2010

Assessing Prevalence of Eating Disorders and Eating Disorder Symptoms among Lightweight and Open-Weight Collegiate Rowers

Brianna Kearns

Running head: PREVALENCE OF EATING DISORDERS AND THEIR SYMPTOMS

Assessing Prevalence of Eating Disorders and Eating Disorder Symptoms among Lightweight and Open-Weight Collegiate Rowers

Brianna Kearns

Barry University

Acknowledgements

Foremost, I would like to express my deep and sincere gratitude to my thesis chair and personal life coach, Dr. Jennifer Gapin, for her unwavering support throughout this process. This research would not have been possible without her patience, motivation, encouragement, and immense knowledge. Her guidance (and kind words in the tougher times!) has helped me to successfully pursue my true research interests, as well as realize that the fight *IS* actually worth fighting.

I would also like to heartily thank the rest of my thesis committee: Dr. Tal Amasay, Dr. J. Gualberto Cremades, and Dr. Kathryn Ludwig, for their insightful comments, challenging questions, and open-door policies.

My sincere thanks and appreciation go out to my colleagues who supported me along the way, particularly Rodney Vallejo and Matthew Sherman, for their stimulating discussions, bravery to disagree with me, and for all of the fun we have had in the past two years. Furthermore, I thank all of my friends at Barry University, but in particular, Bekah Schmidt. I am forever indebted to my other half for being an amazing roommate and an even better friend (I love you if even if you are a Red Sox fan).

I would also like to thank my entire extended family for providing a loving and encouraging environment for me. My Mom-Mom, sister Danielle, brother Gregg, nephew Elijah, and all those who just so happen to come from other parents: Carrie Kelley, Erin Kirms, Shaina Horton, Meredith Maguire, Bonnie Plageman, Allison Mitele, and Mike Devaney. I would like to send a special word of thanks to my best friend for allowing me to write novel-length e-mails to her while she fought much bigger battles for our country overseas. I love you, Carrie.

I owe my deepest gratitude to my first and only true love, Russ Lampman, who gratefully provided emotional and financial support from 1200 miles away. I cannot wait to be reunited with you.

Lastly, and most importantly, I wish to thank my parents Gregg and Margaret Kearns. They bore me, raised me, taught me, supported me, and loved me. To them, I dedicate this thesis.

Abstract

There is limited eating disorder (ED) research regarding collegiate rowers. The purpose of this study was to examine prevalence rates of ED and ED symptoms for 133 male and female competitive collegiate rowers competing in lightweight and open-weight programs. Participants completed the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Holloran, Mulholland, & Schneider, 1997) to assess prevalence and three subscales of the Eating Disorders Inventory-2 (Drive for Thinness, Perfectionism, and Body Dissatisfaction; EDI-2; Garner, 1991) to examine symptoms. More than half of the participants were classified as *symptomatic* (n = 65; 49%) or *eating disordered* (n = 5; 4%). Results showed that lightweight rowers had higher prevalence of ED, greater drive for thinness (F (1, 129) = 19.07, p <.001), and greater body dissatisfaction (F (1,129) = 4.57, p <.05) than open-weight rowers. Male rowers had higher prevalence of ED than female rowers, but females had greater body dissatisfaction than males (F(1,129) = 9.57, p = 0.002). Implications for counseling, prevention, and future research directions are discussed.

Keywords: eating disorders, eating disorder symptoms, rowers

Table of Contents

Chapter

CHAPTER I

Introduction

Sports are a means of engaging in physical activity, socialization, and recreation. Athletes, however, have been identified as a high risk population for the development of eating disorders and/or disordered eating (Hausenblas & Carron, 2002; Kirk, Singh, and Getz, 2001; Petrie & Greenleaf, 2007; Petrie, Greenleaf, Reel, & Carter, 2008). Eating disorders include intense feelings of being fat; desire to be thinner; distorted body image; and extreme behaviors to address these feelings and perceptions (American Psychiatric Association; APA, 2000). Examples of behaviors used to compensate for these feelings may include restricting calories (self-starvation), bingeing and purging, and excessive exercise as a means of weight management (Bowen-Woodward and Levitz, 1989; Dickstein, 1989; Thome and Espelage, 2004). Disordered eating behaviors, on the other hand, differ from an eating disorder classification because they do not include *all* criterions for a clinical eating disorder diagnosis, according to the Diagnostic and Statistical Manual-IV-Text Revision (DSM-IV-TR; APA, 2000). Montenegro (2006) noted that a myriad of ramifications result from eating disorders, including weight preoccupation, disturbed eating behaviors, and distorted body-image. Athletes who deny their bodies important nutrition, for example, can lead to amenorrhea (in females), reduced body mass and lean muscle tissue, fatigue, irritability, insomnia, lack of concentration, and growth failure (Montenegro, 2006). Furthermore, many athletes with eating disorders experience depression, anxiety, and substance abuse, and may also be at risk for serious medical complications, such as heart problems and death (Montenegro, 2006).

Sherman and Thompson (2001) concluded that the sport environment is a social context in which the athlete's performance, as well as the appearance of the athlete's body is a focal

point. This setting can increase body and weight anxieties due to performance requirements, team weigh-ins, physique-revealing uniforms, and social comparisons and pressures from coaches and teammates (Greenleaf, 2002; Hausenblas & Symons-Downs, 2001; Petrie & Rogers, 2001; & Petrie & Sherman, 1999). Potential moderating variables that should be taken into consideration when examining the relationship between athletic participation and the development of eating disorders include competition levels, gender, and sport group (Hausenblas & McNally, 2004). Research examining various sport groups has found that athletes in sports characterized by appearance expectations and/or leanness, such as gymnastics, swimming, track and cheerleading; endurance (e.g., long distance running, cross-country skiing); and weight requirements (e.g., wrestling, judo, rowing) have more weight and disordered eating problems than sports in which weight and appearance is less important (e.g., volleyball, basketball) (Brownell & Rodin, 1992; Montenegro, 2006; Sundgot-Borgen, 1994a, 1994b).

Collegiate rowing is an example of a sport that offers weight classifications (lightweight and open-weight) to expand the pool of competitive athletes; however, these athletes have the additional pressures of making weight in order to compete. There have only been a few studies conducted on eating disorders and disordered eating behaviors among rowers, particularly lightweight rowers, and of that limited research there are conflicting results (Karlson, Becker, & Merkur, 2001; Sykora, Grilo, Wilfley, and Brownell, 1993; Terry, Lane, & Warren, 1999; Terry & Waite, 1996). Karlson, Becker, and Merkur (2001) state that the lack of research on lightweight rowers, particularly for female rowers, may be due in part to the fact that lightweight rowing has traditionally involved small numbers of participants. Despite the literature stating that athletes, especially those involved in sports with weight requirements, are vulnerable populations for the development of eating disorders (Karlson et al., 2001; Montenegro, 2006;

Sundgot-Borgen, 1994a, 1994b); there is a limited amount of research regarding athletes in the sport of rowing. Therefore, more thorough investigations on eating disorders and disordered eating behaviors in populations of male and female open-weight and lightweight rowers are needed in order to generalize those results to the sport of rowing.

There has been considerable speculation about why there is an increased risk for eating disorders among athletes. One explanation is the existence of a "contagion effect" among eating behaviors, which can be present among social groups such as athletic teams. This is evident when teammates' eating behaviors spread from one teammate to another (Hausenblas & Carron, 2000). Previous research on social contagion effects of eating behaviors within groups has generally concentrated on the negative outcomes, such as when teammates encourage one another to engage in pathogenic weight-loss methods (i.e., use of laxatives, diet pills, diuretics, and/or engaging in self-induced vomiting) (Rosen, McKeag, Hough, and Curley, 1986). However, there have also been studies supporting constructive group influences, such as discouraging pathological weight loss behaviors and encouraging healthy eating (Hausenblas & Carron, 2000; Wertheim, Paxton, Schutz, & Muir, 1997). Future studies are needed among sports teams in order to further investigate the influence of teammates on one's eating behaviors and identify certain risk factors and social trends to help determine which athletes are most vulnerable to the development of eating disorders.

There were several purposes in this current study. The first main purpose of this proposed study is to assess differences among lightweight and open-weight rowers, which allows weight restriction to be studied within the same sport rather than across sports, due to their similar physical training and schedule (Sykora et al., 1993). There is limited research with athletes that has previously investigated this issue because most sports lack non-weight restricted

comparisons. There are, however, a few published rowing studies with equivocal results when comparing differences between patterns of eating behavior and attitudes of lightweight and open-weights. Of this research, one study found that 19.4% of elite lightweight women scored above the critical level on the Eating Attitudes Test (Garner, Olmstead, Bohr, & Garfinkel, 1982), suggesting that they may be at risk for an eating disorder (Terry & Waite, 1996). A follow-up investigation found that 21% of female lightweight rowers, 6% of male lightweight rowers and 4% of female open-weight rowers scored over the threshold for eating disorder concerns (Terry, Lane, & Warren, 1999). A third study produced results that were not significant, but there was a trend toward similar weight loss practices and disordered eating behaviors among lightweight and open-weight rowers (Sykora et al., 1993). This research will add to the limited and conflicting literature regarding comparisons of weight divisions among the same sport. Specifically, comparisons of lightweight and open-weight rowers will be made regarding the prevalence of eating disorders and eating disordered symptoms.

There are also few studies that have been conducted regarding the prevalence rates of eating disorders among athletes, particularly male athletes, despite the growing literature stating that male and female athletes are considered an at-risk population for eating disorders and disordered eating (Carter & Rudd, 2005; Hausenblas & Carron, 1999; Petrie et al., 2008; Sanford-Martens, Davidson, Yakushko, Martens, Hinton, & Beck, 2005; Sundgot-Borgen & Torstveit, 2004). Further, previous research on eating disorders among athletes typically uses measures to examine eating disorder *symptoms*, often in order to assess *prevalence* of eating disorders (Hausenblas & Carron, 1999; Hausenblas & McNally, 2004). Therefore, Hausenblas and Carron (1999) recommended that researchers use a measure that is based on diagnostic criteria in order to more accurately assess prevalence of eating disorders. The Questionnaire for

Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, and Schneider, 1997) is a recently developed tool that was designed to examine eating disorder prevalence based on DSM-IV criteria. This study will assess the prevalence rates of eating disorders in male and female collegiate rowers by using the Q-EDD (Mintz et al., 1997), while also comparing prevalence rates in lightweight and open-weight rowers to determine if there are differences between groups.

Eating disorder symptoms among collegiate rowers will also be measured using three subscales of the Eating Disorders Inventory-2 (EDI-2; Garner, 1991). The EDI-2 is a questionnaire that has 11 subscales which assess the attitudinal, behavioral, and psychological symptoms of eating disorders. The three scales that will be used in this research are the Drive for Thinness subscale, the Body Dissatisfaction subscale and the Perfectionism subscale. Differences in the scores of the EDI-2 between gender and weight division will be assessed.

This study also contains several exploratory purposes. This first is to assess disordered eating behaviors in a population of collegiate rowers. Disordered eating behaviors differ from eating disorders because they do not meet the full criterion for a clinical diagnosis. Disordered eating behaviors will be investigated through a questionnaire developed for this study by the primary researcher, and the specific behaviors and frequency of the behaviors will be assessed.

Another exploratory purpose of this proposed study is to examine the perceived influence of teammates on eating behaviors and determine if there are more negative influences or more positive influences. A questionnaire developed for this study will be used in order to explore this possibility of teammates influencing eating behaviors, and will include specific items from Hausenblas and Carron's (2000) qualitative work on group influence on eating and dieting behaviors among varsity athletes.

It is hypothesized that lightweight rowers will have a significantly higher prevalence of eating disorders than open-weight rowers (as measured by the Q-EDD). Furthermore, it is hypothesized that female rowers will have a significantly higher prevalence of eating disorders than male rowers. Also, it is hypothesized that a higher prevalence of eating disorder symptoms will be found in the collegiate lightweight rowers and female rowers, as compared to collegiate open-weight rowers and male rowers (as measured by the subscales of the EDI-2). Lastly, due to the exploratory nature of the purposes regarding disordered eating behaviors and the influence of teammates on eating behaviors, no a priori hypotheses will be advanced.

CHAPTER II

Literature Review

One of the basic human psychological needs is the formation of social bonds and relationships with others (Baumeister & Leary, 1995; Pratt, 2000). Baumeister and Leary (1995) cited the need to form attachments to others and form interpersonal relationships as a fundamental human motive. This human need operates across a wide variety of contexts; influences important social, cognitive, and emotional constructs; can predict behavior in a variety of situations; is independent of other psychological and biological needs; may affect psychological adjustment and well-being if absent; and is crucial for all humans.

The psychological benefits that result from group membership and identification with others has been researched by many social scientists (e.g., Baumeister & Leary, 1995; Cohen & Wills, 1985; Linville, 1987; Rowe & Kahn, 1998; Wann & Hamlet, 1994, 1996) and demonstrates that identification with social organizations aid in the development of a network that provides psychological support. Consequentially, this support may result in a mentally healthy person due to the lower rates of depression, anxiety, and loneliness (Wann, 2006). Compton (2005) declared that "positive social relationships" were one of the "core variables that best predict happiness and satisfaction with life" (p.48).

People often join groups, teams, clubs or other social channels in an effort to fill this need. Sport is a particular social setting that offers an abundance of group affiliation processes through relationships with teammates, coaches, parents, leagues, and/or schools. A key motive for participation in sport is affiliation (Ashford, Biddle and Goudas, 1993). This association with a larger group, such as the sport team, may be indicative of our human need to form bonds. Hagger and Chatzisarantis (2005) state that group affiliation not only assists in satisfying this

fundamental need, but is also considered an essential part of the way in which we define ourselves as individuals.

