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The Prevalence of Disordered Eating Among Varsity Collegiate Female Athletes

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THE PREVALENCE OF DISORDERED EATING AMONG VARSITY COLLEGIATE FEMALE AHTLETES

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by
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ABSTRACT

The purposes of this study were to 1) determine the prevalence of disordered eating among female varsity athletes, and 2) determine if there is a greater prevalence of disordered eating among athletes who participate in sports that emphasize leanness than those that do not.

This study was designed to measure levels of behavior related to disordered eating patterns rather than to diagnose any eating disorders among the participants. The survey included a web-based version of the self-reported Eating Attitudes Test (EAT-26) questionnaire as well as demographic questions. The 26 question EAT-26 survey consists of three sub-scales: dieting, bulimia and food preoccupation, and oral control.

Those invited to participate were female varsity athletes from three Atlantic Coast Conference universities; their university athletic director sent the athletes an informational letter containing a link to the web-based survey and invited them to complete the survey. Sixty-four athletes from the three universities completed the survey. Respondents were categorized as participating in a "lean" or "non-lean" sport based on physical esthetics associated with that sport.

Forty-five (70.3%) of the women participated in a non-lean sport and 17 (26.6%) participated in a lean sport. Two (3.1%) participants did not indicate a sport affiliation. The mean BMI for the total population was 22.3 $\pm$ 2.5, with one athlete significantly underweight and 10 overweight according to standards.

The prevalence of greater risk of disordered eating behaviors among the respondents was 23.4%, with no significant differences based on types of sports in

which they participated. Relative risk of disordered eating behaviors among the total sample was 0.97. The mean score for the EAT-26 across the entire sample was 10.42 ± 11.32, indicating a wide range of eating behaviors among this population. The mean EAT-26 score for the non-lean sports was 9.73 ± 11.70, and the mean score for the lean sports was 11.94 ± 10.84; these means are not statistically significantly different. The two sports with the highest mean score on the EAT-26 were the non-lean sports of volleyball and golf and the lowest score was reported by basketball and gymnastics.

DEDICATION

I would like to dedicate this work to my family and friends. Their continuous love, encouragement, and support gave me the strength to see this through to the end and allowing me to keep my sanity! Thank you.

ACKNOWLEDGMENTS

I would like to thank my advisor, Dr. Beth Kunkel, for all her help and support. I would also like to thank Dr. Kemper and Dr. Jenkins for their dedication and support in helping me achieve my goal.

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CHAPTER ONE

LITERATURE REVIEW

Over the past two decades, there has been considerable research on the risk factors and incidence of eating disorders among college students, particularly females. Eating disorders affect 5 to 10 million Americans and 70 million individuals worldwide. In the United States, as many as 10 million females have a clinically diagnosable eating disorder such as anorexia or bulimia (Crowther et al., 1992; Shisslak et al., 1995). Prevalence rates of both anorexia and bulimia among females in Western countries are estimated to range from 0.4%-13.0% (Makino et al., 2004). The incidence and prevalence of eating disorders in athletes mirror those of the general population. Johnson et al. (1999) found that, out of 1,445 Division I varsity athletes, 9% of the female athletes needed treatment for their eating disorders, and an additional 58% were at a high risk for developing eating disordered behaviors.

Anorexia nervosa is defined by the following criteria: (1) refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected); (2) failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected; (3) intense fear of gaining weight or becoming fat; (4) disturbance in the way in which body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight; and amenorrhea. Within anorexia nervosa, there are two types: restricting—where the person has not regularly engaged in binge-eating or

purging behavior, and binge eating/purging—where the person has regularly engaged in binge-eating or purging behavior. The physical complications of anorexia nervosa may be life threatening. Cardiovascular complications are the most common and the most likely to result in fatalities, particularly in those who vomit, purge or abuse diuretics, because of the electrolyte abnormalities induced. Osteoporosis is an early and perhaps irreversible consequence of severe weight loss. Other complications include hypothermia, blood pressure instability, renal abnormalities, and hypokalemia (Palla and Litt, 1988; Sharp and Freeman, 1993).

Bulimia nervosa is defined by the following criteria: (1) recurrent episodes of binge eating (an episode of binge eating is characterized by eating, in a discrete period of time, an amount of food that is larger than most people would eat during a similar period of time and under similar circumstances, and a sense of lack of control over eating during the episode); (2) recurrent inappropriate compensatory behavior in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting or excessive exercise; (3) the binge eating and inappropriate compensatory behaviors that both occur, on average, at least twice a week for 3 months; (4) self-evaluation unduly influenced by body shape and weight; and (5) disturbances that do not occur exclusively during episodes of anorexia nervosa. Bulimia nervosa can be categorized into two types: purging—where the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas, and non-purging—where the person has used other inappropriate compensatory behaviors, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics,

or enemas (DSM-IV, 2000). Few physical clues can be found that aid in the diagnosis of bulimia. Possible physical signs include ulceration or scarring of the dorsum of the hand, salivary gland hypertrophy, and dental enamel erosion. In laboratory testing, patients with active bulimia may have fluid and electrolyte abnormalities, particularly hypokalemic alkalosis, and some also have elevated serum amylase levels. Rare complications include myopathies from misuse of emetics, ruptured esophagus and pneumomediastinum associated with vomiting, and subtle abnormalities in neuroendocrine regulatory systems (Mitchell et al., 1987).

