

PREVALENCE OF EATING DISORDERS AND PATHOGENIC WEIGHT CONTROL
BEHAVIORS AMONG MALE COLLEGIATE ATHLETES

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Training in sport environments that emphasize leanness and muscularity may damage athletes' body image and negatively influence male athletes' eating behaviors and attitudes. The Questionnaire for Eating Disorder Diagnosis and the Bulimia Test – Revised were completed anonymously online by 732 male intercollegiate athletes. Most male collegiate athletes were classified as asymptomatic (82.9%), followed by symptomatic (16%) and eating disordered (1.1%). The most common forms pathogenic behaviors were excessive exercise (51.6%), binge eating (21.4%), and dieting or fasting (20.5%). Results suggested that athletes who participate in weight class sports are at higher risk for developing these behaviors than endurance sport or ball game athletes. Counseling and other implications for professionals working with athletes are discussed.

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PREVALENCE OF EATING DISORDERS AND PATHOGENIC WEIGHT CONTROL BEHAVIORS AMONG MALE COLLEGIATE ATHLETES

Although some research has suggested that only athletes from lean or aesthetic sports have higher prevalence rates of disordered eating (Sundgot-Borgen & Torstveit, 2004), recent studies have found that sport type is not related to frequency of eating disorders and thus does not differentially increase risk across athletes (Greenleaf, Petrie, Carter & Reel, 2009; Petrie, Greenleaf, Reel, & Carter, 2008). Instead, it may be the unique sport environment pressures that all athletes experience regarding their weight, bodies, and performance that increases their risk of engaging in disordered eating behaviors (e.g., Hausenblas & Carron, 1999; Petrie & Greenleaf, in press). These pressures, which may come in the form of comments from coaches or modeled behaviors from teammates, may send the message that a lean, strong, and particularly for men, muscular body is preferable for both aesthetic and functional reasons and thus exacerbate athletes' focus on body, weight, and appearance and increase their risk of developing disordered eating and pathogenic weight control behaviors.

To explain the potential influences of these pressures, Petrie and Greenleaf (in press) modified and expanded an existing socioculturally-based model of eating disorders for male and female athletes (Petrie & Greenleaf, 2007). They suggested that athletes experience two types of pressures. First, they are exposed to general societal messages from the media, family, and friends that highlight cultural ideals in terms of body size and shape, appearance, weight, eating, and what it means to be a man or a woman. Second, as athletes, they experience sport-specific pressures from coaches, teammates, sport judges, peers, family members and the media about the size, shape, and functionality of their bodies in their sports. Thus, they receive the message that

their bodies must not only be aligned perfectly with the societal ideal, but must also highly functional so they can excel athletically.

In accord with the model, general societal pressures are expected to lead to body dissatisfaction through the internalization of societal body and appearance ideals. In turn, body dissatisfaction may result in athletes engaging in certain weight-control behaviors, such as dietary restraint and muscle building. Sport-specific pressures to attain a certain body ideal, such as a lean and/or muscular physique, may result in higher levels of dietary restraint, body dissatisfaction, and drive for muscularity. This model acknowledges that athletes face different types of pressures and that these pressures, singly or in combination, may increase body dissatisfaction and the use of pathogenic eating and weight control behaviors that, in the end, may result in the development of a subclinical or clinical eating disorder.

Consistent with this model, researchers have examined the prevalence of eating disorders and pathogenic weight control behaviors as well as body dissatisfaction among athletes (e.g., Sundgot-Borgen & Torstveit, 2004; Thompson & Sherman, 1999; Williams, Sargent & Durstine, 2003). However, most research has been conducted with female athletes, leaving a void in the literature. The limited research that has been done with male athletes suggests that they also experience eating disorders and, at even higher levels, subclinical disorders and pathogenic weight control behaviors (e.g., Petrie, Greenleaf, Reel, & Carter, 2008; Sundgot-Borgen & Torstveit, 2004). For example, amongst male athletes who were competing at the national/international level across a variety of sport types, Sundgot-Borgen and Torstveit (2004) found that 3% and 6%, respectively, met diagnostic criteria for clinical or subclinical eating disorders. In two different studies of male collegiate athletes representing 16 different sports, Petrie and colleagues (Petrie et al., 2008; Petrie, Greenleaf, Carter, & Reel, 2007) reported that

none of the athletes were classified as having a clinical eating disorder; however, between 16.6% and 19.2% of their samples were symptomatic (i.e., subclinical). Further, Johnson, Powers, and Dick (1999) reported that 9.5% and 38%, respectively, of the male collegiate athletes in their sample were at risk for anorexia nervosa or bulimia nervosa.

Regarding the potential influence of sport type on prevalence, Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, and Strauss (2009) examined male high school athletes representing 26 different sports. They found that 5.4% of the athletes who competed in ball game sports, 10% in endurance (e.g., running, swimming), 17% in weight class (e.g., rowing, wrestling), and 42% in anti-gravitational (e.g., gymnastics, skating) scored above the cutoff on the Eating Attitudes Test (EAT-26; Garner et al., 1982), indicating they were “at-risk” for disordered eating. Conversely, in a sample of male collegiate athletes, Petrie et al. (2008) found no differences in the frequency of disordered eating behaviors across sport type when classifications were made using the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz et al., 1997). The findings across these and other studies (e.g., Sanford-Martens et al., 2005; Sundgot-Borgen & Torstveit, 2004) suggest that male athletes from the high school to the elite level experience significantly more subclinical than clinical problems, and that athletes in some sports (e.g., wrestling, gymnastics) may have elevated risk. Additional research is needed to clarify the pattern of eating disorder prevalence amongst male collegiate athletes and determine if there is a relationship to sport type.

Eating disorders have not been studied just at the clinical and subclinical levels, but have included pathogenic weight control behaviors (e.g., dieting, vomiting) as well. Although the prevalence of clinical eating disorders is low (Petrie et al., 2008; Petrie et al., 2007), male athletes do report engaging in certain weight control behaviors at a much higher frequency. For

example, in a sample of male collegiate athletes, Petrie et al. (2008) reported that 37% exercised two or more hours daily in order to burn calories, 14.2% fasted or went on strict diets at least twice in the previous year, 6.5% intentionally vomited at least 2-3 times in the previous month, 4.5% used diuretics once a week, and 7.9% used laxatives once a week; another 16.7% stated they binge-ate (i.e., eating uncontrollably to the point of stuffing oneself) at least once a week. Similarly, Johnson et al. (1999) found that 26.6% of the male collegiate athletes in their sample had at least one episode of binge-eating in their lifetime; 4.42% indicated doing so daily. Regarding the use of weight-gain supplements, rates among male collegiate athletes have ranged from 11.8% to 37.5% and increased use has been related to spending more time on weight workouts each week (Raudenbush & Meyer, 2003). These studies suggest that male athletes do use pathogenic weight control behaviors, though these behaviors tend to be focused on eating, exercising, and gaining muscle mass, rather than on diuretics, diet pills, and purging-type behaviors (e.g., vomiting). Male athletes' engagement in such behaviors is likely the result of the performance expectations in their sport and the pressures to maintain a muscular but lean body build.

Although current research findings (e.g., Petrie, Greenleaf, Reel, & Carter, 2008; Sanford-Martens et al., 2005) suggest that male athletes do experience eating disorders, albeit primarily at the subclinical level and/or in the form of specific weight control behaviors (e.g., exercising), these studies have been limited in several ways. First, with few exceptions (e.g., Sundgot-Borgen & Torstveit, 2004), the studies' samples have been relatively small and limited geographically. To our knowledge, no study has used a large, diverse, nationwide, multi-sport sample to examine prevalence of disordered eating behaviors in male collegiate athletes, which is needed to better understand the extent of these problematic behaviors in this population. Second,

eating disorder measures with questionable psychometric properties, that is, not validated to determine actual prevalence (e.g., Johnson et al., 1999; Milligan & Pritchard, 2006; Rosendahl et al., 2009), have been used. Thus, current rates may be under or overestimates, and not correctly reflect male collegiate athletes' actual prevalence.

