect size.

5. *Branch of service.* There was a statistically significant association between branch of service and weight control behavior use, $\chi^2_{(3, N = 3,391)} = 20.67, p < .001$, Cramer's $V = .08$ with 30.99% Army, 26.19% Marine Corps, 21.56% Navy, and 19.41% Air Force endorsing these behaviors. A binary logistic regression examining branch of service as a predictor of weight control behavior use revealed that Marines were not more likely than Navy personnel to engage in weight control behaviors ($OR = 1.29, 95\% \text{ CI} = 0.79 - 2.12$). However, after adjusting for BMI, a binary logistic analysis revealed that Marines were at greater odds of engaging in weight control behaviors than Navy personnel ($OR = 1.76, 95\% \text{ CI} = 1.06 - 2.93$). The effect size for the association between branch of service and use of weight control behaviors was small.

6. *Rank.* There was no significant difference in prevalence of weight control behavior use by rank, $\chi^2_{(1, N = 2,792)} = 0.32, p = .57, \Phi = .01$, with 21.73% of enlisted and 20.09% of officers reporting the use of weight control behaviors prior to weigh-in/physical readiness testing.

A set-wise bivariate logistic regression of the demographic risk factors (with each demographic characteristic adjusted for by the other demographic characteristics and rank excluded; see Table 3) revealed that military women had 2.9 times greater odds of engaging in weight control behaviors than men ($OR = 2.93, 95\% \text{ CI} = 2.35 - 3.66$). Racial/ethnic minority personnel had lesser odds than Caucasians to engage in weight

control behaviors ($OR = 0.65$, 95% $CI = 0.54 - 0.78$). Marine Corps personnel had greater odds of engaging in weight control behaviors than Navy personnel ($OR = 2.18$, 95% $CI = 1.30 - 3.66$). For each unit increase in BMI, odds for engaging in weight control behaviors increases approximately 26% ($OR = 1.26$, 95% $CI = 1.23 - 1.30$). For each unit increase in age, odds for engaging in weight control behaviors increases approximately 3.5% ($OR = 1.04$, 95% $CI = 1.02 - 1.05$). Altogether, demographic factors accounted for 22.0% of the variance in weight control behavior use, Nagelkerke $R^2 = .22$.

Aim 1B: Psychological correlates of weight control behaviors.

There was a positive significant correlation between dietary restraint and use of weight control behaviors, $r_{pb}(3,389) = .36$, $p < .001$, 95% $CI = 0.33 - 0.39$, suggesting that as dietary restraint increases, the risk of engaging in weight control behaviors increases. Drive for thinness EDI scores and use of weight control behaviors were positively associated, $r_{pb}(3,389) = .42$, $p < .001$, 95% $CI = 0.39 - 0.45$. There was a positive significant correlation between body dissatisfaction and use of weight control behaviors, $r_{pb}(3,389) = .41$, $p < .001$, 95% $CI = 0.38 - 0.44$, in that as body dissatisfaction increases, the risk of engaging in weight control behaviors increases. There also was a positive relation between bulimia EDI subscale scores and weight control behavior use, $r_{pb}(3,389) = .22$, $p < .001$, 95% $CI = 0.19 - 0.25$, in that as bulimia subscale score increases, risk of engaging in weight control behaviors increases.

A set-wise bivariate logistic regression analysis was conducted with dietary restraint, drive for thinness, body dissatisfaction, and bulimia EDI subscale scores as predictors of weight control behavior use prior to a weigh-in (see Table 4). Results revealed that for each unit increase in dietary restraint scale score, odds of engaging in a

weight control behavior increases by approximately 12.7% ($OR = 1.13$, 95% CI = 1.10 - 1.15). For each unit increase in drive for thinness EDI subscale score, odds of engaging in a weight control behavior increases by approximately 7.6% ($OR = 1.08$, 95% CI = 1.05 - 1.11). For each unit increase in body dissatisfaction EDI subscale score, odds of engaging in a weight control behavior increases by approximately 10.6% ($OR = 1.11$, 95% CI = 1.09 - 1.13). For each unit increase in bulimia EDI subscale score, odds of engaging in a weight control behavior increases by approximately 6.8% ($OR = 1.07$, 95% CI = 1.03 - 1.11). Altogether, these psychological factors account for 31.5% of the variance in weight control behavior, Nagelkerke's $R^2 = .32$. These factors remained significant predictors of weight control behaviors after adjusting for the demographic factors included in the logistic regression from Aim 1A (see Table 5).

Aim 1C: Weight-related correlates of weight control behaviors

A significant association was found between dieting (i.e., trying to lose weight at last weigh-in) and use of weight control behaviors, $\chi^2_{(1, N = 3,391)} = 1,129.62$, $p < .001$, $\Phi = .58$. Participants who reported trying to lose weight at their last weigh-in (61.30%) had greater odds of engaging in weight control behaviors than participants who did not endorse trying to lose weight at their last weigh-in (7.60%). There also was a significant positive correlation between worry about meeting standards at last weigh-in and weight control behavior use $r_{pb}(3,389) = .54$, $p < .001$, 95% CI = 0.52 – 0.56, meaning that as worry about meeting weight standards increases, odds of engaging in weight control behaviors increases. A significant association was found between exercise frequency and weight control behavior use, $\chi^2_{(3, N = 3,391)} = 56.53$, $p < .001$, Cramer's $V = .13$. An examination of the means suggests that people who exercise “on and off” (30.81%) and

people who exercise only before a physical readiness test (34.94%) were more likely to engage in weight control behavior use than individuals who exercise consistently (19.49%) and individuals who do not exercise (20.10%).

A set-wise, bivariate logistic regression was conducted using weight-related risk factors (i.e., dieting, worry about meeting standards at last weigh-in/physical readiness test, and exercise frequency) as predictors of weight control behavior use (see Table 6). Trying to lose weight at last weigh-in ($OR = 8.33$, 95% CI = 6.66 – 10.43) and worry about meeting weight standards at last weigh-in ($OR = 1.45$, 95% CI = 1.39 – 1.53) were both significant predictors of weight control behaviors. In terms of exercise frequency, individuals who reported exercising “for a few months at a time, then lay off for a while” were had 1.3 times greater odds of engaging in weight control behaviors than individuals who exercise consistently in ($OR = 1.34$, 95% CI = 1.04 – 1.73). Altogether, these factors accounted for 48.4% of the variance in weight control behavior use, Nagelkerke’s $R^2 = .48$. Additionally, individuals who reported exercising just before a PT test also became a significant predictor of weight control behavior use after adjusting for demographic and psychological factors ($OR = 1.823$, 95% CI = 1.19 – 2.79).

These weight-related factors remained significant predictors of weight control behavior use after adjusting for demographic and psychological factors (see Table 7). The entire model accounted for 55% of the variance in weight control behavior use, and the Hosmer and Lemeshow Test was not significant, which means that the model is similar to the observed data and therefore the model is a good fit to the data.

Aim 2: Test of Stice's Dual-Pathway Model in a military sample

A set-wise, bivariate logistic regression was conducted to determine the goodness of fit for a modified version of the Dual-Pathway Model of Bulimic Pathology (Stice, 2001; Stice et al., 1996) in a military sample. Specifically, the variables BMI, drive for thinness, body dissatisfaction, dietary restraint, and dieting were included from the original model, in addition to worry about meeting weight standards. Results indicated that all factors were significantly associated with increased odds of engaging in weight control behavior use (see Table 8): BMI ($OR = 1.07$, 95% CI = 1.04 – 1.10), worry about meeting standards ($OR = 1.31$, 95% CI = 1.24 – 1.38), drive for thinness ($OR = 1.06$, 95% CI = 1.03 – 1.08), body dissatisfaction ($OR = 1.06$, 95% CI = 1.03 – 1.08), dietary restraint ($OR = 1.06$, 95% CI = 1.04 – 1.09), and dieting ($OR = 5.59$, 95% CI = 4.41 – 7.09). Altogether, this adapted version of the Dual-Pathway Model of Bulimia Nervosa accounted for 52.6% of the variance in weight control behavior use, Nagelkerke's $R^2 = .53$. However, the Hosmer and Lemeshow Test was significant, which indicates that the model is not a good fit for the data. Neither the significance of the Hosmer and Lemeshow Test nor the proportion of variance in weight control behavior use explained by the factors changed after adjusting for gender, which suggests that the extent to which the model fits a military sample is the same regardless of gender.

Aim 3: Is this weight control behavior use pathological?

Approximately 5.1% ($n = 173$) of the entire sample reported engaging in weight control behaviors prior to PT testing with similar frequency (i.e., at least twice a week) and duration (i.e., 2-3 months or longer) as individuals diagnosed with eating disorders, including 8.7% of military women and 4.2% of military men (see Table 9 for

demographic composition of individuals who are behaviorally at risk of an eating disorder). Approximately 22.3% of individuals who endorse engaging in one or more weight control behaviors ($n = 774$) are using weight control behaviors with similar duration and frequency as individuals diagnosed with eating disorders. This finding suggests that a large proportion of individuals who engage in weight control behaviors are using them frequently and for a long time.

Table 10 provides the means of EDI and dietary restraint subscale score means for individuals engaging in weight control behaviors versus individuals who deny using weight control behaviors. Three hundred forty-one respondents (10.1% of the entire sample) had one or more elevated EDI drive for thinness, body dissatisfaction, and/or bulimia subscale scores. One hundred twenty-two personnel (3.6% of the entire sample) had two or more EDI subscale elevations, and 18 personnel (0.5% of the entire sample) had elevations on all three EDI subscales. See Table 11 for the demographic composition of individuals who are psychologically subthreshold for an eating disorder (i.e., individuals who have elevated scores on at least 2 out of the 3 EDI subscales). In terms of the combined psychological and behavioral definition used in this study, 40 participants (1.2%) were at risk of having or developing an eating disorder (see Table 12 for demographic composition of combined at-risk group).

DISCUSSION

Summary of Findings

The main purpose of this study was to determine demographic, psychological and weight-related factors associated with weight control behavior use among active duty

military personnel prior to physical readiness testing. Table 14 provides a breakdown of the support for each hypothesis in this study.

Aim One: Psychosocial correlates weight control behaviors.