Because of the evidence of a continuance, the phrase "eating disorders not otherwise specified" (EDNOS) was introduced in the DSM-IV. It is used to characterize all disordered eating behaviors that do not meet all criteria indicated for bulimia nervosa or anorexia nervosa, yet indicate a significant disturbance in normal eating patterns. Disordered eating encompasses a spectrum of abnormal eating behaviors such as food and/or fluid restriction and is less severe than the full Diagnostic and Statistical Manual of Eating Disorders (DSM-IV-TR) definition criteria for an eating disorder (American Psychiatric Association, 2000). Some examples of these less severe disordered eating patterns include a preoccupation with food and calories, strict avoidance of high fat and high calorie foods, and developing an obsession with exercise to compensate for food intake. Practices such as self-induced vomiting, excessive exercise, laxative use, diuretic use, and diet pills are considered to be pathogenic weight control practices and are each associated with eating disorders (Dummer et al., 1987). However, due to the association with such health risks such as amenorrhea, osteoporosis, and clinical eating disorders,

disordered eating must be taken very seriously (Sanborn et al., 2000). Disordered eating behaviors can develop into clinical eating disorders.

Anorexia nervosa and bulimia nervosa have complex etiologies that are shaped by developmental, social, and biological processes. There is emerging evidence that both anorexia and bulimia are familial disorders with strong biological correlates. The exact nature of the interactions between these processes is not completely understood. Food behaviors are controlled by many factors, including appetite; availability; family, peer and cultural practices; and attempts at voluntary control. Dieting in order to achieve a body weight leaner than needed for health is highly promoted by current fashion trends, in promotional campaigns for special foods, and in some activities and professions (NIMH, 2005). One of the professions in which body image is scrutinized is competitive sports.

Athletes at a Division I National Collegiate Athletic Association institution participated in a study to determine their general nutritional knowledge (Rosenbloom et al., 2002). Although many had a working knowledge of general nutrition, responses indicated that much of that information was misconstrued. If athletes make food choices based on incorrect information, there could be negative consequences on health as well as sport performance. In another study, fewer than 40% of athletes reported they received nutritional information before college and, despite receiving formal nutrition education in college, 99% of these athletes had suboptimal nutritional knowledge and practices (Batson et al., 2004).

Anorexia nervosa, bulimia nervosa, and disordered eating behaviors have been well defined and recognized in athletes at all levels of sport. Most athletes do

not meet the clinical criteria for eating disorders as defined in the Diagnostic and Statistical Manual of Mental Disorders (American Psychological Association, 2000). However, rates of eating disorders among athletes are higher than in the general population and athletes may present with many of the underlying symptoms of disordered eating (Patel et al., 2003). In the past decade, elite athletes have experienced serious health problems associated with disordered eating behaviors or clinically diagnosed eating disorders (Johnson et al., 1999; Thompson et al., 1999).

Brownell et al. (1992) listed personality characteristics associated with eating problems such as competitiveness, concern with performance, compulsive concern with body shape, and perfectionism. When performance and weight were both issues for the athlete, risk for disordered eating behaviors was increased (Sundgot-Borgen, 1994).

In other research examining the incidence of eating disorders among female college students, participation in sports increased the potential for eating disorders (Berry and Howe, 2000). In addition to the socio-cultural esthetics of a thin physique, female athletes may feel pressure from coaches, trainers, judges, and teammates to meet weight restrictions and to strive for a low body weight or body fat percentage in order to make the team or maintain a competitive edge in a sport (Kirk et al., 2001).

There are perceived ideal images for athletes in different sports. A runner is tall and thin, a gymnast is short and petite, and a football player is muscular. Athletes that do not fit the ideal body type for their sport are more likely to have both internal

and external pressure to achieve that specific body image and are at higher risk of body dissatisfaction (Krane et al., 2001). Williamson et al. (1995) found that eating disorders in female varsity athletes were influenced by the interaction of perceived social pressures from teammates regarding body weight or size, performance anxiety, and negative self-appraisal of athletic achievement. Self-imposed expectations and thoughts that the 'thinner you are the better you will perform' can also contribute to patterns of disordered eating. Rosen et al. (1986) found that 32% of a female collegiate athlete sample practiced disordered weight control behaviors and 70% of those athletes felt such practices were harmless. Berry and Howe (2000) found that social pressure to be thin was a significant predictor of restrained eating and disordered eating symptomology and that coaches and peers can play a significant role in the development of eating disorders among female varsity gymnasts. This type of pressure might lead to a drive for thinness, preoccupation with weight and shape, adoption of pathogenic weight control behaviors, and eventually serious eating problems (Smolak et al., 1999). Thompson and Sherman (1993) proposed three possible explanations for the prevalence of eating disorders in athletes: athletics may attract already at risk individuals, participation may result in the disorder, or participation may precipitate the disorder in those who are predisposed to its development. It may be then that individuals who are beginning or who are already involved in competitive sports are at risk for the development of an eating disorder particularly when the pressures of the sports arena are factored in (Berry and Howe, 2000).

Thinness and leanness can be viewed as beneficial in both performance and appearance. Athletes who participate in sports in which low weight or small body size is considered important for success in performance may be at higher risk for eating disorders (Kirk et al., 2001). 'Lean sports' are those sports that, for competitive or esthetic reasons, place value on leanness. Examples are distance running, gymnastics, swimming and diving, cheerleading, and dance. With the assumption that participation in different sports poses different pressures for athletes, there might be a higher or lower risk or prevalence of disordered eating among those athletes. Female athletes who participate in esthetic sports such as gymnastics, dance, and figure skating were more likely to report body dissatisfaction, score higher on the Eating Disorder Inventory (EDI), and be diagnosed with a clinical eating disorder than athletes who participate in non-lean sports (Berry and Howe, 2000). Based on results of a meta-analysis of the relationship between athletic participation and eating problems, elite female athletes competing in lean sports, especially dance, had a higher risk for eating problems (Smolak et al., 2000).