Given these limitations, my purpose was to assess eating disorders, pathogenic weight control behaviors, and body image concerns in a large, diverse, nationally-based sample of male collegiate athletes using measures that were designed for diagnostic purposes. Based on current research and theory (e.g., Petrie & Greenleaf, in press; Petrie, et al., 2008, Sanford-Martens et al., 2005), I hypothesized that: (1) the majority of athletes would be asymptomatic; followed by symptomatic and then eating disordered; (2) the most frequently used weight control behavior would be exercising, followed by use of a strictly regimented diet; very few athletes would use vomiting, diuretics, or laxatives; (3) in general, the majority of athletes would be satisfied with their bodies, reporting that specific body parts were not too fat nor that they felt fat all over; (4) sport type (i.e., endurance vs. weight class vs. ball game) and NCAA level (i.e., I vs. II vs. III) would moderate the frequency of the above behaviors and beliefs such that those athletes who competed in endurance and weight class sports and at the Division I level would report the highest level (or frequency) of disturbances.

Method

Participants. Male collegiate athletes ($N = 732$; $M_{\text{age}} = 19.91$, $SD = 1.50$) representing 17 sports and 35 of the 50 states in the U.S. participated. The athletes competed at the NCAA Division I (27.6%; $n = 202$), Division II (17.3%; $n = 127$), and Division III (54.5%; $n = 399$) levels; four athletes attended NAIA (.5%) schools. In terms of race/ethnicity, the majority were White, NonHispanic (83.9%; $n = 614$), followed by Hispanic (4.8%; $n = 35$), Black,

NonHispanic (4.6%; $n = 34$), Asian American (2.6%; $n = 19$), and American Indian (.1%; $n = 1$); the remainder identified as other (2.3%; $n = 17$) or did not answer (1.6%; $n = 12$).

In terms of academic status, 235 (32.1%) were freshmen, 179 (24.5%) sophomores, 189 (25.8%) juniors, and 129 (17.6%) seniors or above. Most of the athletes (78%; $n = 571$) received no scholarship support for their athletic participation, though 22% ($n = 161$) were either on partial or full scholarship. The 17 sports were grouped into five categories (Sundgot-Borgen & Torstveit, 2004): technical (i.e., bowling, golf, fencing, skiing; $n = 23$), endurance (i.e., swimming, track & cross-country; $n = 227$), aesthetic (i.e., diving, $n = 2$), weight class (i.e., crew, wrestling; $n = 43$), and ball game (i.e., baseball, basketball, football, hockey, lacrosse, soccer, tennis, volleyball; $n = 437$).

The athletes' body mass index (BMI) ranged from 16.09 to 44.9 kg/m² ($M = 24.28$, $SD = 3.96$). According to the Centers for Disease Control (CDC; n.d.) the athletes fell into the following weight categories: underweight (1.6%, $n = 12$), normal (64.6%, $n = 473$), overweight (24%, $n = 176$), and obese (9.7%, $n = 71$). However, only 5.5% ($n = 40$) of the athletes reported feeling fat all over.

Instruments. Participants provided information regarding their age, race/ethnicity, state where they attended college/university, NCAA competitive level, year in school, scholarship status, height, weight, and the varsity sport in which they primarily competed. The 50-item Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997) assesses eating disorder classification based on criteria from the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR*; American Psychiatric Association; APA, 2000). Participants respond to questions regarding eating disorder behaviors, such as the frequency and duration of binge eating, the use (frequency and duration) of purging behaviors,

and concerns and satisfaction with body. Based on their responses, participants are classified as eating disordered (i.e., anorexia, bulimia, or eating disorder not otherwise specified; EDNOS), symptomatic (displaying some eating disorder symptoms but do not meet a clinical diagnosis), or asymptomatic (no eating disorder symptoms). Mintz et al. (1997) provided extensive support for the measure's validity and reliability. The Q-EDD has been used to determine eating disorder prevalence among male collegiate athletes (e.g., Petrie, Greenleaf, Reel, & Carter, 2008; Sanford-Martens et al., 2005).

Seven items from the 36-item Bulimia Test Revised (BULIT-R; Thelen, Mintz, & Vander Wal, 1996) were used to determine the extent to which the athletes engaged in pathogenic weight control behaviors, specifically vomiting, laxatives, diuretics, dieting/fasting, and excessive exercise, and their frequency and duration of binge eating. Each item contains five response options, ranging from 1, *no or lowest frequency of disturbance*, to 5, *highest frequency of disturbance*. These items have been used in previous research to measure the prevalence of pathogenic weight control behaviors and binge eating among male collegiate athletes (e.g., Petrie et al., 2008).

Procedure. Approval was obtained from the university's Institutional Review Board for human subjects research. Following approval, the head athletic trainers from NCAA institutions (Division I, II, III, and NAIA) were contacted via email during the summer of 2010 to solicit their school's participation and provide information about the study. The email also contained standardized instructions for introducing the study to the athletes at their schools. Reminder emails were sent throughout the 2010-2011 academic year. Data collection began in October 2010 and was closed by June 2011.

Any male NCAA or NAIA varsity athlete was eligible to participate. The data from this study were collected online via a secure website as part of a larger study on the physical and psychological health of male collegiate athletes that was funded by a grant from the NCAA; overall, the survey questionnaire took approximately 20 minutes to complete. Prior to beginning, the athletes provided consent for their participation. Because no follow-up information was being obtained, athletes did not provide any identifying information. When done, the athletes had the opportunity to sign up for a random drawing to win one of fifty \$50.00 cash prizes. Although the athletes needed to provide their names and contact information to be entered into the drawing, these data were not associated with their questionnaire responses.

Data analysis. Data were collected via the internet through a secure web-based site and I did not have any missing data. Prevalence rates for the entire sample were determined based on the QEDD classifications (i.e., eating disordered, symptomatic, and asymptomatic). To examine the potential relationship of sport type (e.g., endurance, weight class, ball game) to QEDD classifications, chi-square analyses were conducted. In addition, I computed the frequencies with which the athletes reported engaging in different pathogenic eating and weight control behaviors, such as vomiting, excessive exercise, binge eating, and laxatives. These frequencies are reported for the entire sample as well as by sport type.

Results

Eating disorder prevalence. Based on the athletes' responses to the QEDD, the majority were classified as asymptomatic (82.9%, $n = 607$); 16% ($n = 117$) were symptomatic and 1.1% ($n = 8$) eating disordered. Of those with an eating disorder, four met the criteria for subthreshold bulimia, three for binge-eating disorder, and one for nonbinge bulimia.

Because so few athletes were classified as having an eating disorder, and consistent with past research (e.g., Cohen & Petrie, 2005; Petrie, Greenleaf, Carter, & Reel, 2007), they were combined with the symptomatic group to create a broader symptomatic/ED group ($n = 125$). Thus, for subsequent analyses, these two groups (asymptomatic vs. symptomatic/ED) were compared.

Due to the small sample sizes, athletes from the aesthetic ($n = 2$) and technical ($n = 23$) sports were excluded. There was a relationship between sport type (endurance vs. weight class vs. ball game) and eating disorder classification, $\chi^2 [2, N = 707] = 25.280, p < .001$. Athletes in weight class sports were overrepresented in the symptomatic/ED category (44.2%) compared to athletes in endurance (12.8%) and ball game (16.7%) sports. See Figure 1.