Generally speaking, when examining the effect sizes of the various psychosocial factors associated with weight control behaviors (see Table 13), weight-related factors appear to be the most predictive of engaging in weight control behaviors, followed by psychological factors, and finally demographic factors. Given their small effect sizes, gender, age, race/ethnicity, rank, and branch of service appear not to be particularly predictive of weight control behaviors. However, BMI, which has a medium effect size, appears to be the most predictive demographic factor associated with weight control behaviors. The finding that minorities had lesser odds of engaging in weight control behaviors than Caucasians after adjusting for BMI implies that racial/ethnic minorities may engage in weight control behaviors as much as Caucasians due to a tendency to have higher BMIs, which puts them at a higher risk of being over weight and/or body composition standards. Similarly, Marines may be more likely than Navy personnel to engage in weight control behaviors due to the tendency of having higher BMIs. In other words, BMI may be influencing the association between demographic factors (i.e., race/ethnicity and branch of service) and weight control behaviors.

Regarding psychological risk factors for weight control behaviors, drive for thinness, body dissatisfaction, and dietary restraint subscale scores had small to medium effect sizes and bulimia subscale scores had a small effect size. This finding suggests that engaging in weight control behaviors appears to have a psychological component for at least some military members, which corroborates other findings in the literature

conducted with military samples (Carlton et al., 2005; Lauder & Campbell, 2001; Lauder et al., 1999) as well as civilian samples (e.g., Dale & Landers, 1999; Jacobi et al., 2004; Stice, 2001).

The weight-related factors of dieting (i.e., trying to lose weight) prior to last weigh-in and worry about meeting weight standards at the last weigh-in/physical fitness test had the largest effect sizes in the current study and appear to be the strongest psychosocial correlates of weight control behaviors among active duty military personnel in this model. The hypothesis that individuals who did not exercise consistently would be at greater odds of engaging in weight control behavior use than individuals who exercised consistently was partially supported. Individuals who reported being inconsistent in their exercise patterns (i.e., exercise on and off every several of months or only prior to a physical readiness test) appear to be more likely to use weight control behaviors than individuals who reported exercising consistently or not at all. This finding may imply that consistency in exercise routines is more important than amount of exercise per se in terms of predicting who engages in weight control behaviors. Research in the general U.S. population has shown that people who successfully maintain weight engage in regular exercise (Elfhag & Rossner, 2005; Jeffrey et al., 2000; Wing & Hill, 2001). Alternatively, it is possible that individuals who do not exercise are on waivers or may not care/have to worry about meeting weight standards, which makes them less likely to engage in weight control behaviors prior to physical readiness testing. Additional, prospective studies are needed to further elucidate the reason for this finding.

Aim 2: Test of the Stice's Dual-Pathway Model of Bulimic Pathology

Despite the absence of a negative affect construct in the current study, an adapted version of the Stice Dual-Pathway Model of Bulimic Pathology that included BMI, worry about meeting weight standards, drive for thinness, body dissatisfaction, dietary restraint, and dieting were all significantly associated with weight control behavior use, accounting for approximately 52% of the variance in weight control behavior use. This proportion of explained variance is particularly noteworthy considering that the sample in the current study primarily consisted of adult men and personnel of various ethnicities (as compared with Caucasian, adolescent females in the Stice et al. (1996) and Stice (2001) studies). In particular, individuals who reported dieting (i.e., trying to lose weight prior to last weigh-in/physical readiness test) were at 5.6 times greater odds of engaging in weight control behaviors than individuals who did not report dieting. However, the Hosmer and Lemeshow Test was significant, which means that the model differs from the observed data and therefore the model is not a good fit for the data. It is possible that adding a negative affect construct may improve the fit of the model. Additionally, some of the indicators of the constructs used in the current study (including using a dichotomous outcome measure and different statistical analysis) differ from those used Stice's (2001) model, which also may contribute to the poor fit. In summary, the findings from Stice's work appear to not be generalizable to a military population.

Aim Three: Is the use of weight control behaviors among military personnel pathological?

The percentage of individuals engaging weight control behaviors prior to PT testing with similar frequency and duration as individuals diagnosed with eating disorders

was rather high (5.1%), considering that the sample primarily consisted of men. Approximately twice as many women as men reported engaging in weight control behaviors with the same or greater duration and frequency as individuals diagnosed with BN in the general population (APA, 2000). This 2:1 female to male ratio is much smaller than the 10:1 ratio of AN and BN among women and men in the civilian population, respectively (APA, 2000). The finding that 22.3% of individuals who report engaging in one or more weight control behaviors are using them with similar duration and frequency as individuals diagnosed with eating disorders suggests that a large proportion of individuals who engage in weight control behaviors are using them frequently and for a long time. The 8:1 female to male ratio of being at risk of an eating disorder (i.e., having two or more elevated EDI subscale scores) in the current study exceeds the 10:1 rate found among civilians (APA, 2000). Taken together, these findings suggest that military men may be at greater risk of developing an eating disorder compared to civilian men. However, it is important to note that this study used self-report questionnaires, which may partially account for the elevated rates of eating disorder pathology in this sample (Fairburn & Beglin, 1994).

When determining the prevalence of individuals at risk of an eating disorder, it is necessary to consider the psychological features of the behavior (Dale & Landers, 1999). In terms of the combined psychological and behavioral definition used in this study, 40 participants (1.2%) were at risk of having or developing an eating disorder (see Table 12 for demographic composition of combined at-risk group). Again, this percentage is high, considering that the sample primarily consists of military men.

Implications

The majority of military personnel report engaging in some form of weight control. Given the large effect sizes for associations with dieting and worry about making weight prior to weigh-in, weight control behavior use among active duty military personnel may be largely driven by weight standards. The small effect sizes for gender and ethnicity in predicting weight control behavior use are surprising, suggesting that the mechanisms behind weight control behavior use among military members may be different from those hypothesized in civilian eating disordered populations (e.g., young, Caucasian women feeling social pressure to be thin; Stice (2001)). However, individuals who report engaging in weight control behaviors appear to have higher EDI and TFEQ subscale scores than individuals not engaging in weight control behaviors (see Table 10). Therefore, similar to the civilian population (Jacobi et al., 2004), there appears to be a psychological component to weight control behavior use among military personnel (Carlton et al., 2005; Lauder & Campbell, 2001; Lauder et al., 1999). Whatever the direction the relation between psychological factors and use of weight control behaviors may be, the military might consider incorporating a psychological component to their weight management programs (e.g., to address body image concerns).

Among military personnel using means of weight control, unhealthy weight control behaviors are used more than healthy means of weight control (i.e., caloric restriction and exercise). This finding is alarming and suggests that military personnel may benefit from voluntary, non-punitive weight management programs that focus on safe and healthy means of weight loss. Unit briefings as well as online tutorials also may be helpful for promoting healthy means of weight loss. Additionally, it is essential for

leadership (i.e., commanders and supervisors) to emphasize the importance of how troops lose and maintain weight, versus sending the message “just meet the standards no matter what it takes.” Current weight management programs also might consider revising the definition of making “adequate progress” in terms of percent of body fat or pounds of weight lost. Reinforcing positive lifestyle changes as opposed to only the bottom line may foster the use of healthy means of weight loss. Additionally, putting more emphasis on progress in fitness and physical readiness instead of weight/body composition also might promote healthy eating and exercise habits.

Incorporating a relapse prevention component into existing weight management programs may assist in preventing relapse and promoting long-term weight loss (Marlatt & George, 1984). A relapse prevention intervention aims to assist individuals in anticipating and coping with the problem of relapse and can be applied a general approach to lifestyle change (Shumaker, Schron, Ockene, & McBee, 1998). This approach aims to assist individuals in lifestyle behavior change by helping to decrease a person’s dichotomous thinking (e.g., “good” = dieting versus “bad” = broke the diet; Shumaker et al., 1998). An emphasis is placed on moderation as opposed to abstinence. Additionally, the individual develops an increased awareness and balance between “should” and “want” activities in order to help restore balance in their life by taking time to engage in indulgences, including positive addictions. This emphasis on moderation and balance between obligatory and desired activities may help reduce dichotomous thinking and extreme eating and compensatory behaviors among dieters. Working to attain this balance between “should” and “want” activities might be particularly helpful for military personnel when they are under constant stress and/or who have many job

demands placed on them in order to accomplish the mission (e.g., deployment, working in hostile or austere environments, shift work).

Given that individuals who have inconsistent exercise habits appear to have a higher risk of engaging in weight control behaviors, developing programs and procedures that encourage consistent exercise habits also may be beneficial (Elfhag & Rossner, 2005; Jeffrey et al., 2000; Wing & Hill, 2001). Setting aside a few duty hours each week for working out as a unit or in small groups also may promote more consistent exercise habits. Considering that military personnel travel frequently and may work schedules that do not permit them to enroll in weight management programs during the duty hours, it may be helpful to develop on-line and/or on-site weight management programs in addition to offering programs outside of normal duty hours. Research presented at the 2005 Annual Scientific Meeting of NAASO, The Obesity Society, described a study of the efficacy of an internet weight loss program among 425 overweight Air Force personnel (i.e., personnel within five pounds of their maximum allowable weight or heavier; Hunter (2005)). Compared to the usual care condition (where participants selected their own weight loss group, such as Weight Watchers or a military-sponsored program), participants who supplemented usual care efforts with Minimal Contact Behavioral Internet Therapy lost more weight (Hunter, 2005).

Ideally, the military might consider conducting more frequent (and perhaps unannounced) weight and body composition assessments and physical readiness tests in order to encourage more consistent adherence to these standards (Sweeney & Bonnabeau, 1990). Alternatively, if implementing such a procedure is not practical and feasible, military units may consider occasionally conducting “unofficial” weight/body

composition and fitness assessments. Such non-punitive assessments would provide personnel with more opportunities for self-assessment as well as give them the opportunity to seek help from their peers and base services at the first sign of difficulty meeting or maintaining standards. Further, incorporating unofficial assessments would communicate the importance of adhering to these standards at all times (as opposed to only during assessment periods). At a minimum, supervisors and commanders might encourage more frequent self-weighing, which has been shown to improve maintenance of weight loss among civilians (Wing, Tate, Gorin, Raynor, & Fava, 2006).

Despite the high prevalence of weight control behavior use among military personnel, it appears that the overall prevalence eating disorders among active duty military personnel appears to be comparable to the prevalence of eating disorders found among women in the general U.S. population (APA, 2000). However, the rate of eating disorders among military men may be higher than that found among civilian men (McNulty, 1997b).