Screening for risk of disordered eating is important in achieving early intervention. An efficient and effective screening tool should associate behavioral or dietary factors with specific diagnostic signs or health outcomes in a valid and explicit manner, assess representative criteria from a variety of participants exhibiting diverse characteristics, and be an appropriate length. The last of these is particularly important, as it is seldom viable to screen large numbers of participants with lengthy surveys or costly and time intensive clinical interviews.

Commonly used screening tools include the Diagnostic Survey of Eating Disorders (DSED)—a lengthy survey designed to identify susceptibility to anorexia nervosa or bulimia; the Eating Attitudes Test 26 (EAT-26)—a 26 question survey used to identify those at risk of developing an eating disorder or for evaluating the effect of treatment; and the Survey of Eating Disorders Among Athletes (SEDA) a 33 item questionnaire identifying self-reported eating pathology and contributing factors specific to athletic environment. The SEDA was developed by professionals exposed to athletic, student, and eating disordered populations, making it appropriate for an athletic population. Although these tools appear to be valid and reliable, they can be time consuming and require considerable effort from the participant. In addition to their length, the DSED and the EAT-26 are not specific to athletes (DePalma et al., 2002). Despite the fact the EAT-26 is not specific to athletes it is the most widely used, reliable test to assess risk of developing an eating disorder.

The discriminant function for prediction of risk was effectively assessed by the EAT-26 and an interview among varsity athletes at risk for disordered eating behaviors (DePalma et al., 2001). The EAT-26 was effective in determining the correlation between nutrition and incidence of stress fractures in ballet dancers. The researchers reported a higher degree of anorectic tendencies among the group that had a higher incidence of stress fractures (Frusztajer et al., 1990).

Although athletes who may be at moderate risk of developing disordered eating behaviors and never manifest full-blown clinical eating disorders, they still present health concerns to the coaches, staff and faculty who work with them. This study was designed to assess prevalence of disordered eating behaviors among a larger

sample of female varsity athletes from National Collegiate Athletic Association Division I schools.

CHAPTER TWO

MATERIALS AND METHODS

The purposes of this study were to: 1) determine prevalence of disordered eating among varsity female athletes and 2) determine if there is a greater prevalence of disordered eating among athletes who participate in sports that emphasize leanness than those that do not.

This study was a cross-sectional design using a web-based survey to obtain responses from female varsity athletes at each of the Atlantic Coast Conference (ACC) schools. The study was submitted to the Clemson University Institutional Review Board (IRB). Upon receiving approval for the study, a letter was sent to the appropriate athletic director at each ACC school requesting permission to ask their female athletes to complete a survey on eating behaviors. (Appendix A) Of the twelve schools in the conference, permission was granted by the University of Maryland, North Carolina State University, and Clemson University. After receiving permission, an informational letter containing a hyperlink to the survey was sent to each of these athletic directors (Appendix A). The letter introduced the researchers and the intent of the study. The letter was then distributed by each school to their female athletes via e-mail. The survey was published through the online survey website Perseus SurveySolutions Express®, which ensured the confidentiality and anonymity of the responses. A copy of the survey is located in Appendix B.

The survey included the self-reported Eating Attitudes Test 26 questionnaire (EAT-26; Garner et al., 1982), which was used with permission. The EAT-26 is a

highly valid and reliable instrument to measure levels of behavior related to disordered eating patterns; it is not a diagnostic tool. The EAT-26 can be scored as a total and in three subscales:

Dieting, which contains 13 items relating to avoiding "fattening" foods and preoccupation with being thinner;

Bulimia and Food Preoccupation, which contains 6 items reflecting thoughts about food and bulimic behaviors; and

Oral Control, which contains 7 items relating to self-control of eating and the perceived pressure from others to increase body weight.

In scoring the EAT-26, a total score greater than 20 is indicative of eating disorder behaviors.

For each question in the survey, each participant responded by choosing one of 6 choices on a Likert-type scale including always, usually, often, sometimes, rarely, or never. For the first 25 questions, 3 points were awarded to answers of "always," 2 points to answers of "usually," 1 point for answers of "often," and 0 points for answers of "sometimes," "rarely," and "never." For question 26, 0 points were awarded for "always," "usually," and "often," 1 point for "sometimes," 2 points for "rarely," and 3 points for "never." For the 5 behavior questions, each respondent chose either yes or no.

For this study, a set of demographic questions including self-reported height, weight, highest adult weight, lowest adult weight, perceived ideal weight, birth year and sport were included. Body Mass Index (BMI) was calculated using current weight and height of each athlete.

When the survey results were downloaded from the website, the data were exported from Perseus SurveySolutions Express® into Microsoft Windows Excel.

The data were then entered into SPSS for all analyses. The data were then sorted into sets. These sets included demographic questions, attitude questions, and behavior questions. The athletes were grouped into sub-sets of lean and non-lean sports. The classification of athletes participating in lean versus non-lean sports was based on the assumption that lean sports are those sports that place a competitive or aesthetic value on leanness, whereas non-lean sports do not. (Reinking et al., 2005; Smolak et al., 2000; Petrie & Rogers, 2001). Lean sports were gymnastics, swimming and diving, and track and field. Non-lean sports were basketball, golf, rowing, soccer, softball, tennis and volleyball.

Frequency analysis was performed by sport for all questions on the survey. Due to the small sample size, the Mann-Whitney U test was performed to determine the mean EAT-26 score for the entire sample. The prevalence rate and relative risk was performed. To determine significant differences between prevalence rate of disordered eating behaviors between the two groups (lean and non-lean), and EAT-26 scores between the two groups, a one-way ANOVA was run. Correlation analyses were also conducted to determine possible associations between variables.