Participating on a sports team is not only a means of forming social bonds and relationships, but it is also a way of learning new skills and engaging in physical activity. Sports team participation has been found to be positively related to overall mental and physical health and well-being (Marsh & Kleitman, 2003; McHale, Vinden, Bush, Richer, Shaw, & Smith, 2005; Pedersen & Seidman, 2004). Overall, sports are a healthy means of engaging in physical activity, socialization, and recreation. Becoming a member of a sports team or any social group entails adhering to a specific set of social cognitions or beliefs among the group-members, brought on by their interactions between one another, the notion of a common goal or desired outcome, a specific structure within the group, and the presence of important group processes, such as communication and cohesion (Carron & Hausenblas, 1998). Generally, individuals on a team behave on the basis of information from the group, in addition to their own personal beliefs, personality and intrapersonal constructs (Hagger & Chatzisarantis, 2005). For some members, participating in team sports may mean adhering to the group's negative behaviors, such as unhealthy eating and dieting habits (i.e., exercise addiction, ingestion of illegal/unhealthy supplements, poor eating habits). Some studies have found that involvement in athletics tended to increase the risk for disordered eating and/or eating disorders, particularly in female athletes (Greenleaf, Petrie, Carter & Reel, 2009; Hausenblas & Symons-Downs, 2001; Holm-Denoma, Scaringi, Gordon, Van Orden, Joiner, 2009; Kirk et al., 2001; Krane, Stiles-Shipley, Waldron, & Michalenok, 2001; Hausenblas & Carron, 2002; Petrie & Greenleaf, 2007); while others note that the relationship between eating disorders and athletic participation is equivocal (DiBartolo & Shaffer, 2002; Hausenblas & McNally, 2004; Smolack, Murnen, & Ruble, 2000). Further, few

studies have been conducted regarding the prevalence of eating disorders among male athletes (Petrie & Greenleaf, 2007). Methodological problems, such as the use of single-source samples (e.g., male athletes from one university, as in Sanford-Martens et al., 2005), and the use of questionnaires with no established psychometric properties to determine prevalence rates (e.g., Johnson, Powers, & Dick, 1999) have limited the necessary exploration in trends among athletes, specifically of the male gender.

The literature thus far regarding the impact of sport participation and the prevalence rates of eating disorders and their symptoms among male and female college athletes is controversial, and further investigations among athletes are needed in order to clarify this issue. In summary, it is important for researchers to identify vulnerable populations and potential risk factors for developing an eating disorder because of the mental and physical ramifications associated with the disorder. Problematic issues such as weight preoccupation, disturbed eating behaviors, and distorted body-image may be a result of an eating disorder (Montenegro, 2006). Furthermore, athletes who deny their bodies important nutrition can develop physical health concerns such as amenorrhea (in females), reduced body mass and lean muscle tissue, fatigue, irritability, insomnia, lack of concentration, and growth failure; as well as psychological concerns such as depression, anxiety, and addiction (i.e., substance abuse) (Montenegro, 2006). By identifying at-risk populations and/or moderating variables, researchers will then be able to provide education and implement programs and regulations in an attempt to enhance safety and health concerns.

Eating Disorders Versus Disordered Eating

Eating disorders are characterized by severe disturbances in eating behavior (DSM-IV-TR; APA, 2000). The two most common specific diagnoses are Anorexia Nervosa and Bulimia Nervosa. Both of these eating disorder diagnoses include a disturbance in perception of body

shape and weight as an essential feature (DSM-IV-TR; APA, 2000). The first diagnosis, Anorexia Nervosa, is characterized by "a refusal to maintain a minimally normal body weight" (DSM-IV-TR; APA, 2000; pg. 583). There are four diagnostic criteria (A-D) needed for a clinical diagnosis of Anorexia Nervosa. The first is that anorexic individuals maintain a body weight that is below a minimally normal level for their age and height (uses Metropolitan Life Insurance tables or pediatric growth charts for norms; Criterion A). Criterion A offers a guideline that suggests that the individual weigh less than 85% of the weight that is considered normal for the person's age and height; although, these cutoffs are only provided as suggestions because it is unreasonable to specify a single standard for minimally normal weight that applies to all individuals of a given age and height (DSM-IV-TR; APA, 2000). Criterion B states that the individual has an intense fear of gaining weight or becoming fat, even though underweight. This fear is typically not alleviated by weight loss, and often becomes more intense as weight decreases (DSM-IV-TR; APA, 2000). Criterion C is a disturbance in the way in which one's 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. The final criterion (Criterion D) is amenorrhea in post-menarche females (i.e., the absence of at least three consecutive menstrual cycles).

There are two subtypes that can be used to specify the presence or absence of regular binge eating or purging during the current episode of Anorexia Nervosa: Restricting Type and Binge-Eating/Purging Type. Restricting Type individuals are not regularly engaged in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas), while Binge-Eating/Purging Type individuals are engaged in binge-eating or purging behavior (DSM-IV-TR; APA, 2000).

Bulimia Nervosa is another eating disorder diagnosis, characterized by "repeated episodes of binge eating followed by inappropriate compensatory behaviors such as self-induced vomiting; misuse of laxatives; diuretics, or other medications; fasting; or excessive exercise" (DSM-IV-TR; APA, 2000, pg. 583; Criterion A & B). A binge is defined as eating in a discrete period of time (a limited period, usually less than 2 hours) an amount of food that is definitely larger than most people would consume under similar circumstances (DSM-IV-TR; APA, 2000; Criterion A1). An episode of binge eating is accompanied by a lack of control, such as feeling that one cannot stop eating or control what or how much one is eating (DSM-IV-TR; APA, 2000; Criterion A2). To qualify for this diagnosis, the binge eating and the inappropriate compensatory behavior must occur, on average, at least twice a week for 3 months (DSM-IV-TR; APA, 2000; Criterion C). Furthermore, self-evaluation is unduly influenced by body weight and shape (Criterion D) and the disturbance does not occur exclusively during episodes of Anorexia Nervosa (Criterion E; DSM-IV-TR; APA, 2000).

As with Anorexia Nervosa, there are also two subtypes with Bulimia Nervosa in order to specify the presence or absence of regular use of purging methods as a means to compensate for the binge eating (DSM-IV-TR; APA, 2000). The first is the purging type, in which the individual has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas during the current episode (DSM-IV-TR; APA, 2000). The second is the non-purging type, in which 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 during the current episode (DSM-IV-TR; APA, 2000).

A third eating disorder diagnosis is classified as Eating Disorder Not Otherwise Specified (EDNOS). EDNOS is a broad eating disorder category that encompasses almost all eating

problems that do not meet the specific criteria for a diagnosis of anorexia or bulimia. This large and somewhat ambiguous classification is diagnosed in 4% of American women each year, which is more than annual anorexia or bulimia diagnoses (National Eating Disorders Association; http://neda.org). Furthermore, the mortality rate associated with EDNOS exceeds that for anorexia or bulimia nervosa (Crow, Peterson, Swanson, Raymond, Specker, Eckert, & Mitchell, 2009).

There has been some criticism regarding the strict cut-offs for a diagnosis of anorexia nervosa or bulimia nervosa, which could result in classifying a patient as having EDNOS. A recent study from the Stanford University School of Medicine and Lucile Packard Children's Hospital (Peebles, Hardy, Wilson, and Lock, 2010) suggests that while current diagnostics cover the right *general* areas, medical criteria for eating disorders should be re-evaluated and possibly broadened. The authors press the urgency of this issue because health insurance agencies offer less coverage for EDNOS treatment than for anorexia or bulimia treatment. This is unfortunate, as the current study found that of the 1310 adolescent female eating disordered patients, approximately two-thirds were diagnosed as EDNOS (62.4% EDNOS; 25.2% Anorexic; 12.4% Bulimic); and 60% of these patients were considered "sicker" than bulimic patients *and* met criteria for hospitalization. Clearly there is a misconception that an EDNOS diagnosis is "less severe" and these authors adamantly propose expanding the diagnostic criteria of anorexia and bulimia.

Examples of EDNOS include: 1) for females, all the criteria for Anorexia Nervosa are met except that the individual has regular menses; 2) all of the criteria for Anorexia Nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range; 3) all of the criteria for Bulimia Nervosa are met except that the binge eating and

inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than 3 months; 4) the regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food (e.g., self-induced vomiting after the consumption of two cookies); 5) repeatedly chewing and spitting out, but not swallowing, large amounts of food; and 6) Binge-eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviors characteristic of Bulimia Nervosa (DSM-IV-TR; APA, 2000).

Previous athlete and eating disorder investigators have frequently used the Eating Attitudes Test (EAT; Garner, Olmstead, Bohr, & Garfinkel, 1982) and the Eating Disorder Inventory (EDI; Garner, 1991) in order to measure eating disorder symptoms. The EDI-2 (Garner, 1991) is a 91- item Likert scale questionnaire that assesses the attitudinal, behavioral, and psychological symptoms of eating disorders. The original EDI's psychometric properties are well-established, particularly for women participants (Garner, 1991). This measure is considered one of the best-validated among women and the most widely used risk and symptom measure for women (Spillane, Boerner, Anderson, & Smith, 2004). Specifically, internal consistency reliability for the scales ranges from .83 to .93 in a female eating-disorder sample and from .77 to .93 within a non-patient female college study sample (Garner, Olmstead, & Polivy, 1983). Each EDI subscale correlates significantly with physicians' ratings, and all EDI items are able to discriminate eating disorder and non-patient samples (Garner et al., 1983). A recent study aimed to test the reliability and validity of this measures comparability between collegiate male and female samples. Results supported the EDI-2's validity with men, as each of its scales were invariant across gender; meaning the scales can be presumed to measure similar constructs in both sexes (Spillane et al., 2004).

For the purposes of this study only the following three subscales were utilized, as they are most relevant to the study hypotheses: a) Drive for Thinness subscale, which measures the desire to lose weight and the fear of fat (7 items); b) Body Dissatisfaction subscale that assesses symptoms related to body image disturbance (9 items); and c) Perfectionism subscale, which examines the need to control all areas of one's life (6 items). The Drive for Thinness and Body Dissatisfaction scales are two of three EDI-2 subscales (the Bulimia scale is the third) that receive the greatest consideration because they are the core subscales for eating disorder screening (Black, Larking, Coster, Leverenz, Abood, 2003). They examine matters related to body shape and physical appearance (Davis, 1990), while the Perfectionism scale assesses psychological concerns related to athletic performance (Brownell, Rodin, & Wilmore, 1992; Fulkerson, Keele, Leon, & Don', 1999). It is not uncommon that one or more of the EDI-2 subscales are extracted for research use (e.g., Cattanach, Phil, Malley, & Rodin, 1988; Doninger, Enders, Burnett, 2005); and due to the limited availability of participants, an overly burdensome battery of questionnaires was a concern.

Items are answered on the following 6-point Likert scale: never (1), rarely (2), sometimes (3), often (4), usually (5), and always (6). Each response is weighed from 0 to 3, with a score of 3 assigned to the response farthest in the symptomatic direction (i.e., always), a score of 2 for the adjacent response (i.e., usually), a score of 1 for the next adjacent response (i.e., often), and a score of 0 assigned to the three responses farthest in the asymptomatic direction (i.e., never, rarely, and sometimes). This 0-3 scoring system rests on the assumption that item scaling on the EDI is continuous only for the responses weighted 1-3; and that non-symptomatic responses should not be aggregated to contribute to the total subscale score reflecting pathology. With that,

subscale scores are calculated by summing the subscale items, and higher scores indicate more eating disorder symptoms (Garner, 1991).

The EDI-2 is a widely used measure in eating disorder research; however, it examines the prevalence of eating disorder *symptoms*, in contrast to the prevalence of specific DSM-IV diagnostic criteria. The EDI-2 also defines a cut-off point in order to differentiate between disordered eating and non-disordered eating. Thus, an individual scoring one point below the cut-off is considered the same as an individual scoring at the bottom of the non-eating disordered category (Hausenblas & McNally, 2004). Researchers have suggested that future studies examine the prevalence of eating disorders in athletes, as opposed to only their symptoms (Hausenblas & Carron, 1999; Sherman & Thompson, 2001); and the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, and Schneider, 1997) has been recommended in order to do so (Hausenblas & Carron, 1999).

The Q-EDD is a self-report questionnaire containing 50 questions and requires approximately 5 to 10 minutes to complete. This instrument measures individual behaviors, such as self-induced vomiting, as well as categorical labels (e.g., eating disordered and non-eating disordered). Items or combinations of items are dichotomously scored (yes or no) in order to generate the categorical labels, in regards to meeting or not meeting DSM-IV criteria for an eating disorder. Then, the individual criteria are combined with additional decision rules into an assessment of meeting or not meeting all criteria for a specific category. The following question was changed for this study in order to reflect the obvious exercise requirements rowers have: "*In addition to your normal rowing practices and team expectations*, do you exercise a lot? Indicate the amount of additional time you spend exercising in order to lose weight."

The non-eating disordered category consists of an asymptomatic (i.e., no eating disorder symptoms) subcategory and a symptomatic (i.e., no DSM-IV eating disorder diagnosis, but some symptoms) subcategory. In order to be placed in the asymptomatic sub-category, respondents must reply negatively to all behaviors constituting eating disorder criteria, as well as respond negatively to the use of strict dieting and appetite control pills as a means of weight control. All symptomatic respondents do not meet the criteria for any of the specified DSM-IV eating disorders, but are not necessarily without any eating disorder symptoms (i.e., they are not considered asymptomatic).

The eating disorder category contains six diagnostic subcategories. Of these six, two subcategories reflect diagnoses of bulimia and anorexia, and four subcategories reflect eating disorder not otherwise specified (EDNOS) depictions of sub-threshold bulimia, menstruating anorexia, non-binging bulimia, and binge-eating disorder. For classification in the eating disordered category, respondents must meet all diagnostic criteria for any one of the six eating disorders.