Limitations

There are several limitations to this study. One limitation is the cross-sectional design. Longitudinal, prospective studies that follow military recruits over time are needed to determine the direction of the relation between weight control behavior use and the psychological and weight-related variables in this study. Also, there may be other variables that were not included in this study (e.g., stress, negative affect) that may play an important role in predicting use of weight control behaviors among military personnel (Jacobi et al., 2004).

Another limitation of this study is the reliance on self-report measures of the predictor and outcome variables. Research has shown that people tend to under-report their weight, particularly among women and heavier individuals (Cash, Grant, Shovlin, & Lewis, 1992), which may explain why BMI only had a medium effect size. Also, this study used current BMI, as opposed to BMI prior to weigh-in, which may be more predictive of weight control behavior use. Future studies should include objective measures of height and weight (as opposed to relying on self-report) and include both height/weight measures and body composition measures, considering that BMI does not account for muscle mass (CDC, 2007). Further, the USUHS weight management questionnaire used in this study has not been validated. Items on the questionnaire relevant to self-report use of weight-control behaviors does not appear to adjust for response style, which means that response style may have influenced the results (i.e., individuals with a positive response style were more likely to obtain higher scores and individuals with a negative response style were more likely to obtain negative scores).

A third limitation of this study is generalizability of the results. Although the sample is representative in terms of gender and ethnicity of military personnel in the late 1990s, the sample primarily consisted of enlisted, Navy personnel. The results may not generalize to military personnel from other branches of service, personnel with other duty status (i.e., National Guard or Reserve), or to military officers.

Another limitation of this study is the lack of use of a clinical interview to supplement the EDI. Not including a clinical interview increases the probability of making a Type I error (i.e., diagnosing an individual with an eating disorder based on their EDI subscale scores when in fact the individual does not meet all the criteria for an

eating disorder (Fairburn & Beglin, 1994)). Additionally, the current study cannot be used to determine the prevalence of specific eating disorders; it can only be used to determine the prevalence of individuals exhibiting disturbed eating behaviors.

Incorporating a clinical interview into future studies would both 1) help decrease the probability of making a Type I error, and 2) permit the researchers to determine which eating disorder(s) each individual has, if any. Adding a specific measure for binge eating also would be important, in order to better determine the prevalence in which the diagnostic criteria for BN and BED are met. Including a measure of extreme exercise frequency and duration also would be useful. Also, re-writing the duration assessment of weight control behaviors to reflect the diagnostic cut-off point (i.e., three months or longer) would help improve the validity of eating disorder prevalence in this population.

In the context of the present study, prevalence of weight control behavior use outside of the weigh-in/physical readiness testing period cannot be determined. Also, it cannot be determined who solely uses weight control behaviors prior to weigh-ins/physical readiness testing versus who uses them at other times in addition to during weigh-ins/physical readiness testing. Perhaps the individuals who also endorse using them at other times are at greater risk of developing an eating disorder than individuals who only use them during the testing period. Another possibility may be that individuals start out using them prior to weigh-ins and then begin to use them at other times as well. The possibilities stem from research that suggests that eating pathology runs along a continuum in terms of severity, with a full-syndrome DSM-IV-TR (APA, 2000) eating disorder representing one endpoint on a continuum (Fitzgibbon, Sanchez-Johnsen, &

Martinovich, 2003; Stice, Killen, Hayward, & Taylor, 1998b). Prospective, longitudinal studies are needed to examine these possibilities.

Finally, it is important to note that the odds ratios in the current study may be inflated because the event being assessed (weight control behavior use – yes or no) is not an infrequent event. An infrequent event is considered to be 10% of the sample, whereas nearly 23% of the sample in this study engage in weight control behaviors.

Future Directions

There are a number of recommendations for future directions in this line of research. Prospective, longitudinal studies that follow military recruits over time could help elucidate the factors that lead to the use of weight control behaviors, as well as distinguish between causal and maintenance factors of weight control behavior. As mentioned above, longitudinal studies would help determine whether or not use of weight control behaviors prior to weigh-in/physical readiness testing can lead to developing a full-syndrome eating disorder (e.g., initially use weight control behaviors exclusively during testing period and over time begin to use them at other times as well). Incorporating measures of stress and negative affect into future studies could be used to determine the influence of these factors on weight control behavior use. It would be important to study the impact of recent changes in weight/body fat standards on weight control behavior use among active duty military personnel in order to assess the positive and negative impacts of policy change on weight control behaviors. For example, the Air Force moved to incorporating a waist circumference measure as part of the physical fitness assessment, as opposed to measuring weight and body composition as a separate requirement (U.S. Department of the Air Force, 2005; U.S. Department of Defense,

2004). Future studies may examine the prevalence of weight control behavior use among National Guard and Reserve military personnel. Considering that these individuals spend much of their time outside of the military training environment, adhering to weight standards may be even more difficult, which may put them at greater risk of engaging in weight control behaviors relative to active duty personnel. As mentioned above, including a clinical interview to decrease Type I error and help elucidate the prevalence of each eating disorder among military personnel. It would be important for prospective, longitudinal studies to compare the prevalence of weight control behavior use at time of weigh-in/physical readiness testing to the prevalence of weight control behaviors outside of the testing period, to see if use of weight control behaviors during the testing period lead to increased risk of engaging in them outside of the testing period, or vice versa. Future studies may compare the prevalence weight control behavior use of military personnel to the prevalence among civilians. It is not known the extent to which “situational” or “transient” eating disorders occur among civilians, which would be important in order to determine how much military culture influences weight control behavior use above and beyond American culture. Finally, treatment studies examining the effectiveness of current and new weight management efforts in reducing unhealthy means of weight control would be informative. Comparing the effectiveness of a psychological intervention, a behavioral intervention, and a combined psychological and behavioral intervention in reducing unhealthy weight control behaviors would help inform treatment targets in current military weight management programs. Considering the moderate associations between psychological factors (i.e., body dissatisfaction, drive for thinness, and dietary restraint) and weight control behavior use among military

personnel (Carlton et al., 2005; Lauder & Campbell, 2001; Lauder et al., 1999), incorporating a psychological component into existing military weight management programs may improve the effectiveness.

Table 1

Participant characteristics (N = 3,391)

<u>Characteristic</u>	<u>N</u>	<u>Percent</u>
<u>Gender</u>		
Male	2,702	79.7
Female	689	20.3
<u>Race/Ethnicity</u>		
Caucasian	2,009	59.2
African American	793	23.4
Hispanic	263	7.8
Asian	154	4.5
Other	172	5.1
<u>Branch of Service</u>		
Navy	2,644	78.0
Army	426	12.6
Air Force	237	7.0
Marine Corps	84	2.5
<u>Rank (N=2,808)</u>		
Enlisted	2,573	92.2
Officer	219	7.8
<u>Characteristic</u>	<u>Mean</u>	<u>Standard Deviation</u>
Age	29.91	7.06
BMI	26.32	4.03
Dietary Restraint subscale	6.15	4.56
EDI Total Score	26.86	18.64
Drive for Thinness subscale	3.11	4.49
Body Dissatisfaction subscale	5.68	5.76
Bulimia Subscale	1.09	2.38

Note. BMI = body mass index. EDI = Eating Disorders Inventory.

Table 2

Prevalence of weight control behavior (WCB) type by gender

	<u>Men (n = 2,702)</u>	<u>Women (n = 689)</u>	<u>Total (n = 3,391)</u>
<u>Type of WCB</u>	<u>%</u>	<u>%</u>	<u>%</u>
Vomiting	0.9	0.7	0.9
Laxatives	2.4	7.0	3.3
Diuretics	2.1	7.0	3.1
Fasting	10.8	15.1	11.7
Skip meals	15.9	22.4	17.2
Chew/spit out food	0.5	0.4	0.5
OTC medication	5.8	13.6	7.4
Rx medication	0.9	4.1	1.6
Sauna	8.3	11.6	9.0
Rubber/plastic suit	5.5	6.8	5.8

Note. OTC = over-the-counter.

Table 3

Demographic correlates of weight control behavior before weigh-in

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-8.740 (.405)		0.000***	
<u>Gender</u> (Reference group: Male)				
Female	1.107 (.113)	2.353	2.934***	3.659
<u>Age</u>	0.035 (.006)	1.022	1.035***	1.048
<u>Body Mass Index</u>	0.232 (.013)	1.230	1.262***	1.293
<u>Race/Ethnicity</u> (Reference group: Caucasian)				
Minority	-0.433 (.096)	0.538	0.649***	0.783
<u>Branch of Service</u> (Reference Group: Navy)				
Marine Corps	0.778 (.265)	1.295	2.177*	3.659

Note. $R^2 = .15$ (Cox & Snell), $.22$ (Nagelkerke). Model $\chi^2(8) = 61.84$, $p < .001$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Psychological correlates of weight control behavior before weigh-in

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-3.100 (.105)		0.045***	
Dietary restraint	0.119 (.011)	1.103	1.127***	1.151
Body Dissatisfaction	0.101 (.009)	1.086	1.106***	1.126
Drive for Thinness	0.074 (.014)	1.048	1.076***	1.106
Bulimia	0.065 (.021)	1.025	1.068**	1.112

Note. $R^2 = .21$ (Cox & Snell), $.32$ (Nagelkerke). Model $\chi^2(8) = 48.79$, $p < .001$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Psychological correlates of weight control behavior, adjusted for demographic factors

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-9.084 (.453)		.000***	
Dietary Restraint	0.098 (.012)	1.078	1.103***	1.129
Body Dissatisfaction	0.101 (.011)	1.083	1.106***	1.129
Drive for Thinness	0.081 (.015)	1.054	1.084***	1.116
Bulimia	0.064 (.022)	1.021	1.066**	1.113

Note. $R^2 = .27$ (Cox & Snell), $.41$ (Nagelkerke). Model $\chi^2 (8) = 54.14$, $p < .001$. Analysis adjusted for gender, race/ethnicity, age, branch of service, and BMI.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6

Weight-related correlates as predictors of weight control behavior before weigh-in

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-3.423 (.111)		0.033***	
Dieting	2.120 (.114)	6.660	8.333***	10.426
Worried about meeting weight standards	0.374 (.025)	1.385	1.454***	1.527
<u>Exercise frequency</u> (Reference group: Exercise consistently)				
On and off	0.293 (.130)	1.038	1.340*	1.730
Just before PFT ^a	0.368 (.209)	0.960	1.446	2.177
Do not exercise	0.090 (.179)	0.771	1.094	1.553

Note. $R^2 = .32$ (Cox & Snell), $.48$ (Nagelkerke). Model $\chi^2(5) = 27.97$, $p < .001$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

^aPFT = physical fitness test.