CHAPTER THREE

RESULTS AND DISCUSSION

Description of Responses

From the 3 participating schools, 64 female varsity athletes completed the survey. Forty-five (70.3%) of the women participated in a non-lean sport and 17 (26.6%) participated in a lean sport (Smolak et al., 2000; Petrie and Rogers, 2001). Two (3.1%) participants did not indicate a sport affiliation. The number of responses from different women's sports can be found in Table C-1.

The participants were asked to provide descriptive data (Table C-2), including year of birth, height, current weight, highest weight, lowest weight, and ideal weight. The means for the total population were age 22 ± 1.5 years; height, 67 ± 3.5 inches; current weight, 146 ± 23 pounds; highest adult weight, 153 ± 25 pounds; lowest adult weight, 134 ± 22 pounds; and perceived ideal weight, 139 ± 21 pounds. The greatest percentage of the participants (26.6%) were 20 years of age. The range in age was 19 to 27 years. The most frequently reported height was 66 inches (15.6%). Height ranged from 61 to 76 inches.

The 2 most frequently reported current weights were 125 pounds and 155 pounds, both of which were reported by 7.8% of the respondents. Weights ranged from 107 to 188 pounds. The highest adult weight ranged from 124 to 218 pounds, with 9.4% of the respondents reporting a highest adult weight of 135 pounds. The lowest adult weight ranged from 95 to 185 pounds, with 10.9% reporting a lowest adult weight of 125 pounds. The minimum variation between highest and lowest adult weight was 3 pounds and the maximum variation was 71 pounds, with a mean

difference of 18.7 pounds. There was no statistically significant correlation between this flux in body weight and scores on the EAT-26 ($r = 0.29$, $p>0.05$). Mond et al. (2006) discussed the conflicting evidence on the reliability of self-reported weights and concluded that, based on his work, there is "acceptable agreement" between self-reports and interview assessments.

Perceived ideal weight ranged from 105 to 185 pounds, with 9.4% of the respondents each reporting an ideal weight of 135 and 150 pounds. Thirty-nine (60.9%) of the athletes provided perceived ideal weights that were at least 5 pounds less than their current weights.

These demographic characteristics of athletes participating in this study are comparable to those of other studies involving varsity female athletes (Creighton et al., 2000; Emslander et al., 1998; Lloyd et al., 1987; Taaffe et al., 1997).

According to the National Heart, Lung, and Blood Institute (1998), normal Body Mass Index (BMI) for adults are between 18.5 to 24.9 kg/m^2. Mean BMI for the total population was 22.3 ± 2.5 (Table B-1). Mean BMI for each sport was basketball, 21.6 ± 1.4; golf, 24.5 ± 4.95; gymnastics, 22.8 ± 2.05 ; rowing, 23.7 ± 1.9 ; soccer, 21.2 ± 1.72; softball, 24.8 ± 2.71; swimming, 21.4 ± 2.3; tennis, 20.3 ± 2.22; track and field, 21.7 ± 3.3; volleyball, 22.3 ± 1.5; and no sport indicated, 20.5 ± 0.71. These numbers are comparable to those reported by Shroff et al. (2006). The National Health and Nutrition Examination Survey III collected reference data to establish weight and height norms (Table B-2) at different ages for females from birth to age 20 and from age 20 to 74 (NHANES III, Kuczmarski, et al., 2002). Of the 64 participants in this study, 1 was significantly underweight with a BMI of 18.3 and 2 had low body weights based on BMIs of 19 and 19.1. Ten of the athletes had

BMI's greater than 25, which is considered overweight. Of those 4 were rowers (25.4, 25.8, 25.8, and 27.8), 1 was track/cross country (28.5), 1 was a golfer (28.3), 3 were softball players (25.8, 27.3, 29.2), and 1 was a gymnast (26.6). Thus, 15.6% of this population was overweight, compared to 66.2% of the general adult population.

EAT-26 scores

The first objective for this study was to determine the prevalence of disordered eating behaviors among collegiate female athletes. For the EAT-26, a score of 20 or higher is indicative of increased risk of disordered eating behaviors. Of the 64 respondents, 15 had scores of 20 or higher, making the prevalence of disordered eating behaviors among this group of female athletes 23.4%, which is higher than the 3.2% incidence in the general population of females (18-30 years) (Ghaderi & Scott, 2001), but less than the 58% of the female varsity athletes who were at risk of disordered eating behaviors reported by Johnson et al. (1999).

The second objective for this study was to determine whether type of sport increased risk of disordered eating behaviors. The prevalence of disordered eating was 22.2% among athletes participating in lean sports and 22.7% among athletes participating in non-lean sports. There were no statistically significant differences in these values ($f = 0.655$, $p>0.05$), nor were they correlated with each other ($r=0.087$, $p>0.05$). In similar studies, it was found that the prevalence of disordered eating behaviors is higher in athletes (13.5%) than in controls (4.6%; $P< 0.001$). It was also noted that the prevalence of disordered eating behaviors is more common among those competing in leanness-dependent and weight-dependent sports than in other sports (Sundgot-Borgen & Torstveit, 2004).

The mean EAT-26 score for the non-lean sports was 9.73 ± 11.70, and the mean score for the lean sports was 11.94 ± 10.84 (Table C-8); these scores are not significantly different ($f = 0.457$, $p>0.05$). The relative risk of disordered eating behaviors among athletes participating in lean or non-lean sports was 0.97 (null = 1), thus, there was no observable difference in the rate of disordered eating behaviors.