The authors of the Q-EDD obtained strong support for the instruments psychometric properties through a series of three studies. Notably, convergent validity was revealed in study 1 by a strong relationship to other self-report measures, specifically the BUILT-R and the EAT. The BUILT-R is only valid for the differentiation between DSM-IV bulimics and non-bulimics; therefore, the convergent validity was examined through the use of these categories on the Q-EDD. This study was conducted with a non-clinical sample of 136 college women, of which 103 were non-eating disordered and 33 were eating-disordered, according to structured clinical interviews. The BUILT-R scores of the Q-EDD defined bulimics and non-bulimics were significantly different, $t(133) = 6.67$, $p < .0001$, with the mean score of the Q-EDD defined

bulimics falling in the bulimic range (i.e., more than 104) and the mean score of the Q-EDD defined non-bulimics falling in the non-bulimic range. The EAT was used in order to demonstrate the convergent validity of anorexics (e.g., determine if individuals diagnosed anorexic by the Q-EDD would score in the anorexic range on the EAT) because this self-report measure is designed to differentiate anorexics and non-eating disordered individuals. Similar to the results of the BUILT-R, the EAT scores of the Q-EDD defined anorexics and non-eating disordered participants were significantly different, t (104) = 3.65, $p < .001$, with the mean score of the Q-EDD defined anorexics falling in the anorexic range (i.e., more than 30) and the mean score of the Q-EDD defined non-eating disordered participants falling in the non-anorexic range.

In addition, strong criterion validity was demonstrated with a 98% accuracy rate between the Q-EDD classification and the clinical interview in study 1, as well as a78% accuracy between the Q-EDD classification and the clinician judgment in study 3. Further, the accuracy rates were 90% in study 1 and 78% in study 3 for the distinction of eating disordered, symptomatic, and asymptomatic groups. Finally, there was a 100% accuracy rate in Study 3 for the differentiation of anorexia and bulimia.

Incremental validity, the extent to which the Q-EDD improves diagnostic accuracy above that of existing tests, was supported by greater accuracy of the Q-EDD diagnoses than those yielded by an established inventory (e.g., BUILT-R). Specifically, the Q-EDD was correct at predicting bulimia 78% of the time, while the BUILT-R was correct 54% of the time. The incremental validity of the Q-EDD in comparison with the EAT was not examined due to having only one interview-defined anorexic. Lastly, the 100% inter-scorer agreement across study 1 and study 2 indicates that scoring of the Q-EDD can be easily mastered.

In addition to measuring prevalence rates of eating disorders and examining eating disorder symptoms among collegiate rowers, this study also examines disordered eating behaviors. Disordered eating behaviors differ from an eating disorder classification of anorexia, bulimia, or EDNOS because they do not include all criterions for the clinical diagnosis, according to the DSM-IV-TR (APA, 2000). Athletes may show disordered eating behaviors by only engaging in one specific behavior, such as occasionally bingeing, and/or only engaging in this behavior for a short amount of time. Many EDNOS diagnoses, on the other hand, appear to have all but one of the symptoms needed for a diagnosis of anorexia nervosa or bulimia nervosa. Disordered eating may include one or more of the previously mentioned behaviors and/or ramifications, but do not reach criterions for a clinical diagnosis. Previous literature on athletes has generally assessed disordered eating or eating disorder *symptoms*, as opposed to the *prevalence* of clinical eating disorders based upon the DSM-IV criteria. Furthermore, research in the area of eating disorders often confuses the two. Future studies are needed with more direct measures of eating disorder symptoms and prevalence rates of eating disorders among athletes.

Vulnerable Populations for Developing Eating Disorders

The college environment may be a factor that increases the risk for eating disorders (Greenleaf et al., 2009). Kashubeck, Marchand-Martella, Neal, & Larson (1997) found that the college setting increased pressures for fitness, thinness and attractiveness for both males and females. Additionally, the demands to succeed in college, combined with the emphasis on attractiveness may be an explanation for why many college students and young adults are at risk for developing symptoms of eating disorders (Levitt, 2004; Meyer, 2005). The transition to the college environment is also associated with increased stress and anxiety and perceived loss of social support (Montgomery & Cote, 2003). The increased academic demands of college

combined with the previously mentioned variables may add to the surmounting pressures for college students, and help to explain why this particular group may have an increased risk for developing eating disorders and disordered eating behaviors.

Females may also be a vulnerable population for the developing an eating disorder. The DSM-IV-TR states that 90% or more of individuals diagnosed with anorexia nervosa and bulimia nervosa are female (APA, 2000). Most eating disorder research, however, continues to examine female populations despite the recent information noting increases in male body-image disturbances and disordered eating attitudes and behaviors (Petrie et al., 2008). Petrie, Greenleaf, Reel and Carter (2008) examined the prevalence of eating disorders and disordered eating behaviors among 203 male collegiate athletes using the Q-EDD (Mintz et al, 1997) and found that while just over 80% of athletes were asymptomatic and no athletes were classified as having a clinical eating disorder, 39 athletes (19.2%) were classified as symptomatic. This should be an area of concern for male athletes because the eating disorder symptoms may be a precursor to the development of an eating disorder. Current literature examining the moderating effect of sex is needed to determine if males and females are equally at-risk for the development of eating disorders and eating disorder symptoms.

Athletes are a third population who may be at an increased risk for developing an eating disorder. A number of theories have been researched and put forward to explain why athletes may be a high-risk population for the development of eating disorders. Johnson (1994) proposed a socio-cultural explanation for this phenomenon, where in an attempt to improve athletic performance some athletes develop eating disorders or patterns of disordered eating. Another interpretation for why athletes may represent a high-risk group is the intra-individual concept, which examines biological and behavioral markers for vulnerability to eating disorders (Leung,

Geller, & Katzman, 1996). Leung et al. (1996) also posed a sport environment explanation, which proposes that environmental pressures for thinness may aid in the development of disordered eating. The sport environment explanation suggests that task and social related athletic pressures may promote unhealthy eating and/or weight management behaviors that parallel disordered eating (Duda & Benardot, 1997; Powers & Johnson, 1996; Round Table, 1981; Sossin, Gizis, Marquat, & Sobal, 1997; Taub & Blinde, 1992). Task related pressures within the athletic arena may include competitive demands and desire to attain a particular weight for performance enhancement; while social pressures may include influences from coaches, teammates, and other significant relationships.

Weight Divisions in Sport

Eating behaviors are critical for all athletes in order to ensure top performance within their respective sport. Athletes may be vulnerable to eating disorders and risky weight loss or weight gain practices as a result of certain sport environment pressures, such as sport weight limits, team weigh-ins, peer pressures, performance demands, and judging criteria (Petrie & Rogers, 2001; Petrie & Sherman, 1999; Swoap & Murphy, 1995; Thompson & Sherman, 1999). These pressures are virtually unavoidable in sports where athletes must make specific weight qualifications in order to compete. Wrestling, judo, weight-lifting, boxing and rowing are examples of sports that have weight divisions for their athletes. While all athletes typically require more energy than non-athletes in order to train and compete in their sport; athletes who have to maintain a specific weight may have even greater pressures to watch their caloric intake and expenditure.

Weight classifications in sport expand the pool of competitive athletes by allowing relatively equal-sized athletes to compete against one another; however, there is the additional

objective and demands of making weight. Collegiate rowing is an endurance sport with weight classifications in which athletes (rowers) race against one another in various sized boats (i.e., a single person boat, a two person boat, a four person boat or an eight person boat). The boats are propelled through the water by the force of the oars as the rowers pull on their handles, allowing the blade to travel through the water. Rowing is a demanding sport requiring physical strength, cardiovascular endurance and strong core balance. In collegiate rowing, rowers are categorized by gender and weight. The two weight categories are lightweight and open-weight (often referred to as "heavyweight"). In the United States, according to US Rowing regulations, lightweight men cannot weigh more than 160 pounds individually and the average of the crew cannot exceed 155 pounds (http://www.usrowing.org/index.aspx). This rule may increase disordered eating among these male rowers because there have been anecdotal reports stating that heavier and often stronger men may be put into the boat – in an effort to increase the overall speed of the boat - along with a lighter rower(s) who is designated to help the crew achieve the average of 155 pounds. For example, two rowers can be 160 pounds each, if one rower is 145 pounds and the crew average is still equal to 155 pounds. Lightweight women cannot weigh more than 130 pounds (with no boat average); while men and women open-weight rowers do not have any weight restrictions (http://www.usrowing.org/index.aspx).

Lightweight rowing is considered by many to be an important category because it gives the average to smaller sized athletes the ability to compete against peers of a similar size. The International Federation of Rowing Association (FISA), states that the weight category was introduced to "encourage more universality in the sport especially among nations with less statuesque people" (http://www.worldrowing.org). The weight divisions offer competitive equity in rowing.

Disordered eating has not been thoroughly investigated among lightweight rowers; possibly due to the fact that lightweight rowing, particularly for females, has traditionally involved small numbers of participants (Karlson, Becker, & Merkur, 2001). While the requirement of equal participation for US women in collegiate sports through the laws of Title IX have increased rowing opportunities for open-weight and lightweight women, lightweight rowing has grown at a much slower rate (Karlson, Becker, & Merkur, 2001). This may be due to the fears of coaches and administrators that the addition of a lightweight program could increase the risk of eating disorders, as the rowers would have to adhere to the weight restrictions. These perceptions are often based on comparisons made between "making weight" in lightweight rowing and wrestling, which is a weight-dependent sport that has been associated with disordered eating in men (Brownell & Steen, 1992).

There are a number of similarities between wrestling and lightweight rowing, as both sports require participants to reach a predetermined weight. Thiel, Gottfried and Hesse (1993) found an equal prevalence of disturbed body image in lightweight male rowers and male wrestlers. For some coaches and athletes, there is a perception that a larger athlete who loses weight to compete in a lower weight division is more advantageous than a smaller athlete who "bulks up" or gains weight. For example, many wrestlers "cut weight" (intentional rapid weight loss) in order to compete in the lowest possible weight category, which generally involves losing and gaining substantial amounts of weight frequently during a season (Oppliger, Nelson-Steen, Scott, 2003; Steen and Brownell, 1990). This "performance-related" drive for thinness makes some college athletes and coaches believe that they will enhance their sport performance by lowering their body fat (Powers and Johnson, 1996). Consequentially, these athletes may engage

in weight cycling, or periodically alternating from food restriction (weight loss) to unrestricted food intake (weight gain), in order to meet the requirements for their weight division.

In comparison, as lightweight rowing becomes more competitive, particularly if there is competition for seats in a winning boat or scholarships, larger rowers may try to make weight, which would increase the likelihood of disordered eating behaviors in an attempt to reach an unnatural lower weight (Karlson et al., 2001). Athletes trying to make weight may engage in extreme eating and weight control behaviors such as binging, purging, abusing diet pills, laxatives, and/or diuretics, fasting, overuse of saunas (dehydration method), and/or excessive exercise to reach their ideal competition weight (Oppliger et al., 2003). These pathogenic behaviors may be indicative of a clinical eating disorder. One study found that 37% of athletes with anorexia nervosa reported that the main reason for the development of their eating disorder was dieting and weight fluctuations required for their sport, suggesting that athletes who have to make weight may be predisposed to the development of eating disorders (Sundgot-Borgen, 1994).

Evidence of pathogenic eating and weight control behaviors in sport was evident in 1997, when in a span of 33 days there were three reported wrestling fatalities. These athletes were all engaged in a program of rapid weight loss to qualify for competition and all died in the presence of their coaches. The Center for Disease Control and Prevention (CDC) reviewed these fatalities and reported that the wrestlers were “attempting to lose an average of eight pounds over a three-to-12 hour period by wearing rubber suits and exercising vigorously in hot environments. In addition, they were attempting to lose this weight after dropping an average of 21 pounds over the previous 10-13 weeks” (Center for Disease Control and Prevention, 1998).

Wrestling, along with many college sports, operate under the governance of the National College Athletic Association (NCAA). Following these reported deaths, the NCAA Wrestling Committee, with the assistance of the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports, adopted significant rule changes to address weight loss issues in wrestling (see NCAA Online at http://www.ncaa.org/wps/ncaa?key=/ncaa/ncaa/sports+and+championship/wrestling for more information). According to an investigation examining the weight management practices of college wrestlers after the implementation of the NCAA rule changes, 40.2% of the 741 wrestlers stated that the new NCAA rules deterred extreme weight loss behaviors. Coaches and fellow wrestlers, however, were considered the primary influence on weight loss methods (Oppliger et al., 2003).

There have also been two reported deaths of former lightweight rowers. In 2000, a former rower was training to make the German national lightweight team and compete at the annual international World Rowing Championship, but collapsed while on a training run and later died. Also, in May 2006, a Boston College lightweight male rower collapsed and died immediately following his race at an annual collegiate championship, the Dad Vail Regatta in Philadelphia, Pennsylvania. Although their deaths were said to have been from unknown causes, members of the rowing community and the media speculate that similar to the wrestling fatalities, the stresses of losing and/or maintaining weight, along with an intense training schedule, may have contributed to these rowers' untimely deaths.

There are few studies conducted on rowers, particularly lightweight rowers, and of that limited research there are conflicting results. Of the three studies that compare lightweights to open-weights, one found that 19.4% of elite British lightweight women (but no open-weight

women) scored above the critical level on the Eating Attitudes Test (EAT), representing significant risk for eating disorders (Terry & Waite, 1996). A follow-up investigation found that 21% of elite female lightweight rowers, as compared to 6% of male lightweight rowers and only 4% of female open-weight rowers scored over the threshold for eating disorder concerns (Terry, Lane, & Warren, 1999). Finally, a third study found trends toward similar weight loss practices and disordered eating behaviors between lightweight and heavyweight rowers across seven northeastern American colleges, although the results were not significant (Sykora et al., 1993). Specifically, the trends showed that lightweights employed more extreme weight loss methods than heavyweights; and lightweight males showed greater weight fluctuation during the season and put on more weight during the off season than did any other rowers (lightweight females, open-weight females, and open-weight males). The authors also found that female rowers displayed more disturbed eating behaviors and weight control methods than male rowers. Karlson, Becker, and Merkur (2001) suggested that the discrepancy in the results of previous literature may be due to differences in competition levels at the college level versus the elite level. They also discussed that there may be a more appropriate selection of leaner and smaller women to row lightweight at the collegiate level, while the elite level may have increased pressures for larger women to attempt to make weight.