Table 7

Weight-related correlates of weight control behavior, adjusted for demographic and psychological factors

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-7.467 (.508)		0.001***	
Dieting	1.746 (.126)	4.479	5.856***	7.329
Worried about meeting weight standards	0.247 (.029)	1.210	1.280***	1.354
<u>Exercise frequency</u> (Reference group: Exercise consistently)				
On and off	0.429 (.139)	1.168	1.535**	2.018
Just before PFT ^a	0.600 (.217)	1.190	1.823**	2.791
Do not exercise	0.297 (.194)	0.921	1.346	1.968

Note. $R^2 = .36$ (Cox & Snell), $.55$ (Nagelkerke). Model $\chi^2(8) = 11.11$, $p = .196$. Analysis adjusted for gender, race/ethnicity, age, branch of service, BMI, dietary restraint, body dissatisfaction, drive for thinness, and bulimia.

* $p < .05$. ** $p < .01$. *** $p < .001$.

^aPFT = physical fitness test

Table 8

Test of the Dual-Pathway Model, adapted for military population

	<i>B (SE)</i>	95% CI for exp <i>b</i>		
		Lower	exp <i>b</i>	Upper
Constant	-5.691 (.418)		0.003***	
Body Mass Index	0.068 (.015)	1.039	1.070***	1.103
Worried about meeting weight standards	0.269 (.028)	1.240	1.309***	1.382
Dietary Restraint	0.061 (.013)	1.036	1.063***	1.090
Body Dissatisfaction	0.054 (.012)	1.031	1.055***	1.080
Drive for Thinness	0.053 (.014)	1.026	1.055***	1.084
Dieting	1.721 (.121)	4.412	5.592***	7.088

Note. $R^2 = .35$ (Cox & Snell), $.53$ (Nagelkerke). Model $\chi^2(8) = 25.19$, $p = .001$.
Analysis adjusted for gender.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9

Demographics of individuals behaviorally subthreshold for an eating disorder (*N* = 173)

<u>Characteristic</u>	<u><i>N</i></u>	<u>Percent</u>
<u>Gender</u>		
Male	113	4.2
Female	60	8.7
<u>Race/Ethnicity</u>		
Caucasian	106	5.3
African American	38	4.8
Hispanic	18	6.7
Asian	1	0.7
Other	10	5.8
<u>Branch of Service</u>		
Navy	143	5.4
Army	19	4.5
Air Force	7	3.0
Marine Corps	4	4.7
<u>Characteristic</u>	<u>Mean</u>	<u>Standard Deviation</u>
Age	31.67	6.82
BMI	28.90	4.13
Dietary Restraint subscale	10.60	4.90
EDI Total Score	46.96	26.68
Drive for Thinness subscale	9.53	6.55
Body Dissatisfaction subscale	12.01	7.31
Bulimia Subscale	2.75	3.83

Note. BMI = body mass index. EDI = Eating Disorders Inventory.

Table 10

Dietary Restraint and EDI Subscale Scores for individuals using and not using weight control behaviors

	<u>Use of weight control behaviors?</u>	
	<u>Yes</u> (<i>n</i> = 770)	<u>No</u> (<i>n</i> = 2,621)
<u>Scale</u>	<u><i>M</i> (SD)</u>	<u><i>M</i> (SD)</u>
Dietary Restraint	9.16 (4.80)	5.26 (4.08)
Body Dissatisfaction	9.99 (6.62)	4.42 (4.80)
Drive for Thinness	6.60 (5.91)	2.08 (3.35)
Bulimia	2.08 (3.28)	0.81 (1.95)
Total EDI Score	37.89 (22.32)	23.62 (16.04)

Note. EDI = Eating Disorders Inventory.

Table 11

Demographics of individuals psychologically subthreshold for an eating disorder ($N = 122$)

<u>Characteristic</u>	<u>N</u>	<u>Percent</u>
<u>Gender</u>		
Male	45	1.7
Female	77	11.2
<u>Race/Ethnicity</u>		
Caucasian	75	3.7
African American	25	3.2
Hispanic	12	4.5
Asian	5	3.3
Other	5	2.9
<u>Branch of Service</u>		
Navy	98	3.7
Army	17	4.0
Air Force	5	2.1
Marine Corps	2	2.4
<u>Characteristic</u>	<u>Mean</u>	<u>Standard Deviation</u>
Age	28.72	6.54
BMI	27.74	4.31

Note. BMI = body mass index.

Table 12

Demographics of individuals psychologically and behaviorally subthreshold for an eating disorder ($N = 40$)

<u>Characteristic</u>	<u>N</u>	<u>Percent</u>
<u>Gender</u>		
Male	13	0.5
Female	27	3.9
<u>Race/Ethnicity</u>		
Caucasian	22	1.1
African American	14	1.8
Hispanic	3	1.1
Asian	0	0.0
Other	1	0.6
<u>Branch of Service</u>		
Navy	32	1.2
Army	5	1.2
Air Force	2	0.8
Marine Corps	1	1.2
<u>Characteristic</u>	<u>Mean</u>	<u>Standard Deviation</u>
Age	31.00	7.19
BMI	28.54	4.72

Note. BMI = body mass index.

Table 13

Effect sizes for demographic, psychological, and weight-related factors associated with weight control behavior

<u>Factor</u>	<u>Coefficient</u>	<u>Effect Size</u>
<u>Demographic</u>		
BMI	r_{pb}	0.33
Age	r_{pb}	0.13
Gender	Φ	0.10
Branch of Service	Cramer's V	0.08
Race/Ethnicity	Cramer's V	0.06
<u>Psychological</u>		
Drive for thinness	r_{pb}	0.42
Body dissatisfaction	r_{pb}	0.41
Dietary restraint	r_{pb}	0.36
Bulimia	r_{pb}	0.22
<u>Weight-related</u>		
Dieting	Φ	0.58
Worry about meeting weight standards	r_{pb}	0.54
Exercise frequency	Cramer's V	0.13

Note. BMI = body mass index.

Table 14

Support for hypotheses

<u>Hypothesis</u>	<u>Supported?</u>
<u>Aim One</u>	
<i>Gender.</i> Military women will be more likely than military men to engage in weight control behaviors.	Yes
<i>Age.</i> Age will be positively associated with the use of weight control behaviors.	Yes
<i>Race/Ethnicity.</i> Racial/ethnic minority military personnel will be less likely to engage in weight control behaviors than Caucasian personnel.	No
<i>BMI.</i> BMI will be positively associated with the use of weight control behaviors.	Yes
<i>Branch of Service.</i> Marine Corps personnel will be more likely than Navy personnel to engage in weight control behaviors.	No
<i>Rank.</i> Enlisted military personnel will be more likely than officers to engage in weight control behaviors.	No
<i>Disordered Eating Cognitions.</i> Disordered eating cognitions will be positively associated with increased weight control behavior use among military personnel.	Yes
<i>Last weigh-in.</i> Individuals who report trying to lose weight at last weigh-in will be more likely to use weight control behaviors than individuals who do not report trying to lose weight at last weigh-in.	Yes
<i>Worry.</i> Worry about meeting weight standards at last weigh-in will be positively associated with the use of weight control behaviors.	Yes
<i>Exercise.</i> Individuals who do not exercise consistently will be more likely than individuals who exercise consistently to engage in weight control behaviors.	Partial
<u>Aim Two</u>	
It is predicted that a modified version of the Dual-Pathway Model of Bulimic Pathology will fit a military population.	No