Berry and Howe (2000) found that particular sports may have a higher number of athletes who may be at risk for disordered eating behaviors, but that was not supported by the results of the present study. The two sports with the highest number of athletes scoring above 20 on the EAT-26 (Table C-9) in the present study were the non-lean sports of volleyball and golf, and the lowest number of athletes scoring above 20 participated in basketball and gymnastics.

Responses to Attitude Questions from the EAT-26

The EAT-26 can be broken down into three sub-scales: dieting, bulimia and food preoccupation, and oral control. Appendix C lists the questions included in each of the sub-scales. Table C-3 contains responses. In the dieting sub-scale (Table C-4), a majority of the responses were sometimes, rarely, and never. When asked to respond to "Am terrified about being overweight", 42 (66%) of the responses were either always or sometimes. In response to the question, "Am preoccupied with a desire to be thinner", 33 (52%) of the responses were either always or sometimes. When asked "Do you enjoy trying new, rich foods", 54 (84%) indicated rarely or never.

In the bulimia/food preoccupation sub-scale (Table C-5), 55 (86%) of the respondents have thought to varying degrees of the impulse to vomit after meals. When asked if they did in fact vomit after their meals, 6 (9%) said they did sometimes while 58 (90%) rarely or never did. Despite 45 (70%) responses indicating a preoccupation with food, only 25 (39%) said they give too much time and thought to food.

For the seven questions in the oral control sub-scale (Table C-6), most of the responses were "sometimes," "rarely," or "never." These responses provide an indication that the participants tend to be selective in what they eat and are aware of what they are eating. There was no indication that they restrict their intake of food through such behaviors as cutting food into small pieces or that other people would prefer that they ate more.

Responses to Behavior Questions from the EAT-26

Responses to the behavior questions on the EAT-26 questionnaire are provided in Table C-7. When asked if they had, in the past 6 months, gone on eating binges where they felt that they may not be able to stop, 39 (60.9%) women responded never, 6 (9.4%) reported once a month or less, 9 (14.1%) reported 2 to 3 times per month, and 5 (7.8%) each reported once a week and 2 to 6 times per week. Those who gave a positive response were 5 of the 11 rowers, 4 of the 7 track/cross country, and 4 of the 4 volleyball players. In a study conducted by the NCAA (Johnson et al., 1999**),** more than one fourth of both male and female athletes reported episodes of consuming large quantities of food at some time in their lives. Female athletes in the Johnson et al. (1999) study were much more likely to feel out

of control during an episode of overeating than males (81% compared to 45%, $p<0.0001$). Thus, when the full criteria for a binge (episode of consuming a large quantity of food plus feeling out of control) is considered, more female athletes (22.68%) than male athletes (11.97%) binge eat ($p<0.0001$).

Fifty-five (85.9%) women reported they never have made themselves sick (vomited) to control their weight or shape, 5 (7.8%) reported doing so once a month or less, 1 (1.6%) each reported doing so 2 to 3 times per month and once a week, and 2 (3.1%) reported doing so 2 to 6 times per week. Those with positive responses included 2 of the 4 volleyball players. Fifty-six (87.5%) women reported they have never used laxatives, diet pills, or diuretics to control their weight or shape, 4 (6.3%) reported doing so once a month or less, 2 (3.1%) reported doing so 2 to 3 times per month, and 1 (1.6%) each reported doing so 2 to 6 times per week and once a day or more. Those with positive responses included 2 of the 4 volleyball players. Taub et al. (1992) found that even though the more severe methods of pathogenic weight control, such as laxative use and vomiting, were used less frequently, their use was still noteworthy.

When asked if they have ever exercised more than 60 minutes a day to lose or control their weight, 32 (51.6%) reported never, 11 (17.7%) reported once a month or less, 5 (8.1%) reported 2 to 3 times per month, 2 (3.1%) reported once a week, 9 (14.5%) reported 2 to 6 times per week, and 3 (4.8%) reported once a day or more. Thus, slightly less than 50% of the respondents indicated they have exercised more than 60 minutes a day to lose or control their weight. Exercising for weight control reasons was associated with disordered eating and those who exercise

for appearance rather than for health reasons may also be more at risk for the development of eating disorders (Silberstein et al., 1988).

When asked if they had lost 20 pounds or more in the past 6 months, 62 (96.9%) had not and 2 (3.1%) had; both of these student-athletes were softball players. This is consistent with the fairly narrow range of weight fluctuations reported by most of the athletes as part of the demographic questions.

CHAPTER FOUR

CONCLUSION

The results of this study were comparable to results in studies involving collegiate female athletes. Using a total score of 20 or higher on the EAT-26 to indicate increased risk of disordered eating behaviors, 23.4% of the respondents were at risk of disordered eating behaviors. This prevalence is higher than the 3.2% of females in the general population, but lower than the 58% of females found at risk in similar studies. Despite a higher mean EAT-26 score among the lean sports (11.94 + 10.84) than among non-lean sports (9.73 + 11.70), there was no significant difference between the prevalence rates of 22.2% among participants of lean sports and 22.7% among participants of non-lean sports.

Similar studies have found that athletes participating in a particular type of sport may be at higher risk for disordered eating behaviors. The result of this study did not support that. Other studies have reported that athletes in sports not requiring leanness have shown symptoms of disordered eating behaviors (Berry and Howe, 2000). Athletes may view losing weight as a performance enhancer, thus, even in sports that have less appearance emphasis (i.e., basketball compared to gymnastics), one might expect some pressure to attain and maintain a relatively low weight (Smolak et al., 2000). Additional research among a larger sample, as well as further differentiation among each sport, is necessary to make meaningful conclusions about the incidence of disordered eating patterns among female student-athletes.