Prevalence of pathogenic weight control behaviors. For the entire sample, 21.4% ($n = 157$) reported binge eating 2-3 times a month (or more) in the previous 3 months. Regarding duration, 79% ($n = 578$) of the athletes indicated that they did not binge eat, 3% ($n = 22$) had been binge eating for less than 3 months, 3% ($n = 22$) for 3 months to a year, 5.9% ($n = 43$) for the past 1-3 years, and 9.2% ($n = 67$) for the last 3 years or more.

The two most common weight control behaviors were exercising followed by dieting/fasting; 51.6% ($n = 378$) exercised for one or more hours each day specifically to burn calories and 20.5% ($n = 150$) fasted or engaged in strict dieting at least once in the past year. In regards to more specific dietary behaviors, 25.1% ($n = 184$) used dietary supplements to help themselves gain weight and become more muscular, 14.8% ($n = 108$) maintained a low fat diet to help control their weight, and 19.1% ($n = 140$) ate a high protein/low carbohydrate diet to help control their weight. Very few of the athletes reported using more severe forms of weight control

behaviors (frequencies represent use of at least once a month or more): laxatives (1.7%, $n = 13$), vomiting (1.6%, $n = 12$), and/or diuretics (2.2%, $n = 16$). See Table 1.

For the most frequent behaviors (i.e., binge eating, exercising, dieting/fasting), I examined the frequencies by sport type.

For binge-eating the five response options were reclassified to three: “once a month or less (or never).” “up to 2-3 times a month,” and “once or twice or more a week” so analyses could be conducted.

There was a relationship between binge eating and sport type (endurance vs. weight class vs. ball game), $\chi^2 [4, N = 707] = 15.002, p = .005$. Athletes in weight class (23.3%) sports reported binge eating 2-3 times a month more often than the endurance (8.8%) and ball game (6.9%) athletes. See Figure 2.

For exercising to burn calories the five response options were reclassified into three to facilitate analyses: “I exercise but not to burn calories (or I don’t exercise),” “I exercise up to 2 hours a day,” and “I exercise 2 or more hours a day.”

There was a relationship between exercising to burn calories and sport type (endurance vs. weight class vs. ball game), $\chi^2 [4, N = 707] = 85.634, p < .001$. A higher percentage of endurance athletes (57.3%) reported not exercising to burn calories compared to weight class (20.9%) and ball game (31.8%) athletes. Ball game athletes (33.6%) reported more frequently exercising up to two hours per day than did the endurance (9.7%) and weight class (7%) athletes. Of the three groups, the weight class athletes (72.1%) were most likely to exercise 2 hours a day or more. These data suggest that, overall, weight class athletes spend the most time exercising to burn calories, followed by ball game athletes; endurance athletes spend the least amount of time exercising specifically to burn calories. See Figure 3.

For fasting and strict dieting, the five options were reclassified into three to facilitate comparisons: “never or not in the past year,” “up to 2-3 times in the past year,” and “4 or more times in the past year.”

There was a relationship between fasting and strict dieting and sport type (endurance vs. weight class vs. ball game), $\chi^2 [4, N = 707] = 51.193, p < .001$. Endurance (85.9%) and ball game (79.6%) athletes were most likely, compared to the weight class sports (48.8%) athletes, to report not having dieted/fasted in the past year. More weight class athletes (27.9% and 23.3%), however, indicated that they dieted/fasted 1-3 times per year or 4 or more times per year compared to the endurance (11.0% and 3.1%) and ball game (17.2% and 3.2%) athletes. These results indicate that weight class athletes are more likely to engage in fasting and strict dieting than athletes who participate in endurance and ball game sports. See Figure 4.

Discussion

Consistent with expectations and past research and theory (e.g., Petrie & Greenleaf, in press; Petrie, et al., 2008, Sanford-Martens et al., 2005), most of the athletes were classified as asymptomatic (82.9%), followed by symptomatic (16%) and eating disordered (1.1%). For example, Petrie et al. (2008) found similar rates of asymptomatic (80.8%) and symptomatic (19.2%) athletes, though none of their NCAA Division I male collegiate athletes met criteria for a clinical disorder, which may have been due to the fact that few of the athletes who comprised their sample participated in weight class sports. Findings from studies of male collegiate athletes (e.g., Petrie et al., 2008; Sanford-Martens et al., 2005) suggest that although the experience of clinical eating disorders is rare, these athletes do report symptoms that cluster at the subclinical level, and these symptoms are associated with physical and psychological complications, including electrolyte imbalances, dehydration, cardiac arrhythmia, depression, low self-esteem,

and substance use (Petrie & Greenleaf, 2007). Thus, researchers and counselors cannot ignore eating disorders amongst male collegiate athletes, though their focus may be at the subclinical level.

In terms of specific eating and weight management behaviors, 12.8% of the athletes reported binge-eating at least once a week and 9.4% said they had been binge-eating for 3 years or longer. Similarly, Petrie et al. (2008) found that 16.7% of the male collegiate athletes in their sample reported binge-eating at least once a week, whereas only 8% of male nonathletes were found to binge at a similar frequency (Striegel-Moore et al., 2009). Male athletes, due to the energy demands of their sports, generally need to ingest more calories than their nonathlete peers, and for specific sports, such as football where size is an essential component of sport success, these needs may be exacerbated (American College of Sports Medicine, 2009). And, over time, athletes may come to construe their eating as a binge because of the comparatively large number of calories they consume in one sitting. Alternatively, male athletes, particularly those who compete in weight class sports, may restrict their caloric intake for prolonged periods of time to achieve the weight goal of their sport (i.e., competing in the lowest weight class possible). Such extreme restriction may set the athlete up for a binge when their physiology overwhelms the cognitive controls they have been using to maintain their restricted diet (Heatherton & Baumeister, 1991). In support of this explanation, we found that weight class athletes reported binge eating more frequently than did athletes from other sports.

The most common forms of weight control behaviors amongst all the athletes were exercising specifically to burn calories (51.6%) and dieting or fasting (20.5%), which is consistent with other studies that have been conducted with male collegiate athletes (e.g., Petrie et al., 2008). Not surprisingly, male athletes are more likely to change their energy output

(exercise) or input (diet) than to rely on laxatives, vomiting or diuretics to change or maintain their weight. In general, laxatives, diuretics, and vomiting are neither efficient nor effective ways to lose weight (Tylka & Subich, 2002), and can compromise health in other ways, such as gastrointestinal problems, esophageal deterioration, dental complications, electrolyte imbalance, and dehydration (Rome & Ammerman, 2003). Being aware of these negative effects, athletes may choose to exercise and restrict their food intake instead because they know these approaches work and they may experience a secondary effect, particularly from exercise, of initially enhanced performance. Athletes also may rely on exercise and diet to manage their weight because these behaviors are accepted within the sport environment (and thus do not draw negative attention) and even extreme forms may be lauded by coaches and other sport personnel (Thompson & Sherman, 2010). Coaches may praise athletes who spend time outside of practice training/exercising, reinforcing the idea that more is better and creating behavioral expectations about eating and exercise that may not be healthy and many athletes cannot meet.

Sport type was related to not only the prevalence of eating disorders, but also to some specific eating and weight control behaviors. The athletes in weight class sports were more likely to be symptomatic or eating disordered than those who participated in endurance and ball game sports. Weight class athletes also were more likely than ball game or endurance athletes to binge eat, exercise excessively, and diet or fast. As these behaviors represent the symptoms present in subclinical disorders, it makes sense that weight class athletes would report higher frequencies than those in other sports. Findings from previous research examining this association in male collegiate athletes have been equivocal; some studies (Petrie et al., 2008; Sanford-Martens et al., 2005) have demonstrated no association with sport type and others have shown greater risk for certain groups of athletes, such as weight class, endurance, and anti-

gravitational (Milligan & Pritchard, 2006; Rosendahl, et al., 2009; Sundgot-Borgen & Torstveit, 2004). These findings are consistent with those studies indicating that disordered eating behaviors vary based on sport type, which may be due to our large and diverse sample. Unlike past studies that had few weight class sports (e.g., Petrie et al., 2008; Sanford-Martens et al., 2005), our sample included enough athletes who played these sports that we could examine them as we did.