Figure 1. Sample Characteristics by Branch of Service

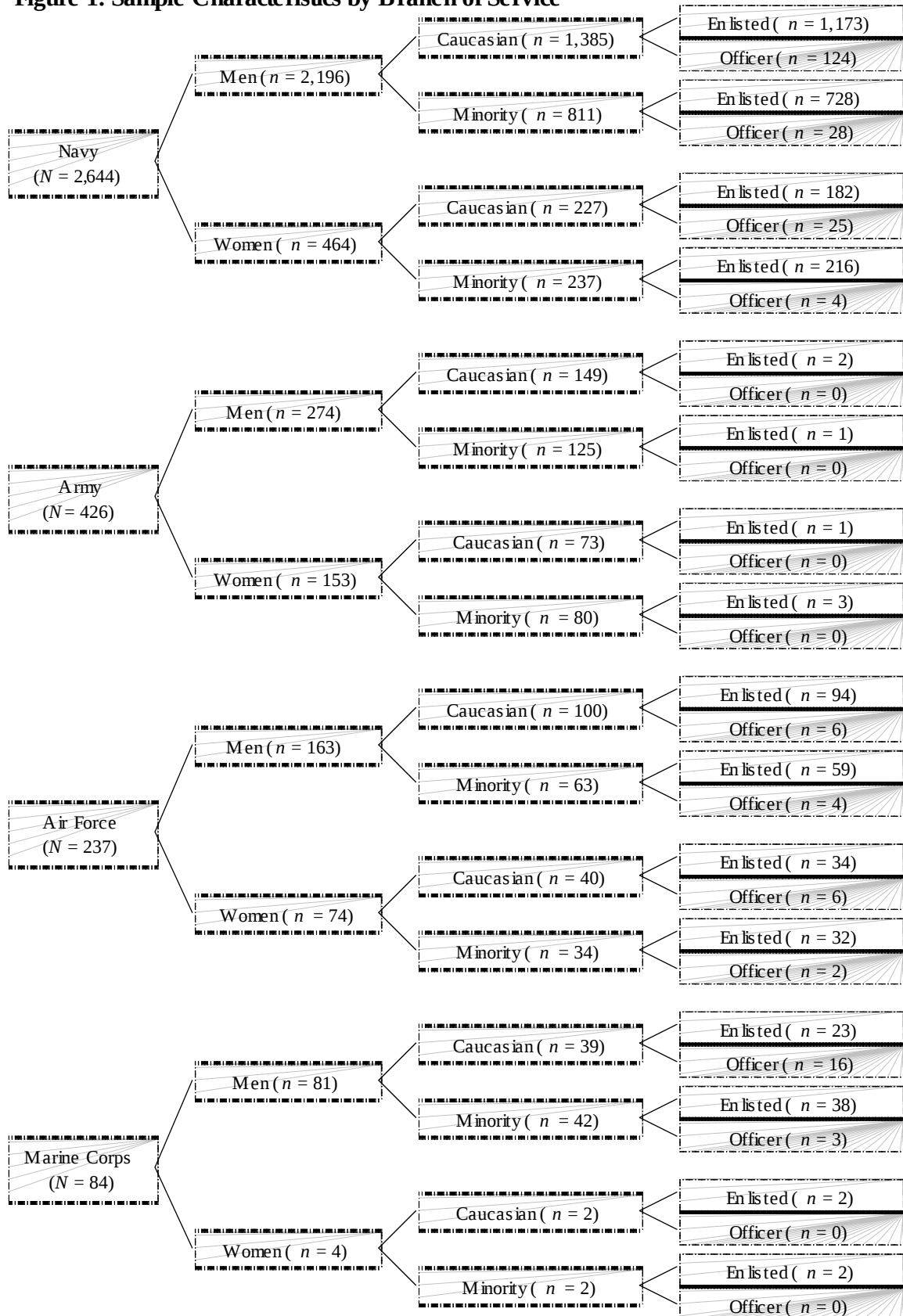


Figure 2. Stice et al. (1996) Dual-Pathway Model of Bulimic Pathology

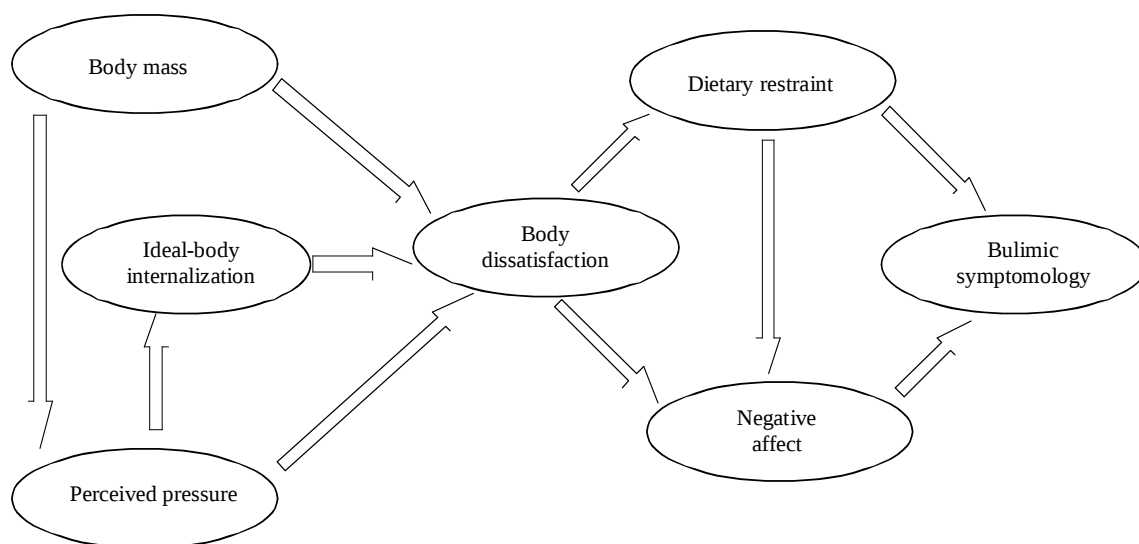


Figure 3. Stice (2001) Dual-Pathway Model of Bulimic Pathology

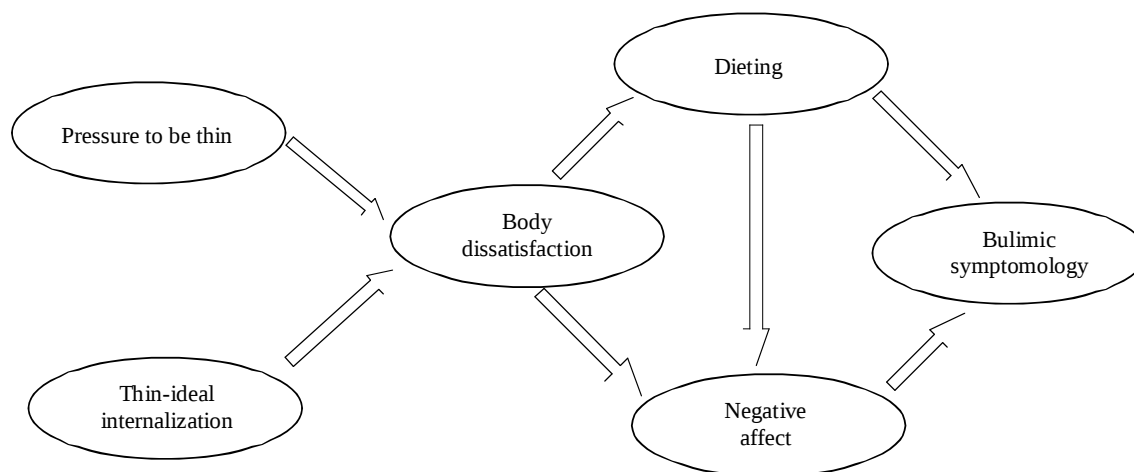
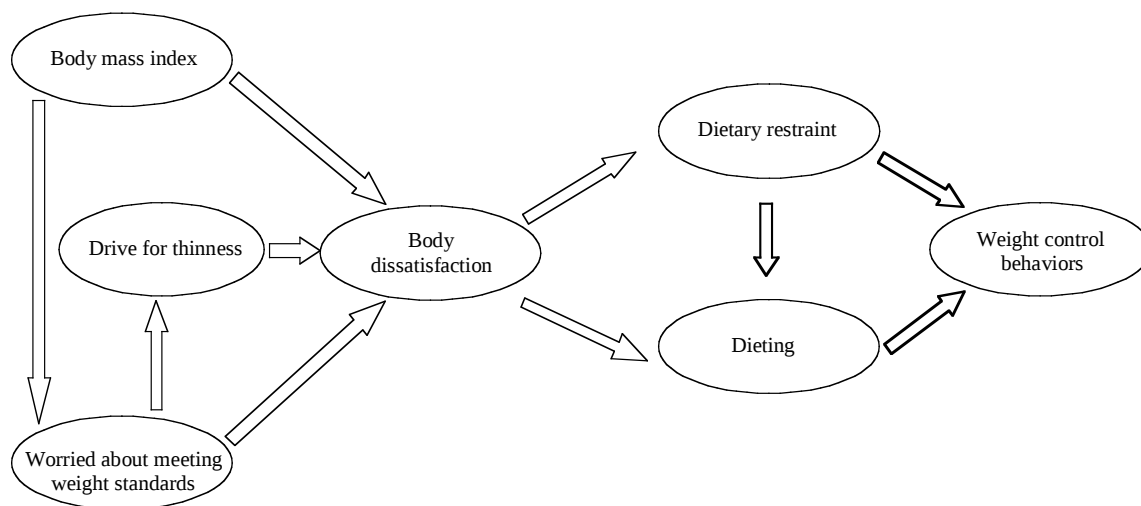


Figure 4. Dual-Pathway Model, adapted for a military population



Appendix A: The USUHS Weight Management Study Questionnaire



UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES
4301 JONES BRIDGE ROAD
BETHESDA, MARYLAND 20814-4799



Dear Service Member,

Thank you for agreeing to participate in the study entitled "Prevalence of Disordered Eating Among Active Duty Service Military Personnel." This research is being conducted to examine the existence of chronic and short term dieting among service personnel at the time of the Physical Readiness Test. You will be one of approximately 2100 active duty members of the Armed Forces to participate

Participation requires that you complete all portions of the following questionnaire. There are questions related to dieting, fasting, use of "water pills". The sauna, and vomiting to lose weight. You will also be asked questions regarding your age, rank, and ethnicity. Please read the directions and each question carefully, giving your most accurate answer to each one.

Your confidentiality (privacy) will be protected to the best extent of the law. Your name will not appear anywhere on the questionnaire. All data will be grouped prior to release. This is a voluntary survey. You may refuse or withdraw participation at any time with out penalty or loss of benefits.

Once you have received a questionnaire, please answer all questions and then return them to your Command Point of Contact (CPOC) upon leaving this room.

If you have any questions or concerns, you may contact Dr. E.L. Lewis in the Department of Family Medicine at 301-295-3632 (e-mail: elewis@mxu.usuhs.mil), Dr. T. Sbrocco in the Department of Medical & Clinical Psychology at 301-295-9674 (e-mail: tsbrocco@mxu.usuhs.mil), or the Office of Research Administration at 301-295-3303 at the Uniformed Services University of the Health Sciences.

Sincerely,

Evelyn L. Lewis, M.D., M.A.
CDR, MC, USN
Principal Investigator



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WEIGHT MANAGEMENT STRATEGY QUESTIONNAIRE



The purpose of this survey is to examine the types of eating and exercise behaviors military personnel may use to make weight. Questions also address attitudes toward dieting and the weight and fitness standards. These questions were developed based on observations of and discussions with military personnel. We know that soldiers, sailors and airmen try many different behaviors in order to manage their weight. Many of the behaviors are not looked on favorably; nonetheless we know they do occur. We need to know how often they occur. Please take a few minutes to answer the following questions. Your responses will remain anonymous, so please answer all questions as honestly and accurately as possible. Completion of this survey constitutes consent to participate in the study.

Demographic Information

Date MM/DD/YY

--	--	--	--	--	--	--

The following information is not intended to identify you, but to understand if certain groups of people are more likely to use specific weight management behaviors. Please answer all questions.