APPENDICES

Appendix A

Information Concerning Participation in a Research Study

Information Concerning Participation in a Research Study
Clemson University

Attitudes toward Eating Behaviors among Female Collegiate Athletes

Description of the research and your participation

You are invited to participate in a research study conducted by Dr. Beth Kunkel and Lindsey Clarke, a graduate student in nutrition. The purpose of this research is to determine the attitudes toward eating and body image among female collegiate athletes at ACC schools.

Your participation will involve completing an on-line survey about your eating behaviors and attitudes toward body weight. This survey will take about 10 minutes to complete.

Risks and discomforts

There is a slight risk that completing some of the questions on this survey will make you feel uncomfortable as you think about aspects of your eating behaviors. You may choose not to answer any questions that make you feel uncomfortable or you may stop completing the survey at any point if you feel too uncomfortable to continue.

Potential benefits

There are no known benefits directly to you that would result from your participation in this research. This research may help us to understand more about eating behaviors and body image among female collegiate athletes so that programs can be developed to help athletes achieve and maintain healthy behaviors.

Protection of confidentiality

We will not be able to identify who participates in this research since it is being submitted to a website and we are not asking for any personal identifiers in the survey itself. The survey company who will collect the data will be able to access the address of the computer from which you complete the survey, but do not intend to use those data in any way. We will not have access to that information. Data obtained from this research will only be presented in an aggregate manner, which will further decrease any potential for identification. In rare cases, a research study will be evaluated by an oversight agency, such as the Clemson University Institutional Review Board or the federal Office for Human Research Protections, that would

require that we share the raw data from this study. If this happens, the information would only be used to determine if we conducted this study properly and adequately protected your rights as a participant.

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate by choosing not to complete the on-line survey. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Contact information

If you have any questions or concerns about this study or if any problems arise, please contact Dr. Beth Kunkel at Clemson University at 864.656.5690. If you have any questions or concerns about your rights as a research participant, please contact the Clemson University Office of Research Compliance at 864.656.6460.

Dear Associate Athletic Director:

We are asking your permission to allow your female varsity athletes to participate in an on-line survey to determine the prevalence of disordered eating patterns among female varsity athletes in ACC schools. This study is part of a research project being conducted by Dr. Beth Kunkel and Lindsey Clarke at Clemson University. Dr. Kunkel is a professor in the Department of Food Science and Human Nutrition and Ms. Clarke is an athletic trainer completing her MS degree in nutrition.

The survey will be conducted on-line through Peresus SurverSolutions Express®, a web-based survey system. If you allow us permission to access your athletes, we will ask that your staff send them an e-mail with the attached informational letter; this letter meets IRB requirements for studies that waive documentation of consent. In essence, if they complete the survey, they are providing their consent. In this e-mail, athletes will be asked to access the website where the survey will be and to complete any or all of the questions. The survey is a standard survey used by nutritionists to assess attitudes toward eating that may be suggestive of a disordered eating pattern; it is NOT a diagnostic tool. We have attached a copy of the survey tool for your review as well.

When we download the survey from Peresus SurveySolutions Express®, we will maintain the data on a computer in Dr. Kunkel's laboratory and will only report aggregate data in publications from this study. We will be happy to provide you with the aggregate data from your institution if you would like.

Thank you for your consideration of allowing us to conduct this survey at your institution. If you decide to participate, please contact Ms. Clarke at lclarke@clemson.edu or me at bkunkel@clemson.edu

Sincerely,

M. E. Kunkel, PhD, RD
Professor

Appendix B

Eating Attitudes Test (EAT-26)

	A	U	O	ST	R	N
1. Am terrified about being overweight	1	2	3	4	5	6
2. Avoid eating when I'm hungry	1	2	3	4	5	6
3. Find myself preoccupied with food	1	2	3	4	5	6
4. Have gone on eating binges where I feel that I may not be able to stop	1	2	3	4	5	6
5. Cut my food into small pieces	1	2	3	4	5	6
6. Aware of the calorie content of foods that I eat	1	2	3	4	5	6
7. Particularly avoid food with a high carbohydrate content (ie. bread, potatoes)	1	2	3	4	5	6
8. Feel that others would prefer if I ate more	1	2	3	4	5	6
9. Vomit after I have eaten	1	2	3	4	5	6
10. Feel extremely guilty after eating	1	2	3	4	5	6
11. Am preoccupied with a desire to be thinner	1	2	3	4	5	6
12. Think about burning up calories when I exercise	1	2	3	4	5	6
13. Other people think that I am too thin	1	2	3	4	5	6
14. Am preoccupied with the thought of having fat on my body	1	2	3	4	5	6
15. Take longer than others to eat my meals	1	2	3	4	5	6
16. Avoid foods with sugars in them	1	2	3	4	5	6
17. Eat diet foods	1	2	3	4	5	6
18. Feel that food controls my life	1	2	3	4	5	6

19. Display self-control around food	1	2	3	4	5	6
20. Feel that others pressure me to eat	1	2	3	4	5	6
21. Give too much time and thought to food	1	2	3	4	5	6
22. Feel uncomfortable after eating sweets	1	2	3	4	5	6
23. Engage in dieting behavior	1	2	3	4	5	6
24. Like my stomach to be empty	1	2	3	4	5	6
25. Have the impulse to vomit after meals	1	2	3	4	5	6
26. Enjoy trying new rich foods	1	2	3	4	5	6

Eating Attitudes Test (EAT-26) (Continued)