Taken together, our findings, and those from other studies (Milligan & Pritchard, 2006; Rosendahl et al., 2009; Sundgot-Borgen & Torstveit, 2004), suggest that athletes in certain sports (e.g. wrestling, crew) may be at increased risk due to the weight-dependent nature of their sport. These athletes' competition category depends on their weight and they are reminded of this fact prior to each performance when they are weighed and a determination is made about whether or not they will be allowed to compete. Athletes in weight class sports also may perceive that their sport success is closely related to their weight and physique. These sport environmental pressures may lead them to spend considerable time monitoring their weight and focusing on their body size/shape. As a result, they may be more likely to internalize expectations about their physique and may become dissatisfied with their body and their weight. When that happens, they may increase their efforts to alter their bodies, perhaps through increased exercise or decreased caloric intake. Future research should examine if these pressures and expectations are related to the elevated frequency at which weight class, and other, athletes engage in disordered eating behaviors.

This study had several limitations that warrant discussion. First, data were collected solely through the use of self-report measures, which can reflect individual bias particularly given the sensitive nature of the questions being asked. Athletes, though, were assured of

anonymity in their self-report and we used only valid questionnaires that have been part of past athlete eating disorder prevalence studies. In future studies, it may be helpful to corroborate athletes' self-report, either through objective measures (e.g., actual height and weight) or coach observations. Second, although this sample represented all three Divisions and most sports sanctioned by the NCAA, and covered athletes attending schools in 35 states in the U.S., it was not a population-based, representative sample. My methodology, though, improved on recent prevalence studies where samples have been drawn from only a single institution (e.g., Sanford-Martens et al., 2006). Third, the manner in which data were collected, via a secure website, did not allow for follow-up interviews with athletes, therefore, I was unable to determine with absolute certainty the rate of eating disorders in male collegiate athletes. However, the use of validated and reliable measures with a large, national sample, which are strengths of the current study, may offset the impact of the lack of diagnostic interviews. In future studies, whenever practical, researchers could include diagnostic interviews to confirm information gathered via self-report. Researchers also might examine the sociocultural and psychological variables that potentially increase male athletes' risk of experiencing eating disorders and engaging in disordered eating behaviors. Such studies could test existing etiological models for athletes to determine their validity (Petrie & Greenleaf, in press).

The current study has implications for counselors working with athletes and professionals working in college athletic departments. Although rates of clinical eating disorders among male collegiate athletes are low, symptomatic levels as well as certain pathogenic weight control behaviors occur relatively frequently. Thus, it is important for professionals working with athletes to recognize that male athletes are not immune to engaging in eating disordered behaviors and to be aware that athletes from certain sports (e.g., weight class) might be at

increased risk. Because most problems will be at the subclinical level and certain behaviors (e.g., exercising) may be valued in the sport environment, male athletes' disturbances may not be easily identifiable. For that reason, consultants, counselors, athletic trainers, and coaches need to be educated about possible indicators that a male athlete may be engaging in unhealthy behaviors and steps taken to intervene once any problems have been identified (Bonci et al., 2008).

Overall, the results suggest that male athletes experience clinical eating disorders at low rates, though considerably more do engage in disordered eating and pathogenic weight control behaviors. Most commonly, male collegiate athletes exercise excessively and limit their food intake as means of controlling their weight and some also binge eat. Although athletes in all sports may engage in these behaviors, sport type was associated with the presence of such behaviors. Athletes in weight class sports may be at higher risk for disordered eating and pathogenic weight control behaviors as compared to their peers in endurance and ball game sports. Future research might examine eating disordered attitudes and behaviors in specific sports to determine the extent to which prevalence may vary.

Table 1

Prevalence of Pathogenic Eating and Weight Control Behaviors (N = 732)

Behavior	<i>n</i>	%
Frequency of Binge Eating (i.e., eat uncontrollably to the point of stuffing yourself)		
>2 times a week	23	3.1
2 times/week	27	3.7
Once a week	44	6.0
2-3 times/month	64	8.6
Once a month or less (or never)	575	78.6
Duration of binge eating		
3 or more years	67	9.2
1 to 3 years	43	5.9
3 months to one year	22	3.0
Less than 3 months	22	3.0
Don't binge eat	578	79.0
Exercise in order to burn calories		
>2 hours/day	135	18.4
2 hours/day	127	17.3
1-2 hours/day	116	15.8
<1 hour/day	69	9.4
Don't exercise to burn calories	285	38.9
Tried to lose weight by fasting or going on strict diets		
Most or all of the time	18	2.5
4-5 times in past year	15	2.0
2-3 times in past year	40	5.5
Once in past year	77	10.5
Not in past year (or never)	582	79.5
Intentionally vomit after eating		
≥ Twice a week	3	.4
Once a week	5	.7
2-3 times/month	2	.3
Once a month	2	.3
<Once a month or never	720	98.4
Use diuretics to help control weight		
≥3 times/week	3	.4
1-2 times/week	3	.4
2-3 times/month	5	.7
Once a month	5	.7
<Once a month or never	716	97.8
Use laxatives/suppositories to help control weight		
≥ Once a day	4	.5
3-6 times/week	3	.4
1-2 times/week	3	.4
2-3 times/month	3	.4
< Once a month or never	719	98.2

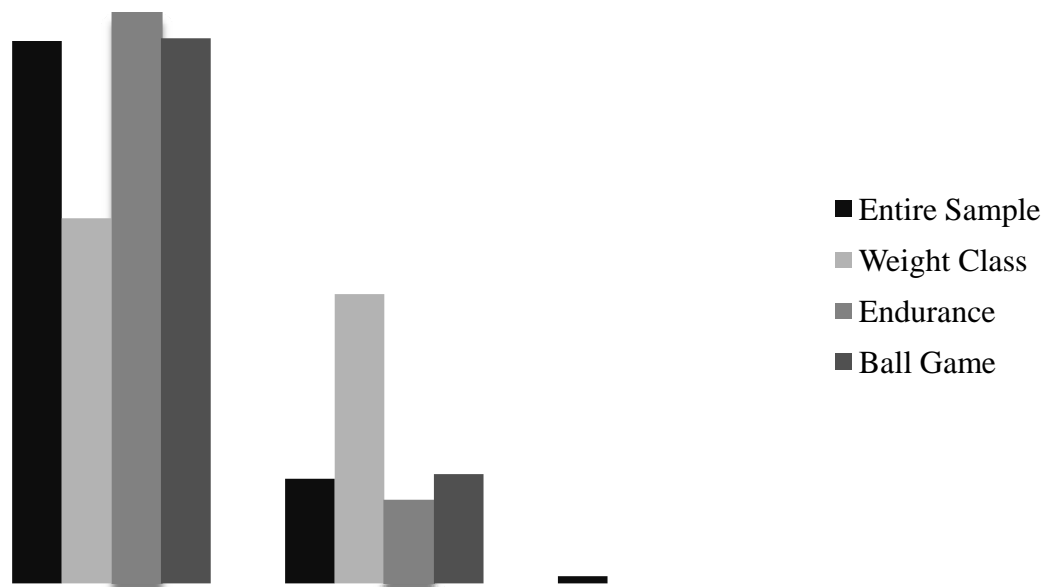


Figure 1. Prevalence of disordered eating based on the Q-EDD for the entire sample and by sport type.