A more recent study examined eating behaviors of collegiate women who were lightweight rowers, runners, and controls using the Eating Disorders Examination Questionnaire (EDE-Q; Stice, Telch, Rizvi, 2000), and found that rowers showed significantly more restraint in eating patterns during the month prior to competition and less shape concern than either runners or controls (Karlson, Becker, & Merkur, 2001). In addition, rowers in this study reported increased use of diuretics, but there were no significant differences between the groups in terms

of probable cases of eating disorders or disordered eating. The authors concluded that lightweight rowing and distance running were not associated with increased prevalence of eating disorders in their sample; however, the use of pathologic weight making behaviors should be a significant clinical concern. These results support ongoing monitoring of disturbed eating and weight-making practices in weight-dependent sports, but do not support discouraging the growth of collegiate lightweight rowing (Karlson, Becker, & Merkur, 2001).

Sport Participation and Influences of the Athletic Environment on Eating Behaviors

A theory that is particularly useful in researching individual patterns of sport participation is the self-determination theory (Vallerand & Fortier, 1998). Self-determination theory looks at the effects of the social environment on motivation and individual behaviors and helps explain various reasons for why people engage in sport (Deci & Ryan, 1985, 1991; Ryan & Deci, 2000). For example, athletes who are intrinsically motivated engage in activities for inherent pleasure and the satisfaction of three psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 1991; Ryan & Deci, 2000). Relatedness is particularly relevant to the team environment because it pertains to the desire to feel connected with other individuals and experience satisfactory relationships (Deci & Ryan, 1985). On the other hand, extrinsically motivated athletes engage in behaviors that attain material or social rewards (Deci & Ryan, 1985). Amotivation - not perceiving a relationship between one's actions and the resulting outcomes - is another aspect that should be understood when examining human behavior (Deci & Ryan, 1985). Athletes who are amotivated no longer identify any worthwhile reasons or motives for sport participation (Pelletier, Fortier, Vallerand, Tuson, Briere, & Blais, 1995).

Self-determination theory, particularly the concept of relatedness, may help explain why individuals engage in the same behaviors as others within their same environment, such as

teammates on an athletic team. Regardless of whether these behaviors are considered to be healthy or unhealthy; they may help the individual fill his/her desire to feel connected with the group. Certain behaviors, like unhealthy eating and dieting habits, may be particularly detrimental to social groups such as competitive or elite athletes, due to their impact on performance. For example, previous studies have found that the group's influence on eating and dieting behaviors may result negatively on the team (Crandall, 1988; Hausenblas & Carron, 2000; Pike, 1995). One study, specifically, found that 11% of female athletes and 9% of male athletes reported their group to have a negative influence on their eating and dieting behaviors; with the most frequently cited negative group influence being on the quality of food (i.e., encouraging unhealthy eating, eating junk food together) (Hausenblas & Carron, 2000). In addition, Rosen, McKeag, Hough, and Curley (1986) found that sport participation may contribute to disordered eating behaviors, particularly when teammates encourage one another to engage in pathogenic weight-loss methods (i.e., use of laxatives, diet pills, diuretics, and/or engaging in self-induced vomiting). The reinforcement of pathological eating behaviors has been acknowledged as a potential component affecting onset of disordered eating, along with an inter-team competition to lose weight (Chopak & Taylor-Nicholson, 1991; Hausenblas & Carron, 1999; Greenleaf, 2002).

Previous research investigating the social pressures within a sport environment has found information emphasizing the group member's influence on an individual's eating, dieting and exercise behavior. Crandall (1988) noted anecdotal evidence from various authors that proposed that a particular eating disorder, bulimia, tended to run in social groups, such as cheerleading squads (Squire, 1983), various athletic teams (Crago, Yates, Beutler, & Arizmendi, 1985), and dance camps (Garner & Garfinkel, 1980). Crandall (1988) investigated the social pressures in

relation to eating behaviors in sororities and found that as relationships grew more cohesive, the sorority member's binge eating developed to be more like her friends. Thompson and Sherman (1993) also found anecdotal accounts that eating disturbances often spread from one person to another within athletic teams.

While much research on social influences of eating behaviors within groups has concentrated on negative impacts, there has also been previous research that supports constructive group influences, such as discouraging pathological eating behaviors among the team (Wertheim, Paxton, Schutz, & Muir, 1997). For example, Hausenblas and Carron (2000) found that while a majority of the athletes they interviewed did not perceive the presence of group influence on eating and dieting behaviors; when it was perceived to be present, it was generally positive. Quality of food consumed was the most frequently listed positive group influence for male and female athletes. Another study found that athletic teams had a positive impact on eating attitudes and behaviors among female athletes (Gapin & Cassidy, 2003). Due to the conflicting results of previous research, as well as the outdated literature on group influences among eating behaviors within the athletic environment, this area represents a definite need for future studies.

Further investigations identifying at-risk populations and potential risk factors, such as the influence of teammates on eating behaviors, for developing eating disorders are critical in order to alleviate the frequency and severity of eating problems, as well as the ramifications associated with them.

Statement of the Problem

There is a lack of current information regarding the prevalence of eating disorders and eating disorder symptoms among male and female collegiate rowers. Specifically, there is a lack

of information on prevalence of eating disorders using measures that assess the DSM-IV criteria for an eating disorder, such as the Q-EDD (Mintz et al., 1997). There has also been the lack of a distinction between clinical eating disorders and disordered eating behaviors and limited eating disorder research assessing the differences between lightweight and open-weight rowers.

Purposes of the Study

The first purpose of this study is to assess the prevalence rates of eating disorders among collegiate rowers through the use of a questionnaire which uses the Diagnostic and Statistical Manual-IV diagnostic criteria for clinical eating disorders (the Q-EDD). The second purpose of this study is to measure eating disorder symptoms using three subscales of the Eating Disorders Inventory-2 (EDI-2; Garner, 1991), Drive for Thinness, Body Dissatisfaction, and Perfectionism. Comparisons of prevalence rates of eating disorders and eating disordered symptoms will be assessed among male and female rowers, as well as lightweight and open-weight rowers.

Several exploratory purposes will also be examined in this research study. The first will be to assess disordered eating behaviors in a population of collegiate rowers. Disordered eating behaviors differ from eating disorders because they do not meet the full criterion for a clinical diagnosis. Disordered eating behaviors will be investigated through a questionnaire developed for this study by the primary researcher and differences in the reported behaviors and reported frequency of the behaviors will be assessed.

Another exploratory purpose of this proposed study is to examine the perceived influence of teammates on eating behaviors and determine if there are more reported negative influences or more reported positive influences. A questionnaire developed for this study will be used in order to explore this possibility of teammates influencing eating behaviors, and will include specific

items from Hausenblas and Carron's (2000) qualitative work on group influence on eating and dieting behaviors among varsity athletes.

Significance of the Study

This study will help assess specific behaviors and trends among lightweight and open-weight collegiate rowers. Specifically, this research will include a measure of prevalence rates of eating disorders among male and female collegiate rowers according to DSM-IV criteria, which is something that recent studies have not done. These trends may then be further analyzed and explored in an effort to inform athletes, parents, coaches, administrators, athletic trainers, sport psychologists and any other university and rowing personnel whose primary concern is the health and safety of the athletes. Furthermore, the information gained from this study may give incentive for rowing programs, universities, and/or the NCAA to provide a structured set of regulations in an effort to enhance safety and competitive equity, as well as competition, rather than weight loss.

Hypotheses

It is hypothesized that there will be a higher prevalence of eating disorders in lightweight rowers than open-weight rowers (as measured by the Q-EDD). Furthermore, it is hypothesized that female rowers will have a higher prevalence of eating disorders than male rowers.

It is also hypothesized that lightweight rowers will score significantly higher on the EDI-2 subscales than open-weight rowers. Further, it is hypothesized that female rowers will score significantly higher on the EDI-2 subscales than male rowers.

No a priori hypotheses will be advanced for the purposes regarding disordered eating behaviors and the influence of teammates on eating behaviors due to their exploratory nature.

CHAPTER III

Method

Participants

Approximately 28 head coaches and 1000 rowers were recruited to participate in this study. Participants consisted of current coaches and rowers who were recruited from 23 universities throughout the United States with competitive collegiate men and women's lightweight rowing programs. These 28 programs (14 men; 14 women) were specifically chosen because they have the most number of lightweight appearances within the last decade at the invitational Intercollegiate Rowing Association (IRA) regatta. The IRA is the oldest collegiate rowing championship in the United States (in its' 108th year as of 2010), as well as the most competitive collegiate championship for lightweight programs. The women's programs are all Division I NCAA member institutions (men's rowing is not considered a NCAA sport). Division I colleges typically have larger enrollment and a greater number of scholarships than Division II colleges; while Division III teams do not award scholarships to their athletes. All current rowers at these 28 rowing programs, regardless of weight division (open weight or lightweight), were asked to volunteer in this study.

Procedures

The principal investigator e-mailed the head coach at each of the 28 rowing programs regarding this research. The e-mail included an introduction of the principle investigator and a brief explanation of the current study (see Appendix A). Coaches were then asked to either forward a request for participation with the link to the surveys (see Appendix B) and a cover letter that details the research out to their teams via e-mail (see Appendix C), or to provide the principal researcher with their athletes' contact information.

After the participants received the e-mail from their head coach or the principal researcher and clicked the link to the survey on www.surveymonkey.com, the cover letter appeared again and the participants showed agreement to voluntarily participate in the study by clicking on the "Continue" button below the cover letter. Thus, consent was given prior to completion of the questionnaires.

All data was collected anonymously by using the "web link collector" option on www.surveymonkey.com and was scored according to each instrument's specific scoring procedure. Anonymous information means that no names or other identifiers were collected by the author and no IP addresses were delivered to the researcher by SurveyMonkey.com. The data was printed in a hard-copy format in order to statistically analyze, in which case it was kept in a locked filing cabinet in the primary researcher's office. Further, electronic data was kept in a password protected file owned by the primary researcher. The data will be kept for five years, and will be shredded after that time frame. There were no follow-ups provided upon completion of the study; however, if the participant wanted to receive the results of this study they were given the opportunity to contact the primary researcher via email, which was provided in the cover letter and the initial email. Additionally, the cover letter provided a list of resources in which the participant could find more information on how and where to receive additional information on nutrition, eating disorders, and counseling.

Measures

Demographic questionnaire.

The Demographics Questionnaire assessed the participant's sex, age, height, weight, race/ethnicity, and school status. Body Mass Index (BMI) was calculated from the participant's self-reported height and weight. The American College of Sports Medicine (ACSM; 2000) claims that BMI has a standard error rate of 5% when used to estimate body fat. The Training Information and Eating Behaviors Questionnaire assessed more rowing specific information, such as weight classification and years of experience.

Questionnaire for Eating Disorder Diagnosis (QEDD).

The Q-EDD is a self-report questionnaire containing 50 questions based on the DSM-IV criteria for eating disorders, which was converted to an online format for administration (see Appendix D). This instrument measures individual behaviors, such as self-induced vomiting, as well as categorical labels (e.g., eating disordered and non-eating disordered). Items or combinations of items are dichotomously scored (yes or no) in order to generate the categorical labels, in regards to meeting or not meeting DSM-IV criteria for an eating disorder. Then, the individual criteria are combined with additional decision rules into an assessment of meeting or not meeting all criteria for a specific category. The question "Do you exercise a lot?" was changed for this study in order to reflect the obvious exercise requirements rowers have to: "*In addition to your normal rowing practices and team expectations*, do you exercise a lot? Indicate the amount of additional time you spend exercising in order to lose weight."

Participants can be classified in the non-eating disordered category, which consists of an asymptomatic (i.e., no eating disorder symptoms) subcategory and a symptomatic (i.e., no DSM-IV eating disorder diagnosis, but some symptoms) subcategory, or the eating disorder category,

which contains six diagnostic subcategories. Of these six, two subcategories reflect diagnoses of bulimia and anorexia, and four subcategories reflect eating disorder not otherwise specified (EDNOS) depictions of sub-threshold bulimia, menstruating anorexia, non-binging bulimia, and binge-eating disorder.

The authors of the Q-EDD obtained strong support for the instruments psychometric properties through a series of three studies (Mintz et al., 1997). Notably, convergent validity was revealed in study 1 by a strong relationship to other self-report measures, specifically the BUILT-R and the EAT. In addition, strong criterion validity was demonstrated with a 98% accuracy rate between the Q-EDD classification and the clinical interview in study 1, as well as a78% accuracy between the Q-EDD classification and the clinician judgment in study 3. Incremental validity was supported by greater accuracy of the Q-EDD diagnoses than those yielded by an established inventory (e.g., BUILT-R). Specifically, the Q-EDD was correct at predicting bulimia 78% of the time, while the BUILT-R was correct 54% of the time. Reliability estimates for the QEDD were not available.

Eating Disorder Inventory-2 (EDI-2).

The EDI-2 (Garner, 1991) is a 91- item Likert scale questionnaire that assesses the attitudinal, behavioral, and psychological symptoms of eating disorders. The original EDI's psychometric properties are well-established, particularly for female participants (Garner, 1991). Specifically, internal consistency reliability for the scales ranges from .83 to .93 in a female eating-disorder sample and from .77 to .93 within a non-patient female college study sample (Garner, Olmstead, & Polivy, 1983). Each EDI-2 subscale correlates significantly with physicians' ratings, and all EDI-2 items are able to discriminate eating disorder and non-patient samples (Garner et al., 1983). A recent study aimed to test the reliability and validity of this

measure's comparability between collegiate male and female samples and results supported the EDI-2's validity with men, as each of its scales were invariant across gender (Spillane et al., 2004). For the purposes of this study only the following three subscales were used, as they are most relevant to the study hypotheses: a) Drive for Thinness subscale; b) Body Dissatisfaction subscale; and c) Perfectionism subscale (see Appendix E).

Training information and eating behaviors.