BEHAVIOR

In the past 6 months have you:	Never	Once a month or less	2-3 times a month	Once a week	2-6 times a week	Once a day or more
1. Gone on eating binges where you feel that you may not be able to stop?	1	2	3	4	5	6
2. Ever made yourself sick (vomited) to control your weight or shape?	1	2	3	4	5	6
3. Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?	1	2	3	4	5	6
4. Exercised more than 60 minutes a day to lose or control your weight?	1	2	3	4	5	6

Lost 20 pounds or more?	Yes	No

Appendix C

Results Tables

Table C-1 Participant Delineation Per Sport

Sport	Number
Basketball	7
Golf	2
Gymnastics	5
Rowing	11
Soccer	11
Softball	6
Swimming/Diving	5
Tennis	4
Track & Field/Cross Country/Running	7
Volleyball	4
Not Indicated	2
Total	64

Table C-2 Self-Reported Descriptive Statistics

Parameter	Mean ± Standard Deviation (range)
Year of Birth	1985 ± *1.46* *(1980-1988)*
Current Weight (lb.)	146 ± *23* *(107-190)*
Height (in.)	67 ± *3* *(61-76)*
Highest Adult Weight (lb.)	153 ± *25* *(124-218)*
Lowest Adult Weight (lb.)	134 ± *22* *(95-185)*
Ideal Weight (lb.)	139 ± *21* *(105-185)*
BMI	22.3 ± 2.5 (19-29.2)

Table C-3 Total Frequency Delineation for EAT-26 (Attitude)

	Always	Usually	Often	Some Times	Rarely	Never
Am terrified about being overweight	14	6	8	14	14	8
Avoid eating when I'm hungry	0	1	2	18	28	15
Find myself preoccupied with food	6	7	10	22	14	5
Have gone on eating binges where I feel that I may not be able to stop	1	2	8	11	14	28
Cut my food into small pieces	0	6	3	23	14	18
Aware of the calorie content of foods that I eat [1]	8	12	12	15	11	5
Particularly avoid food with a high carbohydrate content (bread, rice, etc.)	2	1	5	13	25	18
Feel that others would prefer that I ate more	0	1	0	12	16	34
Vomit after I have eaten	0	0	0	6	4	54

[1] (1) No Response

Table C-3 Total Frequency Delineation for EAT-26 (Attitude) (Continued)

	Always	Usually	Often	Some Times	Rarely	Never
Feel extremely guilty after eating	4	3	9	12	13	23
Am preoccupied with a desire to be thinner	8	7	6	12	21	10
Think about burning up calories when I exercise	12	10	8	21	8	5
Other people think that I am too thin	0	1	5	8	20	30
Am preoccupied with the thought of having fat on my body	6	8	4	15	20	11
Take longer than others to eat my meals	0	2	4	10	26	22
Avoid foods with sugars in them	2	0	2	19	25	16
Eat diet foods	1	4	10	19	20	10
Feel that food controls my life	0	5	8	10	18	23

Table C-3 Total Frequency Delineation for EAT-26 (Attitude) (Continued)

	Always	Usually	Often	Some Times	Rarely	Never
Display self-control around food [1]	2	6	15	24	8	8
Feel that others pressure me to eat	1	0	3	7	22	31
Give too much time and thought to food	5	9	5	6	25	14
Feel uncomfortable after eating sweets	4	10	7	16	14	13
Engage in dieting behavior	2	8	7	14	19	14
Like my stomach to be empty	3	3	5	10	16	27
Have the impulse to vomit after meals	1	1	4	4	6	48
Enjoy trying rich new foods	8	8	19	20	2	7

[1] (1) No Response

Table C-4 Total Frequency Delineation for EAT-26 Dieting Sub-Scale

	Always	Usually	Often	Some Times	Rarely	Never
Am terrified about being overweight	14	6	8	14	14	8
Aware of the calorie content of foods that I eat	8	12	12	15	11	5
Particularly avoid food with a high carbohydrate content (ie. bread, potatoes)	2	1	5	13	25	18
Feel extremely guilty after eating	4	3	9	12	13	23
Am preoccupied with a desire to be thinner	8	7	6	12	21	10
Think about burning up calories when I exercise	12	10	8	21	8	5
Am preoccupied with the thought of having fat on my body	6	8	4	15	20	11

[1] (1) No Response

Table C-4 Total Frequency Delineation for EAT-26 Dieting Sub-Scale (Continued)

	Always	Usually	Often	Some Times	Rarely	Never
Avoid foods with sugars in them	2	0	2	19	25	16
Eat diet foods	1	4	10	19	20	10
Feel uncomfortable after eating sweets	4	10	7	16	14	13
Engage in dieting Behavior	2	8	7	14	19	14
Like my stomach to be empty	3	3	5	10	16	27
Enjoy trying rich new foods	1	1	4	4	6	48

Table C-5 Frequency Delineation for EAT-26 Bulimia/Food Preoccupation Sub-Scale

	Always	Usually	Often	Some Times	Rarely	Never	No Response
Find myself preoccupied with food	6	7	10	22	14	5	0
Have gone on eating binges where I feel that I may not be able to stop	1	2	8	11	14	28	0
Vomit after I have eaten	0	0	0	6	4	54	0
Feel that food controls my life	0	5	8	10	18	23	0
Give too much time and thought to food	5	9	5	6	25	14	0
Have the impulse to vomit after meals	8	10	17	20	2	7	0