*Note: Athletes classified as having clinical eating disorders ($n = 8$) were included in the symptomatic categories when examined by sport type.

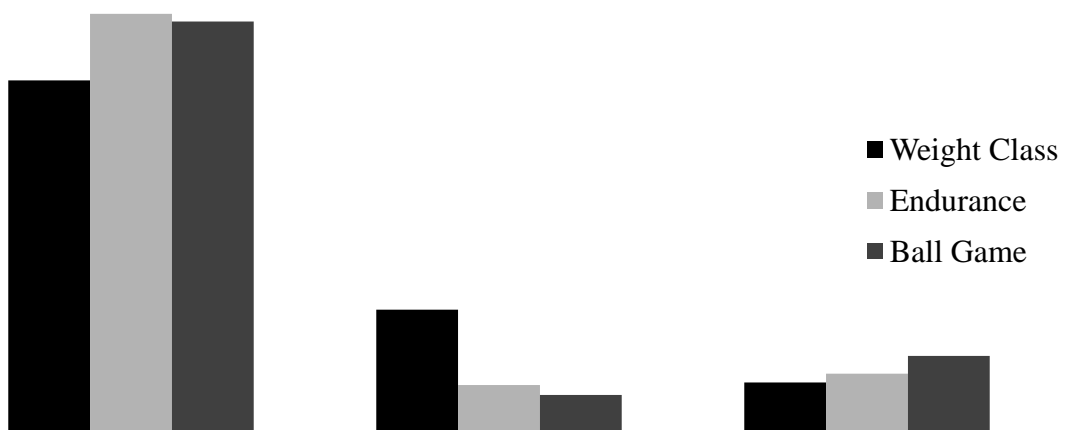


Figure 2. Frequency of binge eating by sport type.

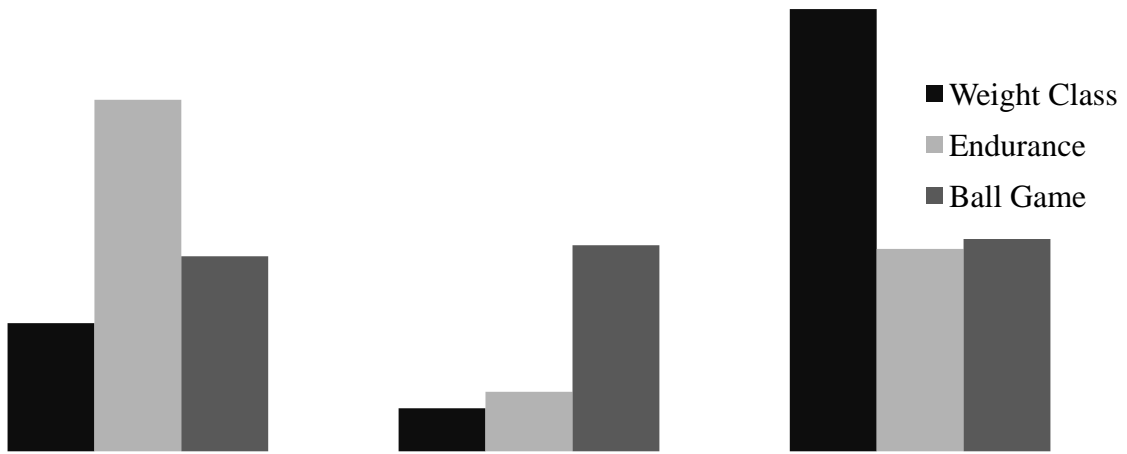


Figure 3. Frequency of exercising to burn calories by sport type.

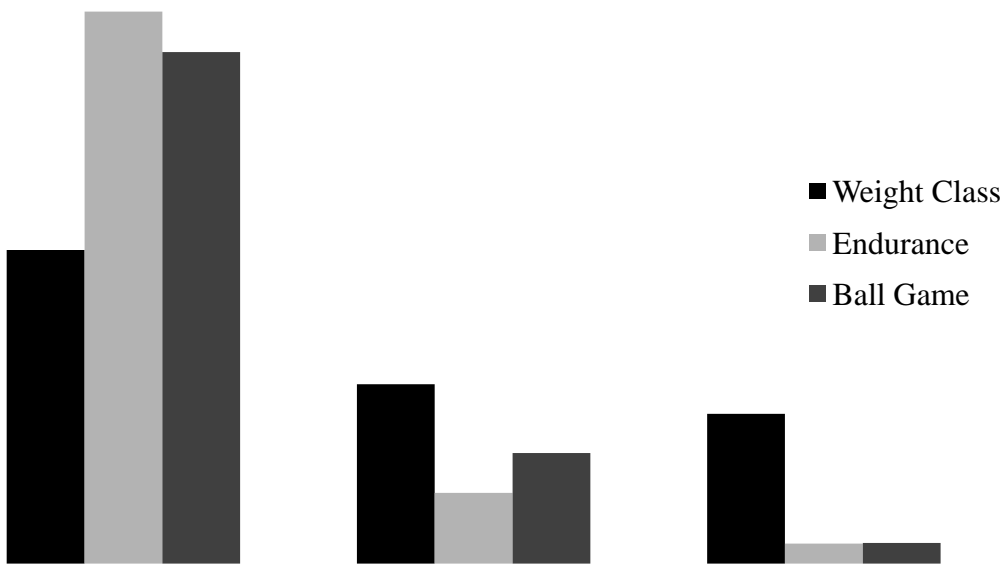


Figure 4. Frequency of fasting and strict dieting by sport type.

APPENDIX
THESIS PROPOSAL

Prevalence of Eating Disorders, Pathogenic Weight Control Behaviors, and Body Image Concerns among Male Collegiate Athletes

Eating disorders are psychological disorders characterized by severe disturbances in eating behavior. The *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV;* American Psychiatric Association; APA, 2000) describes three specific clinical diagnoses: anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (EDNOS). These disorders are associated with an intense preoccupation with appearance and weight, which manifests itself in pathogenic weight control behaviors. For example, individuals with these disorders may severely restrict their caloric intake, purge through various means (e.g., laxatives, vomiting), or excessively exercise to achieve a specific body ideal. Although eating disorders historically have been viewed as a woman's concern, in the last 10-20 years, men have been increasingly using pathogenic weight control behaviors and experiencing higher rates of disordered eating behaviors (Anderson & Bulik, 2004; Raevuori, Hoek, Susser, Kaprio, Rissanen, & Keski-Rahkonen, 2009). In fact, even though binge eating disorder, a disorder categorized as EDNOS, is more likely to be diagnosed at the clinical level in women, subthreshold binge eating disorder may be more common in men (Striegel-Moore et al., 2009). The three diagnoses have varying lifetime and point prevalence rates and are associated with several physical and psychological health complications.

Anorexia nervosa. Anorexia nervosa is characterized primarily by a significant restriction of food intake and an intense fear of gaining weight, along with failure to maintain an adequate weight (i.e., 15% under the normal weight for that person's age and height) and also includes loss of menstruation for girls and women (APA, 2000). In a survey of 9,282 participants from the United States, Hudson, Hiripi, Pope, and Kessler (2007) found lifetime prevalence rates for

anorexia nervosa of .9% for women and .3% for men. Reviews of epidemiological studies using samples of men and women between the ages of 18 and 44 years (Hoek & Hoeken, 2003; Lucas, Crowson, O'Fallon, & Melton, 1999; Machado, Machado, Goncalves, & Hoek, 2007) have reported point prevalence rates for anorexia nervosa to be between .3% and .39% for women and around .05% for men. Anorexia nervosa is associated with several physical health complications, such as decreases in bone density, cardiac arrhythmias, electrolyte imbalance, anemia, and disruptions of the endocrine and reproductive systems, as well as psychological disturbances, such as depression, substance use, social isolation, and obsessive-compulsiveness (Beals, 2004; Rome & Ammerman, 2003). Anorexia nervosa has the highest mortality rate of all psychiatric disorders (Millar et al., 2005).