This measure was partially modeled after Sykora, Grilo, Wilfley and Brownell's (1993) measure in their study of eating, weight and dieting disturbances among rowers. Their questionnaire was derived from previous work with wrestlers and runners (Kiernan, Rodin, Brownell, Wilmore, & Crandall, 1992; Steen & Brownell, 1990; Steen, Oppliger, & Brownell, 1988). This questionnaire included sections on rowing experiences, changes in weight, and eating behaviors (see Appendix F). Additionally, specific questions were asked regarding teammates' influence on eating behaviors. These questions were from Hausenblas and Carron's (2000) qualitative work on group influence on eating and dieting behaviors among varsity athletes: "Have the members of your team ever had a *positive* influence on your eating/dieting behaviors?" If yes, the athletes were asked to check all of the following areas that their team members have influenced: a) the quality of food ingested, b) the quantity of food ingested, c) routines or habits associated with eating, d) psychological concerns surrounding eating, e) weight and body shape consequences of dieting, f) the use of exercise for weight control, and g) other (specify). Furthermore, optional comment areas were provided for each behavior if the participant chose to further explain him/herself. These specific areas were based on the six raw data themes that teammates reported to have an influence on in the study (Hausenblas and Carron, 2000). The identical protocol was used to determine the team's influence on *negative*

eating and dieting behaviors (i.e., “Have the members of your team ever had a negative influence on your eating/dieting behaviors?” If yes, check all the areas that they have influenced).

Design and Data Analyses

The data from the questionnaires was interpreted in order to assess the prevalence of eating disorders and the presence of eating disorder symptoms amongst collegiate rowers. The data was statistically analyzed using SPSS 18.0. Descriptive analyses were provided for the author-developed training and eating behaviors survey, the Q-EDD, and the EDI-2. Power tests were also conducted in order to determine the probability of rejecting a false null hypothesis (the probability of making a correct decision) and determine that the sample size is large enough to have significant power (.80 or above). Instruments involving missing items/answers were not included in the overall study.

Purpose and Hypotheses #1

The first purpose was to assess the prevalence rates of eating disorders among collegiate rowers through the use of a questionnaire which uses the DSM-IV diagnostic criteria for clinical eating disorders (the Q-EDD). Further, prevalence rates across weight division and gender were compared to determine if there were differences between lightweight and open-weight rowers.

1a. It was hypothesized that lightweight rowers would have a higher prevalence of eating disorders than open-weight rowers.

1b. It was hypothesized that female rowers would have a higher prevalence of eating disorders than male rowers.

Independent Variables: Weight Division, Gender

Dependent Variable: Q-EDD Score/Classification

Statistical analyses.

Chi-square (x^2) analyses were calculated to determine classification differences among weight division and gender for the Q-EDD. Participants were first classified as non-symptomatic, symptomatic, or eating disordered; and eating disordered participants were further classified to reflect the DSM-IV diagnosis of bulimic, anorexic or EDNOS. The Chi-square test was used to compare the sets of data for lightweight/open-weight and male/female, and determine if the frequencies of the categories differ by amounts larger than would be expected by chance.

Purpose and Hypotheses #2

The second purpose was to measure eating disorder symptoms using three subscales of the EDI-2: Drive for Thinness, Body Dissatisfaction, and Perfectionism. Along with this purpose, differences in scores on the EDI-2 between gender and lightweight and open-weight rowers were examined.

2a. It was hypothesized that lightweight rowers would score significantly higher on the EDI-2 subscales than open-weight rowers.

2b. It was hypothesized that female rowers would score significantly higher on the EDI-2 subscales than male rowers.

Independent Variables: Weight Division, Gender

Dependent Variable: EDI-2 Subscale Scores

Statistical analyses.

A 2x2 MANOVA (open-weight/lightweight X male/female) was conducted on the scores of the EDI-2 (Garner, 1991). The results indicated if there were significant main effects for

gender and weight division. Follow-up univariate analyses were also conducted to determine the effect of each subscale score (Body Dissatisfaction, Perfectionism, and Drive for Thinness).

Chapter IV

Results

Participants

The head coaches of 28 United States collegiate rowing programs (14 male and 14 female) were emailed and asked to forward a request for participation with the link to the survey and a cover letter that detailed the research to their teams. The head coaches were also informed that they could provide the principle investigator with their athlete's contact information if that was more convenient; however, no coaches chose this option. It is difficult to determine the overall response rate due to the fact that it was the coach's choice to forward the email to their athletes, as well as the potential lack of accuracy on the website roster (if one was listed). There were 148 total surveys; however, only 133 (approximately 90%) were fully completed and used in the analysis of this study. There were 57 males (42%) who completed the survey, with 26 who rowed open-weight (46%) and 31 who rowed lightweight (54%). The remaining 76 of the 133 participants were female (57%); half of whom primarily rowed open-weight (n= 38) and the other half primarily rowed lightweight (n = 38). The average age of the participants was 19.77 years (SD = 1.26) and the average Body Mass Index (BMI; determined by reported height and weight) was 21.84 (SD = 1.75), which falls in the "Normal" weight category range of BMI scores of 20.1-25 (Centers for Disease Control and Prevention, 2009). Approximately 89% of participants reported their race/ethnicity as Caucasian/White (n = 119). The 14 remaining participants reported their race/ethnicity as Asian-American/Pacific Islander (n = 7; 5%), and Other (n = 7; 5%). Approximately 41% of the participants reported their school status as freshman (n = 55), 19% sophomores (n = 25), 17% juniors (n = 23), 22% seniors (n = 29), and 1% reported being a 5th year/graduate student (n = 1). Additionally, only 17 of the 133 rowers

reported receiving some kind of athletic scholarship. Refer to Table 1 for complete descriptive information.

Table 1
Participant Demographics

Variable	Total Number (*n*)	Percentage (%)
Age (years)		
18	20	15.04%
19	47	35.34%
20	26	19.55%
21	25	18.80%
22	14	10.53%
23	1	.75%
Gender		
Male	57	42.86%
Female	76	57.14%
Weight Category		
Open-Weight	64	48.12%
Lightweight	69	51.88%
Race/Ethnicity		
White/Caucasian	119	89.47%
Asian-American/ Pacific Islander	7	5.26%
Other	7	5.26%
School Status		
Freshman	55	41.35%
Sophomore	25	18.80%
Junior	23	17.29%
Senior	29	21.80%
5th Year/Graduate Student	1	.75%
Weight Category		
Low Weight	9	6.77%
Normal	115	86.47%
Overweight	7	6.77%
Athletic Scholarship		
Yes	17	12.78%
No	116	87.22%

Note. Total number of participants = 133.
*Weight categories are determined by BMI scores. Low Weight = 18.1-20, Normal Weight = 20.1-25, and Overweight = 25.1-30.

Questionnaire for Eating Disorder Diagnosis (Q-EDD) Results

Purpose and hypotheses #1.

The first purpose was to assess the prevalence rates of eating disorders among collegiate rowers through the Q-EDD (Mintz, et al., 1997). It was hypothesized that lightweight rowers would have a higher prevalence of eating disorders than open-weight rowers. It was also hypothesized that female rowers would have a higher prevalence of eating disorders than male rowers.

The 133 participants were classified as follows: *asymptomatic* (*n* = 63; 47%), or not having eating disorder symptoms; *symptomatic* (*n* = 65; 49%), or displaying some symptoms but not earning a DSM-IV eating disorder diagnosis; or *eating disordered* (*n* = 5; 4%) based on their Q-EDD responses (see Table 2). The eating disorder subcategories reflect diagnoses of bulimia, anorexia and eating disorder not otherwise specialized (EDNOS). The eating disordered participants were further classified as follows: *bulimic* (*n* = 1), *exercise bulimic* (*n* = 1), and *sub-threshold bulimic* (*n* = 3).

To examine the relationship between weight classification (open-weight versus lightweight) and disordered eating status, a chi-square (x^2) test of independence was calculated comparing the frequency of reported eating disorders, as determined by the QEDD, in open-weight and lightweight collegiate rowers. A significant difference was found, $x^2(4) = 16.12$, $p = .003$. Lightweight rowers were more likely to report having an eating disorder (7%) than open-weight rowers (0%).

Because there were so few participants classified as eating disordered (*n* = 5; 4%), the eating disordered and symptomatic groups were combined for further post-hoc analyses. Previous studies have joined the groups together in analysis of eating disorder prevalence using

the QEDD due to concern that the low number of participants classified as either eating disordered or symptomatic would render the overall x^2 statistic less likely to be valid (Greenleaf, et al., 2009; Hausenblas & McNally, 2004) . While these authors have a valid point, this study was also interested in determining differences between groups (gender and weight division) and those diagnosed as having an eating disorder, as well as those with greater potential of developing an eating disorder (as noted by the classification of symptomatic). A second chi-square analysis was conducted comparing rowers vulnerable to an eating disorder (eating disordered and symptomatic rowers) and those without eating disorder symptoms (asymptomatic rowers). A significant difference was found, $.x^2(1) = 13.79$, $p < .001$. Lightweight rowers were more likely to report an eating disorder or symptoms of an eating disorder ($n = 47$; 68%) than open-weight rowers ($n = 23$; 36%). Additionally, open-weight rowers were more likely to report being asymptomatic, or having no eating disorder symptoms, ($n = 41$; 64%) than lightweight rowers ($n = 22$; 31%).

A second chi-square (x^2) test of independence was calculated comparing the frequency of reported eating disorders across gender in collegiate rowers. A significant difference was found $x^2(4) = 16.73$, $p = .002$, with male rowers reporting an eating disorder more frequently (7%) than female rowers (1%).

Due to the low number of participants classified as eating disordered ($n = 5$; 4%), the eating disordered and symptomatic groups were again combined for further post-hoc analyses (Greenleaf, et al., 2009; Hausenblas & McNally, 2004). A significant difference was found, $x^2(1) = 12.32$, $p < .001$), as male rowers were more likely to report an eating disorder or symptoms of an eating disorder ($n = 40$; 70%) than female rowers ($n = 30$; 39%). Additionally,

female rowers were more likely to report being asymptomatic, or having no eating disorder symptoms, (*n* = 46; 61%) than male rowers (*n* = 17; 30%).

Table 2
Demographics in Relation to Questionnaire for Eating Disorder Diagnosis Classification

Variable	Asymptomatic (*n* = 63)	Symptomatic (*n* = 65)	Eating Disordered (*n* = 5)
Age (years)			
Mean	19.70	19.72	21.20
Gender			
Male	26.98%	55.38%	80%
Female	73.02%	44.62%	20%
Rowing Category			
Open-Weight	65.08%	36.51%	0%
Lightweight	34.92%	64.62%	100%
Race/Ethnicity			
Non-minority	92.06%	89.23%	60%
Minority	7.94%	10.77%	40%
Weight Category			
Low Weight	4.76%	9.23%	0%
Normal	84.13%	87.69%	100%
Overweight	11.11%	3.08%	0%
School Status			
Freshman	36.51%	49.23%	0%
Sophomore	25.39%	12.31%	20%
Junior	17.46%	13.85%	60%
Senior	19.05%	24.62%	20%
5th Year/Grad. Student	1.59%	0%	0%

Note. Non-minority status = White/Caucasian. Minority status = Asian-American/Pacific Islander and Other
*Weight categories are determined by BMI scores. Low Weight = 18.1-20, Normal Weight = 20.1-25, and Overweight = 25.1-30.

Eating Disorder Inventory-2 Results

Purpose and hypotheses #2.

The second purpose of this study was to measure eating disorder symptoms using the following three subscales of the Eating Disorders Inventory-2 (EDI-2; Garner, 1991): Drive for Thinness, Body Dissatisfaction, and Perfectionism. Along with this purpose, differences in scores on the EDI-2 between gender and lightweight and open-weight rowers were examined. It

was hypothesized that lightweight rowers and female rowers would score significantly higher on the EDI-2 subscales than open-weight rowers and male rowers.

Descriptive statistics for the EDI-2 subscale scores for all participants are available in Table 3. A one-way MANOVA was calculated examining the effect of weight classification (open-weight or lightweight) on three subscales of the EDI-2 (Drive for Thinness, Perfectionism, and Body Dissatisfaction) . A significant main effect was found, Pillai's Trace (3, 127) = .133, $p < 0.001$. Follow-up univariate ANOVA's indicated that there was a significant difference in Drive for Thinness scores (F (1, 129) = 19.07, $p < .001$). Lightweight rowers scored significantly higher (M = 5.14, SD = 5.38) than open-weight rowers (M = 1.75, SD = 3.36) on this scale. There was also a significant difference in the Body Dissatisfaction scale scores (F(1,129) = 4.57, $p < .05$); with lightweight rowers scoring significantly higher (M = 4.80, SD = 5.14) than open-weight rowers (M = 3.20, SD = 3.73). There was no significant difference in Perfectionism scale scores (F(1,129) = 1.5, $p > .05$) between open-weight rowers (M = 6.52, SD = 3.92) and lightweight rowers (M = 7.38, SD = 4.25).

A one-way MANOVA was also calculated examining the effect of gender on the three subscales of the EDI-2 (Drive for Thinness, Perfectionism, and Body Dissatisfaction). A significant main effect was found, Pillai's Trace (3, 127) = .094, $p < 0.01$. Follow-up univariate ANOVA's indicated that there was a significant difference in Body Dissatisfaction scale scores of the EDI-2 (F(1,129) = 9.57, $p = 0.002$). Females scored significantly higher (M = 5.03, SD = 5.14) than males (M = 2.70, SD = 3.27). There was no significant difference between gender on the Drive for Thinness subscale (F(1,129) = 0.18, $p > 0.05$) or the Perfectionism subscale (F(1,129) = 0.99, $p > 0.05$).