Table C-6 Frequency Delineation for EAT-26 Oral Control Sub-Scale

	Always	Usually	Often	Some Times	Rarely	Never	No Response
Avoid eating when I'm hungry	0	1	2	18	28	15	0
Cut my food into small pieces	0	6	3	23	14	18	0
Feel that others would prefer that I ate more	0	1	0	12	16	34	0
Other people think that I am too thin	0	1	5	8	20	30	0
Take longer than others to eat my meals	0	2	4	10	26	22	0
Display self-control around food	2	6	15	24	8	8	1
Feel that others pressure me to eat	1	0	3	7	22	31	0

Table C-7 Total Frequency Delineation for EAT-26 (Behavior)

In the past 6 months	Never	Once a month or less	2-3 times per month	Once a week	2-6 times per week	Once a day
Have you ever gone on eating binges where you feel you may not be able to stop?	39 (60.9%)	6 (9.4%)	9 (14.1%)	5 (7.8%)	5 (7.8%)	-
Have you ever made yourself sick (vomited) to control your weight or shape?	55 (85.9%)	5 (7.8%)	1 (1.6%)	1 (1.6%)	2 (3.1%)	-
Have you ever used laxatives, diet pills, or diuretics to control your weight or shape?	56 (87.5%)	4 (6.3%)	2 (3.1%)	-	1 (1.6%)	1 (1.6%)
Have you exercised more than 60 minutes a day to lose or control your weight?	32 (51.6%)	11 (17.7%)	5 (7.8%)	2 (3.1%)	9 (14.1%)	3 (4.8%)

Table C-8 EAT-26 Score Total Per Sport Status

	N	Mean	Standard Deviation
Non-lean Sport	45	9.73	11.70
Lean Sport	17	11.94	10.84
Not Indicated	2	-	-
Total	64	10.34	11.43

Table C-9 EAT-26 Total Score Per Sport

	N	Mean	Standard Deviation
Basketball	7	3.8571	3.23669
Golf	2	20.5000	16.26346
Gymnastics	5	4.4000	2.70185
Rowing	11	6.8182	7.48088
Soccer	11	7.6364	9.77008
Softball	6	12.0000	16.22344
Swimming/Diving	5	17.4000	7.63544
Tennis	4	10.0000	10.67708
Track & Field/Cross Country/Running	7	13.4286	13.95059
Volleyball	4	24.7500	18.04393
Total	62	10.4219	11.32185

Table C-10 Sport by Sport Frequency Delineation for EAT-26 (Behavior) Question #1

In the past 6 months, have you ever gone on eating binges where you feel you may not be able to stop?	Never	Once a month or less	2-3 times per month	Once a week	2-6 times per week	Once a day
Basketball	6	-	-	-	1	-
Golf	2	-	-	-	-	-
Gymnastics	5	-	-	-	-	-
Rowing	6	-	2	2	1	-
Soccer	8	1	-	1	1	-
Softball	4	-	2	-	-	-
Swimming/Diving	1	1	1	1	1	-
Tennis	3	-	1	-	-	-
Track & Field/Cross Country/Running	3	1	1	1	1	-
Volleyball	-	2	2	-	-	-

Table C-11 Sport by Sport Frequency Delineation for EAT-26 (Behavior) Question #2

In the past 6 months, have you ever made yourself sick (vomited) to control your weight or shape?	Never	Once a month or less	2-3 times per month	Once a week	2-6 times per week	Once a day
Basketball	6	1	-	-	-	-
Golf	1	-	1	-	-	-
Gymnastics	5	-	-	-	-	-
Rowing	11	-	-	-	-	-
Soccer	10	-	-	-	1	-
Softball	4	2	-	-	-	-
Swimming/Diving	4	-	-	-	1	-
Tennis	3	-	-	1	-	-
Track & Field/Cross Country/Running	6	1	-	-	-	-
Volleyball	2	2	-	-	-	-

Table C-12 Sport by Sport Frequency Delineation for EAT-26 (Behavior) Question #3

In the past 6 months have you ever used laxatives, diet pills, or diuretics to control your weight or shape?	Never	Once a month or less	2-3 times per month	Once a week	2-6 times per week	Once a day
Basketball	7	-	-	-	-	-
Golf	1	-	1	-	-	-
Gymnastics	5	-	-	-	-	-
Rowing	11	-	-	-	-	-
Soccer	10	1	-	-	-	-
Softball	5	-	-	-	-	1
Swimming/Diving	4	1	-	-	-	-
Tennis	4	-	-	-	-	-
Track & Field/Cross Country/Running	5	1	1	-	-	-
Volleyball	2	1	-	-	1	-

Table C-13 Sport by Sport Frequency Delineation for EAT-26 (Behavior) Question #4

In the past 6 months, have you exercised more than 60 minutes a day to lose or control your weight?	Never	Once a month or less	2-3 times per month	Once a week	2-6 times per week	Once a day	No Response
Basketball	6	-	1	-	-	-	-
Golf	-	-	-	-	1	1	-
Gymnastics	2	2	-	-	1	-	-
Rowing	7	1	-	-	1	1	1
Soccer	6	2	-	2	1	-	-
Softball	3	2	-	-	1	-	-
Swimming/Diving	1	1	-	-	1	1	1
Tennis	2	1	1	-	-	-	-
Track & Field/Cross Country/Running	3	2	-	-	2	2	-
Volleyball	1	-	1	-	1	-	-

Table C-14 Sport by Sport Frequency Delineation for EAT-26 (Behavior) Question #5

In the past 6 months, have you lost 20 pounds or more?	No	Yes	No Response
Basketball	7	-	-
Golf	2	-	-
Gymnastics	5	-	-
Rowing	11	-	-
Soccer	11	-	-
Softball	4	2	-
Swimming/Diving	5	-	-
Tennis	4	-	-
Track & Field/Cross Country/Running	2	-	7
Volleyball	4	-	-

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