Bulimia nervosa. Bulimia nervosa is characterized by a pattern of binge-eating and subsequent weight control behaviors, such as, vomiting, use of laxatives or diuretics, and excessive exercise, that are used to compensate for the binge. Although individuals with bulimia nervosa are typically within normal weight ranges, they often are preoccupied with and base a great deal of their self-worth on their weight and appearance. Lifetime prevalence rates of bulimia nervosa are 1.5% for women and 0.5% for men, suggesting that it is slightly more common than anorexia nervosa (Hudson et al., 2007). Point prevalence rates for bulimia nervosa are approximately 1% for women and 0.1% for men (Hoek & Hoeken, 2003). Individuals with bulimia nervosa may have comorbid health concerns, including: gastrointestinal problems, esophageal deterioration, dental complications, electrolyte imbalance, and dehydration (Rome & Ammerman, 2003). In regards to psychological issues, they are at increased risk for mood disturbance, anxiety, and substance use (Beals, 2004).

Individuals with bulimia nervosa engage in a binge-purge cycle that may begin with restricting their food intake to the point where they become disinhibited around food and binge eat (Heatherton & Baumeister, 1991). During a binge, the individual feels that their eating is out of their own control. After a binge, individuals often experience negative affect (e.g., shame, guilt, anxiety), which may serve as the motivation to purge (e.g., vomit, exercising) the calories just consumed and to regain a sense of control. After the purge, there is usually a sense of relief and reduction in anxiety, which negatively reinforces the binge-purge cycle.

Eating disorders not otherwise specified. When individuals do not meet the full criteria for anorexia nervosa or bulimia nervosa, they may be diagnosed with EDNOS. Some examples of an EDNOS diagnosis include meeting all criteria for anorexia except maintaining a normal weight (or for women also having a regular menses) or meeting all criteria for bulimia nervosa except engaging in compensatory behaviors less than twice a week. Finally, EDNOS includes binge-eating disorder, which is characterized by recurrent episodes of binge eating without the use of compensatory behaviors (APA, 2000).

The lifetime prevalence of binge-eating disorder is 3.5% for women and 2.0% for men (Hudson, et al., 2007). The point prevalence of binge eating disorder is 1.6% for women and 0.8% for men. Conversely, point prevalence for subthreshold binge eating disorder, (a subclinical diagnosis) is 0.4% for women and 0.8% for men (Hudson et al., 2007).

EDNOS may be associated with physical and psychological effects similar to those of anorexia nervosa and bulimia nervosa. For example, dehydration, electrolyte imbalance, and gastrointestinal problems are possible physical complications, whereas depression, social isolation, feelings of shame, and substance use are common psychological correlates of EDNOS (Beals, 2004; Rome & Ammerman, 2003).

Subclinical disordered eating. Research on eating disorders suggests that they exist along a continuum and that there is a broad array of behaviors/attitudes that do not qualify for a clinical diagnosis but are problematic nonetheless. These disordered eating behaviors generally are referred to as subclinical or symptomatic (Mintz, O'Halloran, Mulholland, & Schneider, 1997). For example, Mintz et al. (1997) identified several types of subclinical eating problems, such as low-weight anorexia, nonnormal-weight nonbingeing bulimia, subthreshold nonbingeing bulimia, subthreshold binge-eating disorder, binge dieter, behavioral bulimia, subthreshold behavioral bulimia, and chronic dieter. The common feature among all these subclinical classifications is the presence of symptoms, but at a level that falls below what is required for a clinical diagnosis. The distinction between subclinical and clinical diagnoses is the degree to which the symptoms affect a person's ability functioning effectively.

Research with college students has shown that rates of subclinical disorders may range from 27% to 51% for women (Cohen & Petrie, 2005; Mintz, O'Halloran, Mulholland, & Schneider, 1997; Tylka & Subich, 2002b) and up to 37% for men (Tylka & Subich, 2002a). Research has documented that men as well as women engage in unhealthy eating and compensatory behaviors (Hudson et al., 2009; Striegel-Moore et al., 2009). For example, in a study of 1,808 men ages 18 to 35 years, men reported overeating (26%) and losing control when eating (20%) "often" over the previous three months, as well as bingeing (8%), fasting (4%), and vomiting (1.5%) at least once per week (Streigel-Moore, 2009).

Not only are prevalence rates for subclinical disorders higher than clinical disorders, but many of the same psychological and personality problems associated with clinical disorders are present in subclinical disorders. For example, Tylka and Subich (2002b) found that severity of disordered eating symptoms was related to increased likelihood of endorsing pathogenic weight

control behaviors as safe and effective in a sample of female undergraduates. Further, Cohen and Petrie (2005) found that subclinical college women were more likely than those who were asymptomatic to engage in dichotomous thinking, impression management, and rigid weight regulation. Those women who were classified as subclinical and clinical were similar to one another on feelings of sadness, guilt, and anxiety, as well as on internalization and body dissatisfaction. For young men, Tylka and Subich (2002a) classified male high schoolers as either eating disordered, symptomatic, or asymptomatic. They found that the young men who were symptomatic were more likely to endorse attitudes associated with eating disorders, such as higher ineffectiveness, less interoceptive awareness (that is, less attuned to physiological cues), and more maturity fears than those who were asymptomatic. Further, the symptomatic group was similar to those who were eating disordered on measures of interoceptive awareness and the perception that pathogenic weight control behaviors were safe and effective.

Summary. Clinical eating disorders such as anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified have physical and psychological effects on those who suffer from these disorders. Prevalence rates and associated physical and psychological complications have been determined from population-based studies. Although present among men and women, clinical eating disorders occur with much less frequency than subclinical problems (Cohen & Petrie, 2005; Tylka & Subich, 1999). Subclinical disorders are similar to clinical ones in terms of concomitant psychological issues, such as low self-esteem, body dissatisfaction, and feelings of sadness and anxiety, which supports the approach of considering all levels of disordered eating. In addition, although prevalence rates generally are higher for women than men, some research (e.g., Hoek & Hoeken, 2003; Hudson et al., 2007) demonstrates

that men do experience disordered eating attitudes and engage in pathogenic weight control behaviors.

Development of Disordered Eating

The etiology of eating disorders cannot be traced to one specific factor, but rather results from the interplay of psychological, social, behavioral, familial, physiological, and cognitive factors (Garner, 2004). A leading explanation for the development of disordered eating is the sociocultural perspective (Streigel-Moore & Bulik, 2007). Stice's (1994; 2001) sociocultural model for eating disorders posits that industrialized societies emphasize an ideal physique and body type and, through the socialization process, individuals are pressured to conform to these ideals. Specifically, women are expected to be thin and petite, whereas the ideal for men is lean and muscular (Brownell, 1991; Pope, Phillips, & Olivardia, 2000). These pressures and ideals are communicated by friends and family and through various media outlets that exist, such as music videos, movies, magazines, and fashion models. As a result, men and women are socialized to think about themselves, their appearance, and their bodies in certain ways. Through this socialization process, men and women internalize society's ideals regarding appearance, weight, diet, beauty, and body. That is, they take these ideals as their own and they become part of their self-schema; men and women then use the ideals as the comparison to evaluate their own appearance and determine how they should behave. Most men and women cannot meet society's expectations for body, appearance, and attractiveness (Streigel-Moore, Franko, Thompson, Barton, Schreiber, & Daniels, 2004) As a result, they may become dissatisfied with themselves and their bodies, which is the primary risk factor for the development of disordered eating (Stice, 2002) and other body changing behaviors, such as drive for muscularity (McCreary & Sasse, 2000; Ricciardelli & McCabe, 2004).