1. Age

--	--

2. Sex

☐ Male ☐ Female

3. Ethnic/Racial Background

- ☐ Caucasian
☐ African-American
☐ Hispanic
☐ Asian
☐ Other

4. Your primary job/MOS in the military:

- ☐ Health Care
☐ Administration
☐ Communications/Intelligence
☐ Engineering/Maintenance
☐ Supply and Service
☐ Scientific/Professional
☐ Combat
☐ Other

5. Branch

- ☐ Air Force
☐ Army
☐ Navy
☐ Coast Guard
☐ Marine Corps
☐ Public Health Service

6. Are you: ☐ Active Duty☐ Reserve☐ National Guard

7. Rank

- ☐ E1 ☐ O1 ☐ W1
☐ E2 ☐ O2 ☐ W2
☐ E3 ☐ O3 ☐ W3
☐ E4 ☐ O4 ☐ W4
☐ E5 ☐ O5
☐ E6 ☐ O6
☐ E7 ☐ O7
☐ E8 ☐ O8
☐ E9 ☐ O9

8. Number of years of school completed:

- ☐ GED
☐ High School
☐ Some College
☐ 2 year degree
☐ 4 year degree
☐ Post graduate school/degree

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Weight History

9. Height (inches)

Weight (pounds)

10. What is/was your highest weight in pounds? (Females use non-pregnant weight.)

11. Do you have difficulty maintaining your weight? ☐ Yes ☐ No12. Do you want to lose weight? ☐ Yes ☐ No How much? pounds13. Were you overweight more than 10 pounds as a child or 15 pounds as an adult? ☐ Yes ☐ NoHow old were you the first time you were overweight? years14. How many times have you lost 20 pounds or more and then regained it? ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5+ ☐ N/A
(Not Applicable)

15. How old were you the first time you lost at least 10 pounds through dieting or a change in your behavior?

years ☐ Not Applicable16. Have you ever been over the prescribed weight standards? ☐ Yes ☐ No17. Have you ever been placed on the weight control program? ☐ Yes ☐ NoNumber of times? Currently Enrolled? ☐ Yes ☐ No

18. Which organization(s) have you voluntarily joined in order to lose weight?

- ☐ Bally's Fitness Center
☐ Weight Watchers
☐ Gold's Gym
☐ Jenny Craig
☐ Slim Fast
☐ Weight Loss Center
☐ Other
☐ None

19. At your most recent weigh-in ...

a. Did you try to lose weight? ☐ Yes ☐ Nob. Were you within weight table standards when you weighed in? ☐ Yes ☐ No

If you were within weight standards and you did not try to lose weight, go to question 20. Otherwise, complete question 19 at the top of the next page.

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19. c. Were you within body fat standards when taped? ☐ Yes ☐ No

d. How much weight were you trying to lose? pounds

e. How much weight did you lose? pounds

f. What was the length of time to lose the weight? days

g. Did you keep the weight off? ☐ Yes ☐ No

h. How long were you able to keep the weight days

20. Have you become ill (with a virus, etc.) soon after a weight loss attempt? ☐ Yes ☐ No

21. Have you ever lost duty time following a weigh-in and PT test due to illness, injury, or fatigue?

☐ No

☐ Lost part of 1 duty day

☐ Lost 1 or more duty days days

22. How important is your appearance in how you evaluate yourself? Darken 1 bubble.

not very important ☐ ☐ ☐ ☐ ☐ ☐ ☐ extremely important

23. How important is your weight in how you evaluate yourself? Darken 1 bubble.

not very important ☐ ☐ ☐ ☐ ☐ ☐ ☐ extremely important

Eating and Exercise Habits

24. Where do you eat most of your meals? Select one.

- ☐ Home
- ☐ Restaurant
- ☐ Fast Food
- ☐ Dining Facility
- ☐ Work
- ☐ Other

25. How does your unit conduct physical training? Select one.

- ☐ Physical training as a unit
- ☐ Physical training individually on work time
- ☐ Physical training individually on own time

26. Over the last 6 months, which one statement best describes your exercise habits?

- ☐ I exercise consistently (2-3 times per week)
- ☐ I exercise for a few months at a time, then lay off for a while
- ☐ I only exercise before a PT test in order to prepare for it
- ☐ I don't really exercise at all

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The next series of questions refer to different weight loss methods. For questions 27 through 36, you will be told to skip parts A-F if you have not used this method of weight loss.

27. In order to lose weight, have you ever made yourself vomit?

☐ No (Go to question 28)

☐ Yes (Continue to answer questions A through F)

A. Has there ever been a period of time when you vomited regularly - at least twice a week for a period of 3 months or more?

☐ Yes ☐ No

B. Do you vomit to prepare for weigh-ins/PT tests?

☐ Yes ☐ No

C. If you vomited to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two to Three Months

☐ Four to Six Months

☒ More than Six Months

D. How often during this preparation period do you vomit?

☐ Not Applicable

☐ More than once daily

☐ Daily

☐ 4-6 times a week

☐ 2-3 times a week

☐ Once a week

☐ Less than once a week

E. Have you ever induced or caused vomiting before special events (weddings, sporting events, religious exercises) in order to lose weight?

☐ Yes ☐ No

F. Have you ever induced or caused vomiting before attending military training schools in order to lose weight?

☐ Yes ☐ No

28. In order to lose weight, have you ever taken laxatives (Ex-Lax, Dulcolax, Correctol)?

☐ No (Go to question 29)

☐ Yes (Continue to answer questions A through F)

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28. Has there ever been a period of time when you took laxatives regularly - at least twice a week for a period of 3 months?

☒ Yes ☐ No

B. Do you take laxatives to prepare for weigh-ins/PT tests?

☐ Yes ☐ No

C. If you take laxatives to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two to Three Months

☐ Four to Six Months

☐ More than Six Months

D. How often during this preparation period do you take laxatives?

☐ Not Applicable

☐ More than once daily

☐ Daily

☒ 4-6 times a week

☒ 2-3 times a week

☐ Once a week

☐ Less than once a week

E. Have you ever taken laxatives before special events (weddings, sporting events, religious exercises) in order to lose weight?

☐ Yes ☐ No

F. Have you ever taken laxatives before attending military training schools in order to lose weight?

☐ Yes ☐ No

29. In order to lose weight, have you ever taken diuretics (water pills)?

☐ No (Go to question 30)

☐ Yes (Continue to answer questions A through F)

A. Has there ever been a period of time when you took diuretics regularly - at least twice a week for a period of 3 months?

☐ Yes ☐ No

B. Do you take diuretics to prepare for weigh-ins/PT tests?

☐ Yes ☐ No

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If you take diuretics to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?

- ☒ Not Applicable
- ☐ 1 Day
- ☐ 2-5 Day
- ☐ One Week
- ☐ Two Weeks
- ☐ Three Weeks
- ☐ One Month
- ☐ Two to Three Months
- ☐ Four to Six Months
- ☐ More than Six Months

D. How often during this preparation period do you take diuretics?

- ☐ Not Applicable
- ☐ More than once daily
- ☐ Daily
- ☐ 4-6 times a week
- ☐ 2-3 times a week
- ☐ Once a week
- ☐ Less than once a week

E. Have you ever taken diuretics before special events (weddings, sporting events, religious exercises) in order to lose weight?

- ☒ Yes ☐ No

F. Have you ever taken diuretics before attending military training schools in order to lose weight?

- ☐ Yes ☐ No

Note: Question 30 asks about fasting. Fasting is defined as purposely skipping more than one meal per day for any period of time. On the other hand, skipping meals means that you missed no more than one meal per day for any period of time.

30. In order to lose weight, have you ever fasted (skipped more than one meal per day)?

- ☐ No (Go to question 31)
- ☐ Yes (Continue to answer questions A through F)

A. Has there ever been a period of time when you fasted regularly - at least twice a week for a period of 3 months?

- ☐ Yes ☐ No

B. Do you fast to prepare for weigh-ins/PT tests?

- ☐ Yes ☐ No

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-
2. If you fast to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?
- ☒ Not Applicable
- ☐ 1 Day
- ☐ 2-5 Day
- ☐ One Week
- ☐ Two Weeks
- ☐ Three Weeks
- ☐ One Month
- ☐ Two to Three Months
- ☐ Four to Six Months
- ☐ More than Six Months
- D. How often during this preparation period do you fast?
- ☐ Not Applicable
- ☐ More than once daily
- ☐ Daily
- ☐ 4-6 times a week
- ☐ 2-3 times a week
- ☐ Once a week
- ☐ Less than once a week
- E. Have you fasted before special events (weddings, sporting events, religious exercises) in order to lose weight?
- ☒ Yes ☐ No
- F. Have you ever fasted before attending military training schools in order to lose weight?
- ☐ Yes ☐ No
31. In order to lose weight, have you ever skipped meals?
- ☐ No (Go to question 32)
- ☐ Yes (Continue to answer questions A through E)
- A. Have you skipped meals to prepare for weigh-ins/PT tests?
- ☐ Yes ☐ No
- B. If you skipped meals to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?
- ☐ Not Applicable
- ☐ 1 Day
- ☐ 2-5 Day
- ☐ One Week
- ☐ Two Weeks
- ☐ Three Weeks
- ☐ One Month
- ☐ Two to Three Months
- ☐ Four to Six Months
- ☐ More than Six Months
-

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31. How often during this preparation period do you skip meals?

- ☒ Not Applicable
☐ More than once daily
☐ Daily
☐ 4-6 times a week
☐ 2-3 times a week
☐ Once a week
☐ Less than once a week

D. Have you skipped meals before special events (weddings, sporting events, religious exercises) in order to lose weight?

- ☐ Yes ☐ No

E. Have you ever skipped meals before attending military training schools in order to lose weight?

- ☐ Yes ☐ No

32. In order to lose weight, have you ever chewed food and spit it out (not swallow)?

- ☐ No (Go to question 33)
☐ Yes (Continue to answer questions A through F)

A. Has there ever been a period of time when you chewed food and spit it out regularly - at least twice a week for a period of 3 months?

- ☒ Yes ☐ No

B. Have you chewed food and spit it out in order to avoid gaining weight before a weigh-ins/PT tests?

- ☐ Yes ☐ No

C. If you have chewed food and spit it out to avoid gaining weight before weigh-ins/PT tests, for how long of a period of time did you do this?

- ☐ Not Applicable
☐ 1 Day
☐ 2-5 Day
☐ One Week
☐ Two Weeks
☐ Three Weeks
☐ One Month
☐ Two to Three Months
☐ Four to Six Months
☐ More than Six Months

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How often during this preparation period do you chew food and spit it out?

- ☐ Not Applicable
☐ More than once daily
☐ Daily
☐ 4-6 times a week
☐ 2-3 times a week
☐ Once a week
☐ Less than once a week

E. Have you chewed food and spit it out to avoid gaining weight before special events (weddings, sporting events, religious exercises) in order to lose weight?