Table 3
Descriptive Statistics for the EDI-2 Subscales by Gender and Weight Classification

Scale	Variable	Mean *(M)*	Standard Deviation *(SD)*	Number *(n)*
Drive for Thinness				
	Open-Weight Total			
	Male	1.23	2.05	*n*= 26
	Female	2.11	4.01	*n*= 38
	Total	1.75	3.36	*n*= 64
	Lightweight Total			
	Male	5.26	5.31	*n*= 31
	Female	5.05	5.51	*n*= 38
	Total	5.14	5.38	*n*= 69
	Gender Total			
	Male	3.42	4.59	*n*=57
	Female	3.58	5.01	*n*= 76
	Total	3.51	4.82	*n*= 133
Perfectionism				
	Open-Weight Total			
	Male	6.73	4.34	*n*= 26
	Female	6.37	3.64	*n*= 38
	Total	6.52	3.92	*n*= 64
	Lightweight Total			
	Male	7.97	4.36	*n*= 31
	Female	6.89	4.16	*n*= 38
	Total	7.38	4.25	*n*= 69
	Gender Total			
	Male	7.40	4.36	*n*= 57
	Female	6.63	3.89	*n*= 76
	Total	6.96	4.10	*n*= 133
Body Dissatisfaction				
	Open-Weight Total			
	Male	2.00	2.55	*n*= 26
	Female	4.03	4.19	*n*= 38
	Total	3.20	3.73	*n*= 64
	Lightweight Total			
	Male	3.29	3.71	*n*= 31
	Female	6.03	5.82	*n*= 38
	Total	4.80	5.14	*n*= 69
	Gender Total			
	Male	2.70	3.27	*n*= 57
	Female	5.03	5.14	*n*= 76
	Total	4.03	4.57	*n*= 133

Note. After scoring, Drive for Thinness scores (*n* = 7) can range from 0-21; Perfectionism scores (*n* = 6) can range from 0-18; and Body Dissatisfaction scores (*n* = 9) can range from 0-27.

Exploratory Purposes

This first exploratory purpose of this study was to assess disordered eating behaviors and their frequency in a population of collegiate rowers. The most frequently reported behavior was restrictive dieting, which includes avoiding certain foods and counting calories (*n* =81; 61%). Excessive exercise was described as exercising beyond normal practice requirements and/or team expectations and was the second most frequently reported disordered eating behavior (n = 46; 35%). The third highest reported behavior was fasting (not eating and/or drinking for a certain period of time; *n* = 44; 33%), followed by binge eating (*n* = 39; 30%), use of laxatives (*n* = 9; 7%), vomiting (*n* = 7; 5%), and use of water pills/diuretics (*n* = 4; 3%). One person each reported using diet pills (*n* = 1; 1%) and enema use, or inserting liquids into the rectum and anus resulting in the evacuation of the lower intestinal tract (*n* = 1; 1%). Six people reported engaging in some "other" behavior (*n* = 6; 5%), which included exercising in sweat-suits (*n* = 3), significantly decreasing salt intake (*n* = 1), spitting (*n* = 1), and excessive sauna use (*n* = 1). See Table 4 for complete descriptive information.

Table 4
Frequency of Disordered Eating Behaviors

Behavior	Rarely (*n*)	Occasionally (*n*)	Frequently (*n*)	Always (*n*)	Total *n* = 133 (*n*; %)
Restrictive Dieting	7	20	29	25	81; 60.90%
Excessive Exercise	4	25	13	4	46; 34.58%
Fasting	9	23	10	2	44; 33.08%
Binge Eating	11	17	11	0	39; 29.32%
Laxatives	2	6	1	0	9; 6.77%
Vomiting	5	1	1	0	7; 5.26%
Water Pills/Diuretics	2	1	0	1	4; 3.01%
Diet Pills	0	0	1	0	1; .75%
Enemas	1	0	0	0	1; .75%
Other	1	3	2	0	6; 4.51%

Note. Other behaviors included exercising in sweat suits, decreasing salt-intake, spitting, and excessive sauna use.

Another exploratory purpose of this proposed study was to examine the perceived influence of teammates on eating behaviors and determine if there were more negative influences or more positive influences. A majority of the participants (83% or more) reported *never* or *rarely* engaging in the *same* weight loss behaviors as their teammates, engaging in eating or weight loss behaviors *with* their teammates, and engaging in eating or weight loss behaviors *because* their teammates do. A majority of the participants (*n* =121; 91%) also reported that their teammates have had a *positive* influence on their eating and dieting behaviors. These participants reported teammates having the most positive influences on the quality of food they ingested, followed by their habits or routines associated with eating, quantity of food consumed, psychological concerns surrounding eating, exercise for weight control, and finally, their weight and body shape considerations surrounding eating. Approximately 30% of the participants (*n* = 40) stated that their teammates have had a *negative* influence on their eating and dieting behaviors. The most negative reported influences were on the quality of food ingested, the quantity of food, habits or routines associated with eating, weight and body shape considerations surrounding eating, and finally, psychological concerns surrounding eating and exercise for weight control having the least negative reported influence. More descriptive statistics for this exploratory purpose can be found in Table 5.

Table 5
Frequency of Engaging in Behaviors Due to Teammate Influence

Frequency	Never	Rarely	Occasionally	Frequently	Always
1. Engage in *same* behaviors as teammates	65.41%	18.05%	10.53%	4.51%	1.50%
2. Engage in behaviors *with* teammates	72.18%	12.03%	9.77%	3.01%	3.01%
3. Engages in behaviors *because* teammates	66.17%	20.30%	8.27%	3.76%	1.50%

Another finding worth noting is the amount of weight fluctuation per week reported by participants, both in season and out of season (See Table 6). Approximately 40% of participants classified as eating disordered and 6% of symptomatic participants reported weight fluctuations of 11-15 pounds per week while in season.

Table 6
Percentage of Weekly Weight Fluctuations for Rowers In-Season and Out-of-Season in Relation to the Q-EDDDiagnoses

Variable	Asymptomatic (n = 63)	Symptomatic (n = 65)	Eating Disordered (n = 5)
In Season			
0-2 lbs	63.49%	15.38%	0%
3-5 lbs	30.16%	55.38%	20%
6-10 lbs	6.35%	23.08%	40%
11-15 lbs	0%	6.15%	40%
Out of Season			
0-2 lbs	53.97%	32.31%	40%
3-5 lbs	42.86%	60.00%	60%
6-10 lbs	3.17%	4.62%	0%
11-15 lbs	0%	3.08%	0%

CHAPTER V

Discussion

The main purpose of this study was to examine the prevalence rates of eating disorders and eating disorder symptoms among collegiate rowers. The results of this study suggest that collegiate rowers may be an athletic population at-risk for having or developing an eating disorder. Consistent with the hypotheses, lightweight rowers were more likely to be classified as eating disordered and/or symptomatic than open-weight rowers. Lightweight rowers were also significantly more likely to have certain eating disorder symptoms as indicated by the EDI-2 (Garner, 1991), including greater feelings of body dissatisfaction and a greater drive to achieve thinness. Higher scores on these subscales can be indicative of an eating disorder or developing an eating disorder.

The Drive for Thinness subscale of the EDI-2 assesses excessive dieting concerns, weight preoccupation, and extreme pursuit of thinness (Garner, 1991). Lightweights in this study had significantly higher scores than open-weight rowers, which suggests that they may be more susceptible to a clinical eating disorder diagnosis. To our knowledge, there are no published studies specifically utilizing the EDI-2 in a population of rowers; therefore, comparisons were attempted with other athlete populations. The lightweights scored higher on the Drive for Thinness subscale (M =5.14; SD = 5.38) in comparison to a recent study investigating eating disorders among male and female high school, collegiate, and elite track and field athletes (M = 2.61; SD = 3.81; Hausenblas & McNally, 2004). Reinking and Alexander (2005) investigated disordered eating behaviors using the EDI-2 in female lean sport athletes such as distance running, swimming, gymnastics, dance, and diving and female non-lean sport athletes. Our sample of lightweight rowers scored higher on the Drive for Thinness scale than the female

collegiate non-lean sport athletes (*M* = 3.5; *SD* = 4.2), but lower than the lean-sport female athletes (*M* = 6.9; *SD* = 7.0). In comparison to Garner's (1991) normative scores for a female clinical population (*M* =14.5; *SD* = 5.6), the lightweight rowers Drive for Thinness scores were much lower. The scores of the lightweight rowers in this sample were also lower than Garner, Olmstead, Polivy, and Garfinkel's (1984) study of a sample of females diagnosed with anorexia nervosa (*n* = 50; *M* = 15.1; SD = 0.60) and females considered "weight-preoccupied (as determined by scores of greater than or equal to 15 on the Drive for Thinness subscale of the EDI) (*n* = 35; *M* = 16.1; *SD* = 0.58). Our lightweight rowers, however, had higher scores than the females considered "not weight-preoccupied" (*n* = 134; *M* = 0.9; *SD* = 0.30), when age and deviation from average weight was used as covariates (Garner et al., 1984).

Lastly, using a conservative high-score pre-established cutoff of greater than or equal to 15 on the Drive for Thinness scale as identifying those at greater risk for disordered eating (based on norms for 113 patients; Garner, Olmstead, and Polivy, 1983), 8 (6%) of the 133 rowers were in this group. This score of 15 or greater corresponded to the 94th percentile for a large sample of college females used to establish norms for the EDI (Garner et al, 1983). Of these 8 rowers, 6 were classified as symptomatic according to the QEDD (4.5%) and 2 were classified at eating-disordered (1.5%). Overall, our rower's total mean score of 3.53 on the Drive for Thinness scale appears to be low in comparison to studies on other various populations.

The 7-item Drive for Thinness subscale includes questions such as "I feel extremely guilty after overeating" and "If I gain a pound, I worry that I will keep gaining. It is possible that these attitudes are more prevalent in lightweight rowers than open-weight rowers because each

lightweight is responsible to individually weigh in at 160 pounds or less on race day, or they will be at fault for their entire boat being disqualified.

The Body Dissatisfaction scale of the EDI-2 measures one's dissatisfaction with the shape of body parts (e.g., hip, buttocks) and beliefs that these parts are too big or too fat (Garner, 1991). Lightweights scored significantly higher than open-weights (M = 4.80; SD = 5.14) and female rowers scored significantly higher than male rowers (M = 5.03; SD = 5.17). In comparison to Reinking and Alexander's (2005) study of female collegiate athletes, the lightweights and females in the present study scored lower than lean sport athletes (M =13.2; SD = 8.0) and non-lean sport athletes (M = 7.3; SD = 6.0). However, the lightweight rowers and female rowers in the present study scored higher than the male and female track and field athletes (M = 4.1; SD = 4.5) in Hausenblas and McNally's study (2004). When Hausenblas and McNally (2004) separated their athlete sample by gender, our female rowers scored lower than female track and field athletes (M = 5.34, SD = 5.47). In comparison to Garner's (1991) female clinical population, both the lightweights and females scored well under their reported mean of 16.6 (SD = 8.3). Both the lightweight and female Body Dissatisfaction scores in this sample were also lower than Garner, Olmstead, Polivy, and Garfinkel's (1984) study of a sample of females diagnosed with anorexia nervosa (n = 50; M = 18.5; SD = 1.11) and females considered "weight-preoccupied" (as determined by scores of greater than or equal to 15 on the Drive for Thinness subscale of the EDI) (n = 35; M = 15.8; SD = 1.07). Our lightweight and female rowers, however, had higher scores than the females considered "not weight-preoccupied", as determined by lower scores on the Drive for Thinness subscale (n = 134; M = 3.9; SD = 0.56), when age and deviation from average weight was used as covariates.

Lastly, the Body Dissatisfaction scale score of only one lightweight female (1%; who was diagnosed as eating disordered by the QEDD) was identified as at greater risk for an eating disorder after using a conservative high-score pre-established cutoff of greater than or equal to 20 on the Body Dissatisfaction scale (based on norms for 113 patients; Garner, Olmstead, and Polivy, 1983). Our participant's total mean score on this scale of 4.03 is very low in comparison to the previously mentioned populations.

One explanation for the different findings among studies is that some studies have shown that athletes may have a more positive body image than non-athletes because their bodies may more closely resemble their ideal physique (Hausenblas & Symons Downs, 2001). Karlson, Becker and Merkur (2001) found that while lightweight rowers showed significantly more restraint in eating patterns than runners or controls, they also reported less shape concern. While higher rates of body dissatisfaction have been well documented in females (Sungot-Borgen, 1994; Thompson et al., 1999; Smolak et al, 2000), perhaps the higher rates of body dissatisfaction among lightweights is related to the constant pressures of making weight, weighing-in with lightweights from other teams prior to a race, and/or a misconception that lightweight rowers should have a certain ideal body-type. Regardless of the underlying cause, Friestad and Rise (2004) reported that body image is a significant factor leading to dieting behaviors for both males and females. Furthermore, body dissatisfaction has the most support as a predecessor to disordered eating behavior (Thompson et al., 1999).

The last EDI-2 scale used in this study was the Perfectionism scale, which examines the need to control all areas of one's life, but does not have any established cut-off scores (Black et al., 2003). One of the main interests in examining levels of perfectionism among collegiate rowers was because it has been suggested that athletes have high perfectionism, which Wilmore

(1996) posits may increase their risk of disordered eating. Furthermore, Fulkerson, Keele, Leaon, and Don (1999) found athletes high in perfectionism had higher Drive for Thinness than athletes low in perfectionism. While there were non-significant results in comparing the males and females and the lightweights and open-weights in this study, our Perfectionism scores (n =133; M = 6.96; SD = 4.10) were lower in comparison to scores reported in Garner, Olmstead, Polivy, and Garfinkel's (1984) study of a sample of females diagnosed with anorexia nervosa (n = 50; M = 9.5; SD = 0.83) and females considered "weight-preoccupied (as determined by scores of greater than or equal to 15 on the Drive for Thinness subscale of the EDI) (n = 35; M = 8.9; SD = 0.80). Our sample's total mean average, however, had higher scores than the females considered "not weight-preoccupied" (n = 134; M = 5.6; SD = 0.42), when age and deviation from average weight was used as covariates. More studies are needed examining perfectionism in collegiate athletes, specifically rowers, in order to accurately assess this area.