Although this sociocultural approach was developed to explain women's experiences, shifts have occurred in the social environment over the last two decades, including the emergence of a distinct male physique (Pope, Phillips, & Olivardia, 2000). The sociocultural perspective now is being used to understand men's experiences. There now is a clear standard of male beauty – tall, lean, and muscular (McCreary & Sasse, 2000), and men and boys are under increased pressure from media, family, friends, and female peers to attain this body ideal (Cafri, Thompson, Ricciardelli, McCabe, Smolak, & Yesalis, 2005 Ricciardelli & McCabe, 2003). For example, Pope, Olivardia, Gruber, and Borowiecki (1999) analyzed the muscularity of male action figures from 1964 to 1998. At the end of this time period, the biceps of the toys had grown to the point that, proportionally they would measure 26.8 inches on a 70 inch tall man, exceeding the muscularity of even the largest human bodybuilders.

Ricciardelli and McCabe (2003) proposed that sociocultural pressures and body image concerns also may lead to the pursuit of muscularity. In their biopsychosocial model, they proposed a relationship between the nature of the messages received (e.g., encouragement to engage in weight change strategies) and an increased likelihood of boys and men using body modification strategies, such as increasing their overall caloric intake, increasing time spent exercising, increasing intake of protein, and using muscle-building supplements, in an effort to gain weight and become more muscular. Although social pressures are related to a different body ideal for men, the experience of these pressures may lead to distorted appearance beliefs, dissatisfaction with body and self, and disturbed eating behavior similar to those experienced by women.

In fact, Leit, Grey, and Pope (2002) found that men exposed to advertisements emphasizing the muscular ideal reported increased body dissatisfaction. Additionally, Pope et al.

(2000) studied body image using the somatomorphic matrix, a computer program that allows men to choose their ideal body type. On average, men chose ideal body types that had 28 pounds more muscle than their actual bodies. Given societal pressures and the resultant increased body dissatisfaction among men, and given that body dissatisfaction is a precursor to the development of eating pathology, including ingestion of muscle-building supplements, it is not surprising that disordered eating may be on the rise for men (Anderson, Cohn, & Holbrook, 2000; Garner, 1997; Petrie & Rogers, 2001). In some cases men may be at risk for developing muscle dysmorphia, a disorder in which individuals perceive themselves to be much less muscular than they actually are and become preoccupied with gaining muscularity (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Although this disorder is related to eating pathology and body dissatisfaction, it is beyond the scope of the current paper.

Influences of the Sport Environment

There are unique pressures that athletes experience within the sport environment regarding their weight, bodies, and performance that may increase their risk of engaging in disordered eating behaviors (Hausenblas & Carron, 1999; Petrie & Greenleaf, 2007; Anderson, Petrie, & Neumann, 2011). Although some research has suggested that athletes from lean or aesthetic sports have higher prevalence rates (Sundgot-Borgen & Torstveit, 2004), recent research has suggested that sport type does not moderate level of disordered eating and that all athletes are at similar risk (Greenleaf et al., 2009; Petrie et al., 2008). Regardless, it is clear that male and female athletes do experience unique pressures in the sport environment that may exacerbate their focus on their bodies, weight, and appearance. The pressures athletes experience within the sport context send the message that a lean, strong, and particularly for men, muscular, body is preferable for both aesthetic reasons and functional reasons.

Thompson and Sherman (2010) suggested that there are several unique pressures in the sport environment, such as team “weigh-ins”, stereotypes about athletic bodies, coach pressures about weight, judges’ expectations about body size and shape, revealing uniforms, performance demands of specific sports, and the normalization of pathogenic weight control behaviors, such as excessive exercising. In their study of sport pressures, Reel and Gill (1996) found that almost half of the female cheerleaders in their sample indicated that needing to look good in their uniforms, needing to lose five pounds, and having a weight limit at tryouts were negative pressures. Across sports, female collegiate athletes experience weight pressures from coaches, judges, and teammates, are self-conscious about their weight and appearance, believe that their weight and appearance are important to others, and experience pressure related to weight limits in their sport (Reel, SooHoo, Petrie, Greenleaf, & Carter, 2010). With respect to men, Galli and Reel (2009) interviewed ten athletes and found that seven of them reported pressures from their coaches to attain a certain body ideal. All ten of the athletes reported using the bodies of other athletes as a means of comparison. Further, male collegiate athletes experience two main types of pressure: (1) maintain a certain weight that is perceived to be desirable by their coaches and teammates, and (2) maintain a certain appearance for individuals outside of sport, such as friends, family, and spectators. These pressures are related to lower self-esteem and more negative affect (Galli, Reel, Petrie, Greenleaf, & Carter, 2011).

Incorporating the idea that male and female athletes experience general societal and sport-specific pressures that may increase their risk of engaging in disordered eating behaviors, Petrie and Greenleaf (in press) proposed a socioculturally-based model of eating disorders for male and female athletes. They suggest that athletes are exposed to two types of pressures regarding the size and shape of their bodies. First, they are exposed to general societal messages

from the media, family, and friends that highlight cultural ideals in terms of body size and shape, appearance, weight, eating, and what it means to be a man or a woman. Second, as athletes, they experience sport-specific pressures from coaches, teammates, sport judges, peers, family members and the media about the size, shape, and functionality of their bodies. Thus, they receive the message that their bodies must not only be aligned perfectly with the societal ideal, but their bodies must be highly functional so they can excel in their given sport. According to the model, general societal pressures are expected to lead to body dissatisfaction through the internalization of the societal ideals. In turn, body dissatisfaction may result in athletes engaging in certain weight-control behaviors, such as dietary restraint and muscle building. Sport-specific pressures to attain a certain body ideal, such as lean and/or muscular physique, result in higher levels of dietary restraint, body dissatisfaction, and drive for muscularity. This model acknowledges that athletes face pressures from different sources and that these pressures may combine to increase the likelihood that they will be body dissatisfied and engage in pathogenic eating and weight behaviors that, in the end, may result in the development of a subclinical or clinical eating disorder (Petrie & Greenleaf, in press).

Researchers have acknowledged that the sport environment presents unique pressures regarding body, appearance, functionality, and weight, and thus may contribute to athletes' risk of developing disordered eating attitudes and behaviors. Therefore, prevalence rates for disordered eating among athletes have been examined (Sundgot-Borgen, 1994; Sundgot-Borgen & Torstveit, 2004; Thompson & Sherman, 1999; Williams, Sargent & Durstine, 2003). Most research has been done with female athletes and they are generally thought to engage in pathogenic weight control behaviors more frequently than their male athlete peers (Carter & Rudd, 2005; Sundgot-Borgen & Torstveit, 2004). For example, among elite female athletes,

Sundgot-Borgen and Torstveit (2004) found that 8% met diagnostic criteria for an eating disorder, whereas another 12% met diagnostic criteria for a subclinical eating disorder. In terms of sport type, the findings have been mixed. Some research suggests that athletes in endurance (24%), weight class (30%) and aesthetic (42%) sports exhibited the highest rates of disordered eating attitudes and behaviors among those studied. However, regardless of sport type, female athletes exhibited more symptoms than non-athlete controls. Among collegiate female athletes, Greenleaf et al. (2009) found that 18.63% reported binge eating at least once per week and 15.20% engaged in strict methods to prevent weight gain from a binge. Moreover, 25.5% said they exercised over 2 hours a day to burn calories, 15.69% engaged in strict dieting or fasting, and 2.94% vomited at least 2 times per month.