- ☐ Yes ☐ No

F. Have you ever chewed food and spit it out to avoid gaining weight before attending military training schools in order to lose weight?

- ☐ Yes ☐ No

33. In order to lose weight, have you ever taken over the counter diet pills (Dexatrim, Slender Now)?

- ☐ No (Go to question 34)
☐ Yes (Continue to answer questions A through C)

A. Has there ever been a period of time when you took over the counter diet pills regularly - at least twice a week for a period of 3 months?

- ☐ Yes ☐ No

B. Have you taken over the counter diet pills to prepare for weigh-ins/PT tests?

- ☐ Yes ☐ No

C. If you have taken over the counter diet pills to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?

- ☐ Not Applicable
☐ 1 Day
☐ 2-5 Day
☐ One Week
☐ Two Weeks
☐ Three Weeks
☐ One Month
☐ Two to Three Months
☐ Four to Six Months
☐ More than Six Months

34. In order to lose weight, have you ever taken prescription diet pills (Phen-Fen, Redux, Meridia)?

- ☐ No (Go to question 35)
☐ Yes (Continue to answer questions A through D)

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A. Has there ever been a period of time when you took prescription diet pills?

☒ Yes ☐ No

B. What was the longest time period you took prescription diet pills?

- ☐ 1 week
- ☐ 2 - 3 weeks
- ☐ 1 month
- ☐ 2 - 3 months
- ☐ 4 - 6 months
- ☐ More than 6 months

C. Have you taken prescription diet pills to prepare for weigh-ins/PT tests?

☐ Yes ☐ No

D. If you have taken prescription diet pills to prepare for weigh-ins/PT tests, for how long of a period of time did you do this?

- ☐ Not Applicable
- ☐ 1 Day
- ☐ 2-5 Day
- ☐ One Week
- ☐ Two Weeks
- ☐ Three Weeks
- ☐ One Month
- ☐ Two to Three Months
- ☒ Four to Six Months
- ☐ More than Six Months

35. In order to lose weight, have you ever used a sauna?

- ☐ No (Go to question 36)
- ☐ Yes (Continue to answer questions A & B)

A. Have you used a sauna to lose weight for weigh-ins/PT tests?

☐ Yes ☐ No

B. If you have used a sauna to lose weight for weigh-ins/PT tests, how often did you do this?

- ☐ Not Applicable
- ☐ 1 Day
- ☐ 2-5 Day
- ☐ One Week
- ☐ Two Weeks
- ☐ Three Weeks
- ☐ One Month
- ☐ Two to Three Months
- ☐ Four to Six Months
- ☐ More than Six Months

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In order to lose weight, have you ever exercised in a rubber or plastic suit?

☒ No (Go to question 37)

☐ Yes (Continue to answer questions A & B)

A. Have you used a rubber or plastic suit to prepare for weigh-ins/PT tests?

☐ Yes ☐ No

B. If you have used a rubber or plastic suit to prepare for weigh-ins/PT tests, how often did you do this?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two to Three Months

☐ Four to Six Months

☐ More than Six Months

Questions 37 & 38 ask about your dieting history and any self-imposed mild to moderate calorie restrictions. Mild calorie restriction refers to cutting back your calories by about 300 - 600 calories or stop snacking or ordering desserts. Major calorie restriction refers to cutting your calories down to 1/3 or 1/2. For women, that is eating 1200 or less calories per day. Major calorie restriction for men would eating 1600 or less calories per day. Please answer these to the best of your ability.

37. Has there ever been a period of time when you cut back mildly on calories or food in order to lose weight?

☐ Yes ☐ No

A. Have you cut back mildly on calories or food to prepare for the weigh-in/PT test?

☐ Yes ☐ No

B. If you have cut back mildly on calories or food to prepare for weigh-ins/PT tests, for how long of a period did you do this?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two to Three Months

☐ Four to Six Months

☐ More than Six Months

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☒ Has there ever been a period of time when you severely restricted your calorie intake (less than 1200 (Women) or 1600 (Men) calories per day) in order to lose weight?

☐ Yes ☐ No

A. Have you severely restricted your calorie intake to prepare for the weigh-in/PT test?

☐ Yes ☐ No

B. If you have severely restricted your calorie intake to prepare for weigh-ins/PT tests, for how long of a period did you do this?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two to Three Months

☐ Four to Six Months

☐ More than Six Months

Question 39 asks about your exercise history. Please answer all of the following to the best of your ability.

39. Do you exercise or change your exercise habits (initiate a new program, increase the intensity or frequency) in order to make the weight standards for weigh-in/PT tests?

☒ No (Go to question 40)

☐ Yes (Continue to answer questions A & B)

A. If you exercise or change your exercise habits in order to make the weight standards for weigh-ins/PT tests, how far ahead, in advance, do you begin to prepare?

☐ Not Applicable

☐ 1 Day

☐ 2-5 Day

☐ One Week

☐ Two Weeks

☐ Three Weeks

☐ One Month

☐ Two months

☐ Three months

☐ More than three months

B. During this preparation period for the weigh-in/PT test, how often are you exercising?

☐ 1 week

☐ 2 - 3 weeks

☐ 1 month

☐ 2 - 3 months

☐ 4 - 6 months

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40. What techniques are you likely to use in the future to attempt to control your weight? Mark all that apply.

- ☐ Change eating habits/eat well balanced meals
- ☐ Diet/calorie reduction
- ☐ Not eat the day before a weigh-in/PT test
- ☐ Skip meals
- ☐ Chew food and spit it out (not swallow)
- ☐ Not drink liquids
- ☐ Exercise more than one hour the day before a weigh-in/PT test
- ☐ Perform exercises targeting specific body areas (i.e. waist, thighs, buttocks) to decrease bodyfat
- ☐ Use a sauna/steam room
- ☐ Wear rubber/plastic suit
- ☐ Take laxatives (i.e. Ex-Lax)
- ☐ Take diuretics (water pills)
- ☐ Take prescription diet pills
- ☒ Take over the counter diet pills
- ☐ Self-induced vomiting
- ☐ Other

Attitude Towards Military Weight and Fitness Standards

41. Do you think the military weight and fitness standards are fair? Darken 1 bubble.

extremely unfair ☐ ☐ ☐ ☐ ☐ ☐ ☐ extremely fair

42. Does your command support the military weight and fitness standards? Darken 1 bubble.

extremely unsupportive ☐ ☐ ☐ ☐ ☐ ☐ ☐ extremely supportive

43. How strongly does your command enforce the military weight and fitness standards? Darken 1 bubble.

very loose enforcement ☐ ☐ ☐ ☐ ☐ ☐ ☐ very strict enforcement

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43b. Do you think these standards are important for:

a. General appearance (Mark one circle.)

no, not important ☐ ☐ ☐ ☐ ☐ ☐ ☐ yes, extremely important

b. Fitness for duty (Mark one circle)

no, not important ☐ ☐ ☐ ☐ ☐ ☐ ☐ yes, extremely important

44. Would you maintain these weight standards for yourself if they were not required? (Mark one circle.)

no, absolutely not ☐ ☐ ☐ ☐ ☐ ☐ ☐ yes, definitely

45. At your most recent weigh-in, how worried were you about making your weight? (Mark one circle.)

not worried at all ☐ ☐ ☐ ☐ ☐ ☐ ☐ extremely worried

Tobacco Use

46. Do you smoke (cigar, pipe, cigarettes)? ☐ Yes ☐ No How much per day? cigarettes

47. Do you use smokeless tobacco (chew, snuff, pouch)? ☐ Yes ☐ No How much per day? _____

48. Do you plan to quit? ☐ Yes ☐ No

When? ☐ This week

☐ This month

☐ In the next 3 months

☐ In the next 6 months

☐ Within the year

☐ Longer than 1 year

49. Do you smoke or use tobacco to control your weight? ☐ Yes ☐ No

50. If you use tobacco products, does fear of gaining weight affect your decision to quit? Mark one circle.

no effect ☐ ☐ ☐ ☐ ☐ ☐ ☐ extreme effect

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Attitude Towards Eating and Dieting

Please answer this next set of questions that measure a variety of attitudes, feelings and behaviors. Some of the items relate to food and eating. Others ask you questions about yourself. There are no right or wrong answers so remember to be completely honest in your answers. Read each question and select the one answer that best applies for you. Please read each question carefully.