Participants were given many opportunities to make comments throughout the author developed training information and eating behaviors portion of the survey, and lightweight rowers in particular noted feelings of fear, guilt, and anxiety that generally surrounded the weigh-in prior to racing. Several lightweight rowers (n = 16) reported how it was vital to balance calorie intake to avoid having to cut weight before races, reduce fat/sugar/salt intakes, as well as count calories. Others reported fasting anywhere from 24-36 hours prior to a weigh-in, which included not consuming water and/or liquids. Several reported that they only fasted "once or twice a week" for a "couple of months", and that it was "*different*" than fasting to lose weight because they were fasting to cut weight for the weigh-in. Interestingly, there were also 9 rowers who justified when their disordered eating behavior occurred, such as "only when the weight isn't coming off, "only before a championship" or "only prior to a weigh-in. One participant

jokingly stated that the survey was "giving them too many good ideas" on how to lose weight after answering a question about use of enemas. In regards to binge eating, 15 rowers noted that binge eating occurred after weigh-ins and/or races; however, 4 reported that their binges were "under control" and did not include feelings of emotional distress. According to these comments, rowers in this study appear to have some distorted views on weight loss behaviors. Future studies examining this population's eating behaviors and attitudes are needed in order to gain a better understanding of the role of disordered eating in the sport of rowing.

Open-weight rowers also had the opportunity to write comments regarding their disordered eating behaviors. One open-weight female reported that she *always* engaged in restrictive dieting, which was the highest reported disordered eating behavior among the participants (61%), and stated the following:

> "At one point this year I weighed 142 lbs; now I'm 160 lbs and I think it's a much healthier weight, but I still can't stop myself from counting calories, avoiding certain foods, and thinking about food and what I eat all the time. I feel good when I've restricted myself a little bit and bad whenever I feel like I've binged. I feel very out of control, but at least now feel more (physically) powerful than I did when I weighed less--although also fatter now. I still felt fat then though, so I don't know. I guess I feel fat no matter what weight I am…"

This individual appears to have some distorted thoughts of her own, suggesting that it may not be necessary to be a lightweight rower in order to have eating and weight issues. Comments regarding the second highest reported disordered eating behavior among all the athletes (35%), excessive exercise, generally stated that exercise beyond practice was necessary in order to win or to make weight (lightweights).

While there was quite a range of disordered eating behaviors reported by the rowers, a majority (91%) also stated that positive eating behaviors were a result of interacting with teammates. For example, 104 participants (78%) reported that teammates influenced eating

better quality of food, such as more fruits and vegetables and less “junk” food. Additional comments included encouraging healthy eating and no fast food rules, particularly on road trips. One participant mentioned that his teammates’ want him in the healthiest condition for his own benefit, as well as theirs. Quantity of food was another highly influenced behavior that 90 participants (68%) mentioned their teammates had a positive influence on, with several rowers stating that they eat meals together before and after practices/races to make sure they are eating enough to re-fuel, without going to the extreme of binge eating. This information adds to the limited current research on the contagion effect of eating behaviors that can sometimes be seen among social groups such as athletic teams, particularly concerning positive influences. Hausenblas and Carron (2000) found that while a majority of the collegiate athletes in their qualitative research did not perceive a group influence on their eating and dieting behaviors, of those who did, it was generally positive. Future studies investigating this theory should take qualitative approaches in order to gain a better understanding of social contagion, as well as attempt to create more valid and reliable methods of quantitative measurement for social pressures in relation to eating and dieting. Researchers could also continue to improve the psychometric properties of previously developed measures for the college athlete population, such as the Friend/Peer Support-Health Eating Physical Activity Scale (FPS-HEPAS; Gruber, 2008), a modified version of the Social Influence of Physical Activity Questionnaire (Chogahara, 1999) that has been used with college students (Okun, Karoly, & Lutz, 2002; Okun, Ruehlman, Karoly, Lutz, Fairholme, & Schaub, 2003), or the Friend Support for Heart Healthy Eating Habit Scale (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Other social-related pressures, such as the influence of coaches, athletic trainers, and parents on athlete’s eating and dieting behaviors should also be investigated (Hausenblas & Carron, 2000). Results of this study revealed that a

majority of the participants perceived their teammates to have a positive influence on their eating and weight loss behaviors, which has potential implications for promoting positive, healthy behaviors among teams.

Based on previous research, it was hypothesized that more female athletes would be classified as having eating disorders than male athletes (Powers & Johnson, 1996; Hausenblas & Carron, 2002; Greenleaf,, et al, 2009). Additionally, Karlson (in Karlson et al, 2001) stated that women lightweight rowers are at risk for using unhealthy methods to make weight, such as extreme dieting, purgatives, and dehydrations. Male athletes, however, were classified in this study as eating disordered and/or symptomatic more frequently than female athletes. In comparing the percentage of eating disordered/symptomatic participants with other studies who have also used the Q-EDD, this study has a significantly higher prevalence rate. For example, Hausenblas and McNally (2004) completed a study on eating disorder prevalence in 412 male and female track and field athletes and non-athletes, and found approximately 17% of their population to be classified as eating disordered/symptomatic, with females as the majority (33 female, 7 male). This current study of rowers found that more than half of the participants were classified as eating disordered/symptomatic (51%) and 57% of them were male (4 of the 5 participants who were fully diagnosed with an eating disorder were males). Additionally, Petrie et al. (2009) examined eating disorders using the QEDD across 203 male collegiate athletes from a wide variety of sports including football, basketball, cheerleading, cross-country, diving, fencing, golf, ice hockey, lacrosse, swimming, track and field, volleyball, alpine skiing, baseball, wrestling and soccer; and found that none of the participants were classified as eating disordered and only 20% were classified as symptomatic (the remaining 80% were asymptomatic). Future

studies are needed on male athletes of all sports; however based on the results of this study, it appears that populations of male rowers should be highlighted.

The higher prevalence of eating disorders in male rowers as compared to female rowers may have something to do with male lightweights having a boat weight average of 155 pounds, in addition to the individual weight limit of 160 pounds. This allows some rowers to achieve the lowest possible weight in order to have larger and stronger rowers to compete in the same boat. The single weight class for lightweight women may be a protective factor from engaging in pathogenic weight loss methods in order to lose *additional* weight beyond the 130 pound limit. While lightweight males also have a single weight class, the concept of a boat average may encourage and pressure rowers to lose additional weight. The downside to eliminating this rule would be that smaller lightweight male rowers who may earn a seat in the boat in order to help lower the boat average may no longer have a chance to compete if they cannot make the boat move faster than a larger lightweight rower. Also, this may encourage larger male rowers to lose weight and perhaps be a more competitive rower as a 160 pound lightweight as compared to an open-weight rower, knowing that they will not increase the boat average at that weight. Although this concept was not assessed in this study, collegiate male lightweight rowing programs and their governing bodies may want to consider eliminating the boat average and keeping the individual weight of 160 pounds in an effort to reduce the number of eating disorders among this population.

Implications for Practice

Athletic trainers, physicians, counselors and mental health professionals must be aware of disordered eating issues among all students; however, determining involvement in athletics, particularly in sports with strict weight requirements, may alert them to risk levels associated

with disordered eating behavior. The results of this research suggest that lightweight rowers are more likely than open-weight rowers to report having an eating disorder, as well as having symptoms of an eating disorder. Furthermore, lightweight rowers scored significantly higher on the Body Dissatisfaction and Drive for Thinness subscales of the EDI-2; again suggesting that lightweight rowers may be more at-risk for the mental and physical ramifications of eating disorders.

It is likely that individual and group counseling techniques would include formal and informal assessments of eating disordered behaviors, attitudes, and concerns. Mental health professionals may want to carefully consider the athletes' feelings about their body, as well as their desire to lose weight. Additionally, this research suggests that female rowers are not necessarily at the highest risk for developing an eating disorder. While counselors should never overlook any individual due to certain characteristics, these findings suggest that they should put additional effort into speaking with male rowers. This is particularly important due to the lack of empirical research on eating disorders among male athletes, especially within the rowing community. Universities may consider hiring a sport and exercise psychology consultant because they specialize in working with athletes, have met a minimum standard of education and training in the sport sciences and psychology, and could provide valuable information to coaches, teams, and individual athletes.

Another noteworthy finding in this study is the weight fluctuations among the rowers, both in and out of season. Over 29% of symptomatic rowers and 80% of eating disordered rowers reported losing anywhere from 6-15 pounds while in season. Weight cycling, or alternating periods of food restriction and weight loss with periods of unrestricted food intake and weight gain, may enhance weight gain, as well as predispose individuals to obesity (Saarni,

Rissanen, Sarna, Koskenvuo, & Kaprio, 2006). Another large population-based study has reported a higher "all-cause" and cardiovascular disease mortality of weight cyclers compared to non-obese stable weight subjects (Diaz, Mainous, & Everett, 2005). This consistent weight change may have extremely dangerous mental and physical ramifications, such as greater weight gain and binge eating (Field, Manson, Laird, Williamson, Willett, & Colditz, 2004; Field, Manson, Taylor, Willett, & Colditz, 2004; Marchesini, Cuzzolaro, Mannucci, Dalle, Gennaro, Tomasi et al, 2004; Venditti, Wing, Jakicic, Butler, & Marcus, 1996; Womble, Williamson, Martin, Zucker, Thaw, Netemeyer, et al, 2001), psychological stress and lower general well-being (Foreyt, Brunner, Goodrick, Cutter, Brownell, & Stjeor, 1995) and unhealthier body fat distribution (Field et al, 2004; Wallner, Luschnigg, Schnedl, Lahousen, Sudi, Crailsheim et al, 2004). Coaches, athletic trainers, physicians, and parents should be sure to discuss weight fluctuations with their athletes and the dangers associated with it.

Any professional working with student-athletes should consider the findings of this research for direct service in treatment of an eating disorder, as well as for preventative measures. Private mental health professionals may contact colleges and universities to determine what, if any, educational information and/or outreach programs are available to the students. Furthermore, because athletes are an at-risk population for the development of eating disorders (Hausenblas & Carron, 2002; Kirk, Singh, and Getz, 2001; Petrie & Greenleaf, 2007; Petrie, Greenleaf, Reel, & Carter, 2008), professionals may suggest that additional programs and services be offered specifically pertaining to athletes, such as proper nutrition while training, negative effects of over-training and excessive exercise, and how to recognize signs of eating disorders within themselves and their teammates. Since the results of this study showed that teammates appear to have a positive influence over one's dieting and eating behaviors, team

meetings may be ideal to implement educational programs, enhance group support, and discourage pathogenic behaviors. Making connections with university personnel and employees within athletic departments (administrative, coaches, volunteers, etc.) would be a proactive approach to developing and implementing education, discussing available counseling services, as well as providing options for referrals to those at serious risk.

Limitations

A major limitation of this study is its' correlational nature, which precludes the establishment of causality. Also, the self-report nature of the responses, as opposed to more objectives measures, such as clinical interviews, direct observations, and medical examinations, limits accuracy of the results. Self-report instruments all have the inherent limitation in which the participants respond to questions about behaviors, likes, or interests as if their responses were truths. While subjective measures include data that is typically obtained more quickly and easily, in addition to being more and economically feasible than objective data, they only assess the participants' opinions and perceptions, as opposed to more precise information. More direct measures of these variables in a variety of athletes are essential before results can be generalized to the athletic population as a whole and firm conclusions can be established. Further, in an attempt to survey *competitive* collegiate rowers, initial contact was made to rowing programs who met requirements for most number of invitations to the IRA regatta within the last decade. Therefore, historical success of one's program was used in identifying this convenient sample, as opposed to identifying athletes based on individual rowing scores or by the number of races they have won. A random sampling of collegiate rowers across the United States would also have increased the generalizability of this study.

All rowers who participated were self-selected after initial contact was made due to the voluntary nature of the research. As with any self-report research, the degree to which the participants were honest and accurate in responding to the items, or whether they were responding for social desirability, must be questioned. However, in an effort to encourage honest responses, the participants were informed that all information would be confidential and that their identities would not be connected in the result reporting. Additionally, the participants were informed that the research was investigating eating disorders and eating disorder symptoms in collegiate rowers. The sample may be skewed with participants who are already interested in this area. The relatively small sample size of 133 participants was all college student-athletes and therefore the results may not be generalizable to the entire rowing community, student-body, or non-college populations.

Other limitations of this study are in the measures used. For example, the EDI-2 (Garner, 1991) has a different number of items in all three of the subscales used, ranging from 6 items to 9 items, which may skew the data. Furthermore, athletes tend to have higher levels of perfectionism, which may lead to a greater drive for thinness and could reduce the validity of this measure in athletic samples (Fulkerson et al, 1999). There is also no current measure for the social contagion of eating or dieting behaviors, so the author relied on previous studies to form both quantitative and qualitative facets for this survey. The Q-EDD (Mintz et al, 1997) relies on one's Body Mass Index (BMI) in order to classify participants into weight categories and then diagnose them based on their scores. BMI's for athletes may not be accurate because it does not account for muscle mass, which could increase one's weight and lead to a classification of overweight or obese (CDC, 2009). Lastly, the results of the chi-squares in determining eating disorder prevalence should be interpreted with caution, as they are underpowered at .71 (Faul,

Erdfelder, Lang, & Buchner, 2007).

Future Directions

Given the findings of the present study, additional studies on eating disorders should continue to focus on both male and female open-weight and lightweight rowing programs. Due to very limited and conflicting research, future studies should also examine prevalence rates of eating disorders and eating disorder symptoms in other rowing populations, such as high school rowers, elite level rowers, and club level rowers. For example, greater distorted eating attitudes and eating disorder concerns have been found in elite lightweight women than elite open-weight women or elite males (Terry & Waite, 1996; Terry et al, 1999). Additionally, some high school athletes have been found to have greater eating disorder symptoms than college or elite level athletes (Hausenblas & McNally, 2004). More information is needed regarding the prevalence of eating disorders in athletes in order to educate and eventual implement programs to alleviate this disease. Pilot studies on programs implementing certain requirements needed in order to row (particularly lightweight) would be very informative. For example, having the athletes complete an eating disorder survey and discouraging those who are eating disordered from rowing in order to seek professional help. Additionally, physical testing (body fat, height, weight, BMI, etc) could be very useful in determining which rowers could be put on a healthy weight loss plan in order to achieve the racing weight on time. A promising screening test for disordered eating among female collegiate athletes was developed by Black, Larkin, Coster, Leverenz, and Abood (2003), and includes 6 questionnaire items, 8 self-report interview items, and 4 physiologic measurements such as percentage of body fat, waist-to-hip ratio, standing diastolic blood pressure, and enlarged parotid glands. The authors tested this screening program on 148 college female athletes and concluded that the Physiologic Screening Test more

accurately detected eating disorders/disordered eating athletes than either the EDI-2 or Bulimia Test-Revised. Future studies should continue to develop both psychological and physiological measures of screening and testing for eating disorders.