Male athletes also experience eating disorders and, at higher levels, subclinical disorders and pathogenic weight control behaviors (Petrie, Greenleaf, Reel, & Carter, 2008; Sundgot-Borgen & Torstveit, 2004). For example, in a study of male athletes who were competing at the national/international level across a variety of sport types, Sundgot-Borgen and Torstveit (2004) found that 3% met diagnostic criteria for clinical eating disorders and 6% met criteria for subclinical eating disorders. In two different studies of male collegiate athletes representing more than 16 different sports, Petrie and colleagues (Petrie, Greenleaf, Carter, & Reel, 2007; Petrie, Greenleaf, Reel, & Carter, 2008) found that although none of the athletes were classified as having a clinical eating disorder, between 16.6% and 19.2% of their samples were symptomatic or subclinical according to the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997). Further, Johnson, Powers, and Dick (1999) reported that 9.5% of the male collegiate athletes in their sample were at risk for anorexia nervosa and another 38% at risk for bulimia nervosa.

Milligan and Pritchard (2006) examined the relationship between disordered eating, gender, and sport type, and reported that 9% of male collegiate athletes were at risk for developing a clinical eating disorder. Additionally, they found that male athletes participating in lean sports such as gymnastics, wrestling, and track displayed more eating disordered behaviors than male athletes in non-lean sports, such as basketball and golf, as measured by the Eating Attitudes Test 26 (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). Similarly, in a study of elite level high school athletes participating in several sports, Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, and Strauss (2009) reported that 10% of male athletes in endurance sports (e.g., running, swimming), 17% in weight class sports (e.g., rowing, wrestling), and 42% in anti-gravitation sports (e.g., gymnastics, skating) scored above the cutoff on the EAT-26 (Garner, et al., 1982), indicating some disordered eating symptoms, whereas only 5.4% of male athletes in ball game sports scored above the cutoff that would classify them as at-risk. Conversely, in a sample of male collegiate athletes, Petrie et al. (2008) found no differences in disordered eating behaviors across sport type when classifications were made using the Q-EDD (Mintz, et al., 1997). The findings across these and other studies (e.g., Sanford-Martens et al., 2005; Sundgot-Borgen & Torstveit, 2004) suggest that male athletes from the high school to elite level experience significantly more subclinical than clinical problems. Further, athletes in some sports, such as wrestling, rowing, and running, may be at higher risk than others, such as basketball, baseball, and hockey. Because of the inconsistencies across studies and mixed results in the literature, more research is needed to determine the extent to which sport type may be related to prevalence rates.

Like their female counterparts, male athletes engage in pathogenic weight control behaviors at rates even higher than found for subclinical and clinical disorders (Johnson et al.,

1999; Petrie et al., 2008). For example, Petrie et al. (2008) found that 37% of male collegiate athletes in their sample reported exercising two or more hours daily in order to burn calories, 14.2% indicated fasting or going on strict diets at least twice in the previous year, 6.5% reported intentionally vomiting at least 2-3 times in the previous month, 4.5% said they used diuretics once a week, 7.9% reported using laxatives once a week, and 16.7% stated they binge-ate (i.e., eating uncontrollably to the point of stuffing oneself) at least once a week. Similarly, Johnson et al. reported that male collegiate athletes were less likely than female athletes to use diet pills and vomiting as a means of controlling weight, yet 26.6% reported having at least one episode of binge-eating in their lifetime and 4.42% indicated doing so daily. In a study examining use of weight-gain supplements, Raudenbush and Meyer (2003) found differences across different types of male collegiate athletes. Specifically, rates of weight-gain supplement use across sport types were as follows: 11.8% (soccer), 13.3% (basketball), 25% (swimming), 26.9% (track/cross-country), and 37.5% (lacrosse). Increased use was related to spending more time on weight workouts each week. These studies suggest that male athletes do use pathogenic weight control behaviors, though these behaviors tend to be focused on eating, exercising, and gaining muscle mass, rather than on diuretics, diet pills, and purging-type behaviors (e.g., vomiting). Male athletes' behaviors are likely the result of the performance expectations in their sport and the pressures to maintain a muscular but lean body build.

Given the research to date (e.g., Petrie, Greenleaf, Reel, & Carter, 2008; Sanford-Martens et al., 2005), there is evidence that male athletes do suffer from eating disorders, though they are more likely to be classified as subclinical rather than clinical. They are also more likely to engage in certain types of weight control behaviors than to experience a full-blown clinical disorder. Research on male athletes, however, has been limited in several ways. First, only a

limited number of studies have been conducted with male athletes, and their samples have ranged from high school, to college, to elite level, without a sufficient sample size being reached with respect to any population. Second, some of these studies have used eating disorders measures with questionable psychometric properties, such as the EAT-26 (Garner et al., 1982), or used measures not intended to determine actual prevalence (e.g., Johnson et al., 1999; Milligan & Pritchard, 2006; Rosendahl et al., 2009). Third, only one study has used a national sample, though that study was conducted in a European country with exclusively elite level athletes (Sundgot-Borgen & Torstveit, 2004). No other study has used a large, diverse, nationwide, multi-sport sample to examine prevalence of disordered eating behaviors in male collegiate athletes, which is needed to increase the generalizability of findings. Fourth, within studies of male collegiate athletes, samples have been drawn primarily from NCAA Division I level schools, which may not accurately represent the entire population of intercollegiate athletes. Little is known about the experiences of those male collegiate athletes who participate at the Division II and III levels or those who compete in the NAIA. For example, perhaps prevalence rates vary across level of athletic ability, which might be suggested by the Sundgot-Borgen and Torstveit (2004) study where they found high rates within their sample of elite athletes. Gathering additional information about rates of disordered eating among male collegiate athletes, whose number exceeds 240,000 (NCAA, 2010) will help identify the magnitude of the problem in this population.

Purpose and Hypotheses

Given the limitations of existing prevalence research with male athletes and the recommendations provided by Petrie and Greenleaf (2007), the purpose of the present study is to examine disordered eating and pathogenic weight control behaviors in a large, diverse, national

sample of male collegiate athletes. Specifically, the Q-EDD (Mintz, O'Halloran, Mulholland, & Schneider, 1997) and seven items from the BULIT-R (Thelen, Mintz, & Vander Wal, 1996) will be used to examine rates, severity, and other variables related to disordered eating and pathogenic weight control behaviors among male collegiate athletes. Based on current research (e.g., Petrie, et al., 2008, Sanford-Martens et al., 2005), the following hypotheses are proposed:

1. Based on Q-EDD classifications, it is hypothesized that most athletes will fall into the asymptomatic group. The symptomatic group will be the second largest group of athletes followed by those who meet criteria for a clinical eating disorder, which is hypothesized to be a very small number of athletes.
2. Based on results from the Q-EDD and the BULIT-R, athletes will engage in some pathogenic weight control behaviors more than others. It is hypothesized that excessive exercise will be the most commonly used pathogenic weight-control-behavior, followed by a regimented high protein/low fat diet and use of weight-gain supplements. The least commonly used weight-control behaviors will be fasting, vomiting, and taking laxatives and diuretics.
3. Due to the limited information that exists concerning the potential influences of demographics (e.g., age, years in school, race/ethnicity) and sport type on severity of disordered eating, I offer no specific hypotheses. Instead, I will address the following research questions (though my ability to do so will be based somewhat on the composition of the final sample):
 - a. Is sport type (e.g., aesthetic, endurance, weight-class, ball-game, power, technical, antigravitation) related to eating disorder classification?

- b.** What is the association between level of competition (Division I, II, or III) and eating disorder classification?

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