1=Always

2=Usually

3=Often

4=Sometimes

5=Rarely

6=Never

	1	2	3	4	5	6
1. I eat sweets and carbohydrates without feeling nervous.	☐	☐	☐	☐	☐	☐
2. I think that my stomach is too big.	☐	☐	☐	☐	☐	☐
3. I wish that I could return to the security of childhood.	☐	☐	☐	☐	☐	☐
4. I eat when I am upset.	☐	☐	☐	☐	☐	☐
5. I stuff myself with food.	☐	☐	☐	☐	☐	☐
6. I wish I could be younger.	☐	☐	☐	☐	☐	☐
7. I think about dieting.	☐	☐	☐	☐	☐	☐
8. I get frightened when my feelings are too strong.	☐	☐	☐	☐	☐	☐
9. I think my thighs are too large	☐	☐	☐	☐	☐	☐
10. I feel ineffective as a person.	☐	☐	☐	☐	☐	☐
11. I feel extremely guilty after overeating.	☐	☐	☐	☐	☐	☐
12. I think my stomach is just the right size.	☐	☐	☐	☐	☐	☐
13. Only outstanding performance in my family is good enough.	☐	☐	☐	☐	☐	☐
14. The happiest time in life is when you are a child.	☐	☐	☐	☐	☐	☐
15. I am open about my feelings.	☐	☐	☐	☐	☐	☐
16. I am terrified of gaining weight.	☐	☐	☐	☐	☐	☐
17. I trust others.	☐	☐	☐	☐	☐	☐
18. I feel alone in the world.	☐	☐	☐	☐	☐	☐
19. I feel satisfied with the shape of my body.	☐	☐	☐	☐	☐	☐
20. I feel generally in control of my life.	☐	☐	☐	☐	☐	☐
21. I get confused about what emotion I am feeling.	☐	☐	☐	☐	☐	☐
22. I would rather be an adult than a child.	☐	☐	☐	☐	☐	☐
23. I can communicate with others easily.	☐	☐	☐	☐	☐	☐
24. I wish I were someone else.	☐	☐	☐	☐	☐	☐
25. I exaggerate or magnify the importance of my weight.	☐	☐	☐	☐	☐	☐
26. I can clearly identify what emotion I am feeling.	☐	☐	☐	☐	☐	☐
27. I feel inadequate.	☐	☐	☐	☐	☐	☐
28. I have gone on eating binges where I have felt that I could not stop.	☐	☐	☐	☐	☐	☐
29. As a child, I tried very hard to avoid disappointing my parents and teachers.	☐	☐	☐	☐	☐	☐
30. I have close relationships.	☐	☐	☐	☐	☐	☐
31. I like the shape of my buttocks.	☐	☐	☐	☐	☐	☐
32. I am preoccupied with the desire to be thinner.	☐	☐	☐	☐	☐	☐
33. I don't know what is going on inside me.	☐	☐	☐	☐	☐	☐
34. I have trouble expressing emotion to others.	☐	☐	☐	☐	☐	☐
35. The demands of adulthood are too great.	☐	☐	☐	☐	☐	☐
36. I hate being less than best at things.	☐	☐	☐	☐	☐	☐
37. I feel secure about myself.	☐	☐	☐	☐	☐	☐
38. I think about bingeing (overeating).	☐	☐	☐	☐	☐	☐
39. I feel happy that I am not a child anymore.	☐	☐	☐	☐	☐	☐
40. I get confused as to whether or not I am hungry.	☐	☐	☐	☐	☐	☐
41. I have a low opinion of myself.	☐	☐	☐	☐	☐	☐
42. I feel that I can achieve my standards.	☐	☐	☐	☐	☐	☐
43. My parents have expected excellence of me.	☐	☐	☐	☐	☐	☐
44. I worry that my feelings will get out of control.	☐	☐	☐	☐	☐	☐
45. I think that my hips are too big.	☐	☐	☐	☐	☐	☐
46. I eat moderately in front of others and stuff myself when they are gone.	☐	☐	☐	☐	☐	☐
47. I feel bloated after eating a normal meal.	☐	☐	☐	☐	☐	☐
48. I feel that people are happiest when they are children.	☐	☐	☐	☐	☐	☐
49. If I gain a pound I worry that I will keep gaining.	☐	☐	☐	☐	☐	☐
50. I feel that I am a worthwhile person.	☐	☐	☐	☐	☐	☐
51. When I am upset, I don't know if I am sad, frightened or angry.	☐	☐	☐	☐	☐	☐

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1=Always 2=Usually 3=Often 4=Sometimes 5=Rarely 6=Never

- | | | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 52. I feel that I must do things perfectly or not at all. | 1 | 2 | 3 | 4 | 5 | 6 |
| 53. I have the thought of trying to vomit in order to lose weight. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 54. I need to keep people at a certain distance
(feel uncomfortable if someone tries to get too close). | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 55. I think my thighs are just the right size. | 1 | 2 | 3 | 4 | 5 | 6 |
| 56. I feel empty inside (emotionally). | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 57. I can talk about personal thoughts or feelings. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 58. The best years of your life are when you become an adult. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 59. I think that my buttocks are too large. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 60. I have feelings I can't quite identify. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 61. I eat or drink in secrecy. | 1 | 2 | 3 | 4 | 5 | 6 |
| 62. I think that my hips are just the right size. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 63. I have extremely high goals. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 64. When I am upset, I worry that I will start eating. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

T F Please answer the next set of questions by indicating True (T) or False (F).

- | | |
|---|--|
| 65. ☐ T ☐ F | 65. When I have eaten my quota of calories, I am usually good about not eating more. |
| 66. ☐ T ☐ F | 66. I deliberately take small helpings as a means of controlling my weight. |
| 67. ☐ T ☐ F | 67. I have a pretty good idea of the number of calories in common food. |
| 68. ☐ T ☐ F | 68. While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it. |
| 69. ☐ T ☐ F | 69. I enjoy eating too much to spoil it by counting calories or watching my weight. |
| 70. ☐ T ☐ F | 70. I stop eating when I am not really full as a conscious means of limiting the amount that I eat. |
| 71. ☐ T ☐ F | 71. I consciously hold back at meals in order not to gain weight. |
| 72. ☐ T ☐ F | 72. I eat anything I want, any time I want. |
| 73. ☐ T ☐ F | 73. I count calories as a conscious means of controlling my weight. |
| 74. ☐ T ☐ F | 74. I do not eat some foods because they make me fat. |
| 75. ☐ T ☐ F | 75. I pay a great deal of attention to my figure. |

Please indicate your answer above the response that is appropriate for you.

76. How often are you dieting in a conscious effort to control your weight?
- ☐ rarely ☐ sometimes ☐ usually ☐ always
77. Would a weight fluctuation of 5 pounds affect the way you live your life?
- ☐ not at all ☐ slightly ☐ moderately ☐ very much
78. Do feelings of guilt about overeating help you to control your food intake?
- ☐ never ☐ rarely ☐ often ☐ always
79. How conscious are you of what you are eating?
- ☐ not at all ☐ slightly ☐ moderately ☐ extremely

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80. How frequently do you avoid 'stocking up' on tempting foods?

- ☐ almost never ☐ seldom ☐ usually ☐ almost always

81. How likely are you to shop for low calorie foods?

- ☐ unlikely ☐ slightly likely ☐ moderately likely ☐ very likely

82. How likely are you to consciously eat slowly in order to cut down on how much you eat?

- ☐ unlikely ☐ slightly likely ☐ moderately likely ☐ very likely

83. How likely are you to consciously eat less than you want?

- ☐ unlikely ☐ slightly likely ☐ moderately likely ☐ very likely

84. On a scale of 0 to 5, where 0 means no restraint in eating (eating whatever you want) and 5 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?

- | | | | | | |
|--|--|--|--|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| eat whatever
you want,
whenever
you want it | usually eat
whatever you
want, whenever
you want it | often eat
whatever you
want, whenever
you want it | often limit
food intake
but often
"give in" | usually limit
food intake
rarely
"give in" | constantly
limiting food
intake, never
"giving in" |

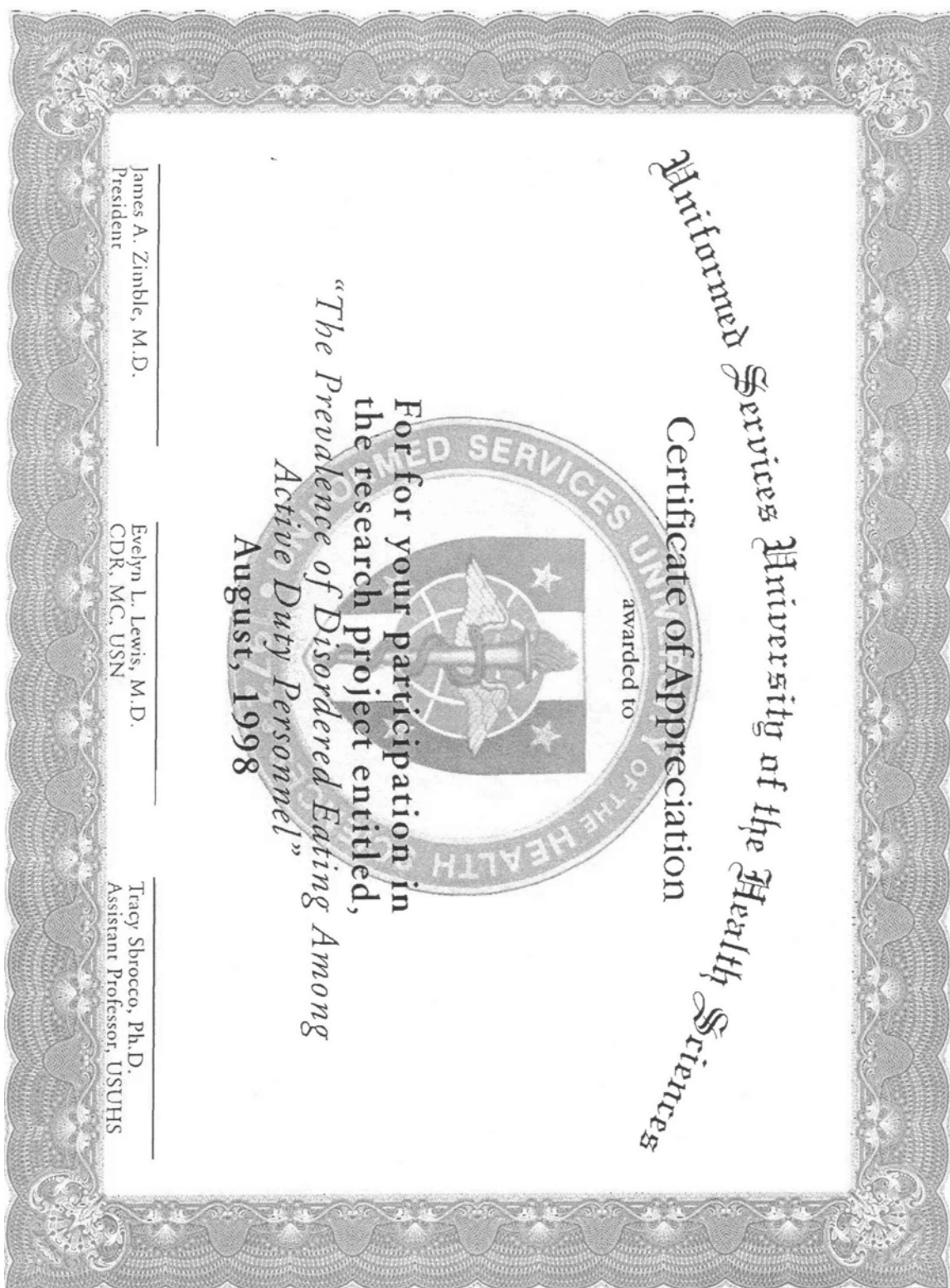
Thank you for taking the time to fill out this survey. Your time and your responses are greatly appreciated.

If you would like more information, please see the cover sheet for contact addresses.

Please use the back of this page to write in other weight concerns and strategies that you or someone you know may have used that were not included in this questionnaire.

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Appendix B: Sample Certificate of Appreciation



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