Hausenblas and Carron (2000) also suggest investigating other social-related pressures, such as the influence of coaches, athletic trainers, and parents on athlete's eating and dieting behaviors. Weight cycling and its present and long-term ramifications in rowers, particularly lightweights, is another area of research that would be beneficial to expand upon. Lastly, future directions may consider more accurate means of diagnosing eating disorders, such as clinical interviews and assessments, as well as developing valid and reliable measurements of teammate's influences on eating and weight loss behaviors.

Based on the results of this study, it is recommended that future research more thoroughly investigates prevalence rates of eating disorders using the Q-EDD among larger samples of collegiate male rowers, and male and female lightweight rowers. Once more accurate prevalence rates are available; the next step would be to use both psychological and physiological screening and testing measures on the most at risk populations, such as the Physiological Screening Test (Black et al, 2003) mentioned previously. When populations with higher rates of eating disorders have been identified and well documented in scientific research, the next logical step is to develop and implement effective preventative measures for these specific groups.

Conclusion

This is the first study to examine prevalence rates of eating disorders using a diagnostic tool based specifically off of the DSM-IV criteria among a population of male and female collegiate rowers. These findings lay the groundwork for future eating disorder studies among

this unique population. The results of this study suggest that collegiate rowers may be an at-risk population for the development of eating disorders and eating disorder symptoms. Specifically, lightweight rowers and male rowers may be most at-risk among the rowing population. Using these results, rowing coaches can be educated and aware of the greater risk of their athletes, as well as the potential warning signs they should be looking for. Further, these coaches should be encouraged to collaborate with their school's athletic trainers, counselors, and sport psychology consultants in an effort to help identify at-risk athletes, as well as educate the rowers on ramifications of eating disorders and disordered eating behaviors.

Additional research is needed to determine more accurate representations of collegiate rowers who may have an eating disorder or disordered eating symptoms, as a majority of the research primarily focuses on *female* athletes in sports *other* than rowing. Of the little research available on rowers, only three studies compare open-weight rowers with lightweight rowers, but at the elite level in comparison to the collegiate level. Research has continually established that college students (Kashubeck et al, 1997; Levitt, 2004; Meyer, 2005) and athletes (Hausenblas & Carron, 2002; Kirk et al, 2001; Petrie & Greenleaf, 2007; Petrie et al, 2008) are considered at-risk populations for the development of eating disorders and eating disorder symptoms. This vital information, along with the results of this study, indicates a definite need for eating disorder research among collegiate rowers.

The results of this investigation suggest that college lightweight and male rowers may be more at risk than rowers without a weight restriction or females. These findings warrant further research and discussions on what kind of physical and mental characteristics coaches, parents, and athletic trainers should look for in athletes who wish to compete as a lightweight rower. For example, these professionals may encourage athletes who have to lose more than 10% of their

body weight in order to compete as a lightweight, to row in the open-weight division in an effort to avoid potential disordered eating issues. Also, potential lightweights may be required to complete measures such as the Q-EDD or EDI-2 prior to determining what weight category they would row so that coaches, athletic trainers, and school psychologists can determine who is eating disordered and/or at a greater risk of developing an eating disorder. After psychological testing, decisions can be made as to proper education, treatment, and potential placement into a lightweight category, which may increase their disordered eating symptoms. Further, it may be beneficial for rowing governing bodies to consider specific regulations and/or guidelines on healthy ways for lightweight rowers to successfully achieve racing weight in order to help protect them from disordered eating behaviors. Examples include gradually decreasing weight throughout the season by having athlete's meet multiple specific individualized weight loss goals, in effort to avoid drastic weight loss measures and weight cycling. Ongoing monitoring of all rower's weight-making behaviors, weight loss, and general health is highly encouraged by parents, coaches, athletic trainers, and teammates. It is vital to enhance safety and competitive equity, rather than discourage the growth of competitive lightweight rowing programs. Overall, awareness of high-risk populations is essential in developing and implementing prevention programs, with the greater goal of addressing and limiting the prevalence of eating disorders.

References

American College of Sports Medicine. (2000). *ACSM's guidelines for exercise testing and prescription (6th ed.).* Baltimore: Author.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders fourth edition-text revised.* Washington, D.C.: Author.

Ashford, B., Biddle, S., & Goudas, M. (1993). Participation in community sports centers: Motives and predictors of enjoyment. *Journal of Sport Sciences, 11*, 249-56.

Baumeister, R. F., & Leary, M. P. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117,* 497–529.

Black, D.R., Larkin, L.J.S., Coster, D.C., Leverenz, L.J., & Abood, D.A. (2003). Physiological screening test for eating disorders/disordered eating among female collegiate athletes. *Journal of Athletic Training, 38*, 4, 286-297.

Bowen-Woodward, K., & Levitz, L.S. (1989). Impact of the college environment on bulimic women. *Journal of College Student Psychotherapy, 3*, 189-198.

Brownell, K.D., & Rodin, J.R. (1992). Prevalence of eating disorders in athletes. In K.D. Brownell, J. Rodin, & J.H. Wilmore (Eds.), *Eating, body weight and performance in athletes (*pp. 128-145). Philadelphia: Lean and Febiger.

Brownell, K.D., Rodin, J., & Wilmore, J.H. (1992). Eating, body weight, and performance in athletes: Disorders of modern society. Philadelphia, PA: Lea & Febiger.

Brownell, K. & Steen, S. (1992). Weight cycling in athletes: effects on behavior, physiology, and health. In Brownell, K., Rodin, J., & Wilmore, J, (Eds.), *Eating, body weight, and performance in athletes* (pp. 159–170). Philadelphia: Lea & Febiger,

Carron, A.V. & Hausenblas, H.A. (1998). *Group dynamics in sport* (2nd ed.). Morgantown, W.V: Fitness Information Technology.

Carron, A.V. & Hausenblas, H.A. (2000). Group influences on eating and dieting behaviors in male and female varsity athletes. *Journal of Sport Behavior, 23,* 1, 33-41.

Carter, J.E., & Rudd, N.A. (2005). Disordered eating assessment for college student athletes. *Women in Sport and Physical Activity Journal, 14*, 62-71.

Cattanach, L., Phil, M., Malley, R., & Rodin, J. (1988). Psychological and physiological reactivity to stressors in eating disordered individuals. *Psychosomatic Medicine, 50,* 591-599.

Centers for Disease Control and Prevention (2009). http://www.cdc.gov/healthyweight/assessing/bmi/index.html

Centers for Disease Control and Prevention. (1998). Hyperthermia and dehydration-related deaths associated with intentional rapid weight loss in three collegiate wrestlers—North Carolina, Wisconsin, and Michigan, November–December 1997. *JAMA, 279*, 824-825.

Chogahara, M. (1999). A multidimensional scale for assessing positive and negative social influences on physical activity in older adults. *Journal of Gerontology: Social Sciences, 54B,* 6, 356-367.

Chopak, J.S., & Taylor-Nicholson, M. (1991). Do female college athletes develop eating disorders as a result of the athletic environment? In D.H. Black (Ed.), *Eating disorders among athletes: Theory, issues, and research* (pp. 87-95). Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98,* 310–357.

Compton, W. C. (2005). *An introduction to positive psychology.* Belmont, CA: Thomson Wadsworth.

Crago, M., Yates, A., Beutler, L. E., & Arizmendi, T. G. (1985). Height-weight ratios among female athletes: Are collegiate athletics the precursors to an anorexic syndrome? *International Journal of Eating Disorders, 4,* 79-87.

Crandall, C.S. (1988). Social contagion of binge eating. *Journal of Personality and Social Psychology, 55,* 4, 588-598.

Crow, S.J., Peterson, C.B., Swanson, S.A., Raymond, N.C., Specker, S., Eckert, E.D., & Mitchell, J.E. (2009). Increased mortality in bulimia nervosa and other eating disorders. *American Journal of Psychiatry, 166,* 1342-1346.

Davis, C. (1990). Body image and weight preoccupation: A comparison between exercising and non-exercising women. *Appetite, 15,* 13-21.

Deci, E.L., & Ryan, R.M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Deci, E.L., & Ryan, R.M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska symposium on motivation: Vol. 38. Perspectives on motivation* (pp. 237-288). Lincoln, NE: University of Nebraska Press.

Diaz, V.A., Mainous, A.G., & Everett, C.J. (2005). The association between weight fluctuation and mortality: Results from a population-based cohort study. *Journal of Community Health, 30,* 153–165.

DiBartolo, P. M., & Shaffer, C. (2002). A comparison of female college athletes and nonathletes: Eating disorder symptomatology and psychological well being. *Journal of Sport & Exercise Psychology, 24,* 33-42.

Dickstein, L.J. (1989). Current college environments: Do these communities facilitate and foster bulimia in vulnerable students? *Journal of College Student Psychotherapy, 3,* 107-133.

Doninger, G.L., Enders, C.K., & Burnett, K.F. (2005). Validity evidence for eating attitudes test scores in a sample of female college athletes. *Measurement in Physical Education and Exercise Science, 9,* 1, 35-39.

Duda, J.L., & Benardot, D. (1997). *The motivational climate and psychological and energy balance precursors to the development of eating disorders in female gymnasts.* Manuscript submitted for publication.

Faul, F., Erdfelder, E., Lang, A.G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39,* 175-191.

Field, A.E., Manson, J.E., Laird, N., Williamson, D.F., Willett, W.C., & Colditz, G.A. (2004). Weight cycling and the risk of developing type-2 diabetes among adult women in the United States. *Obesity Research, 12,* 267–274.

Field, A.E., Manson, J.E., Taylor, B., Willett, W.C., & Colditz, G.A. (2004). Association of weight change, weight control practices, and weight cycling among women in the Nurses' Health Study II. *International Journal of Eating Disorders, 35,* 394.

Friestad, C., & Rise, J. (2004). A longitudinal study of the relationship between body image, self esteem and dieting among 15-21 year olds in Norway. *European Eating Disorders Review, 12,* 247-255.

Foreyt, J.P., Brunner, R.L., Goodrick, G.K., Cutter, G., Brownell, K.D., & Stjeor, S.T. (1995). Psychological correlates of weight fluctuation. *International Journal of Eating Disorders, 17,* 263–275.

Fulkerson, J.A., Keele, P.K., Leon, G.R., & Don', T. (1999). Eating-disordered behaviors and personality characteristics of high school athletes and non-athletes. *International Journal of Eating Disorders, 26,* 73-79.

Gapin, J.I. & Cassidy, K. (2003). Comparisons of eating disorders among female athletes at Division III single sex and co-ed colleges. Unpublished thesis, Bryn Mawr College.

Garner D.M. *Eating Disorder Inventory-2: Professional manual.* Psychological Assessment Resources, Inc.; Odessa, FL: 1991.

Garner, D.M., & Garfinkel, P.E. (1980). Sociocultural factors in the development of anorexia nervosa. *Psychological Medicine, 10,* 647-656.

Garner, D.M., Olmstead, M.P., Bohr, Y., & Garfinkel, P.E. (1982). The eating attitudes test: Psychometric features and clinical correlates. *Psychological Medicine, 12,* 871-878.

Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *The International Journal of Eating Disorders, 2,* 2, 15-34.

Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). The eating disorder inventory: A measure of cognitive behavioral dimensions of anorexia nervosa and bulimia. In Darby PL, Garfinkel, P.E., Garner, D.M., Coscina, D.V. (Eds). Anorexia nervosa: recent developments: New York.

Garner, D. M., Olmstead, M. P., Polivy, J., & Garfinkel, P.E. (1984). Comparison between weight-preoccupied women and anorexia nervosa. *Psychosomatic Medicine, 46,* 3, 255-266.

Greenleaf, C. (2002). Athletic body image: Exploratory interviews with former competitive female athletes. *Women in Sport and Physical Activity Journal, 11,* 1, 63-88.

Greenleaf, C., Petrie, T. A., Carter, J., & Reel, J. (2009). Female collegiate athletes: Prevalence of eating disorders and disordered eating behaviors. *Journal of American College Health, 57*, 489-496.

Gruber, K.J. (2008). Social support for exercise and dietary habits among college students. *Adolescence, 43*, 171, 557-576.

Hagger, M., & Chatzisarantis, N. (2005). The social psychology of exercise and sport. New York, New York: Open University Press.

Hausenblas, H.A., & Carron, A.V. (1999). Eating disorder indices and athletes: An integration. *Journal of Sport and Exercise Psychology, 21*, 230-258.

Hausenblas, H.A., & Carron, A.V. (2000). Group influences on eating and dieting behaviors in male and female varsity athletes. *Journal of Sport Behavior, 23*, 1, 33-41.

Hausenblas, H.A., & Carron, A.V. (2002). Assessing eating disorder symptoms in sport groups: A critique with recommendation for the future. *Journal of Applied Sport Psychology, 16*, 274-286.

Hausenblas, H.A., & McNally, K.D. (2004). Eating disorder prevalence and symptoms for track and field athletes and nonathletes. *Journal of Applied Sport Psychology, 16*, 274-286.

Hausenblas, H.A., & Symons-Downs, D. (2001). Comparison of body image between athletes and nonathletes: a meta-analytic review. *Journal of Applied Sport Psychology, 13*, 323-339.

Holm-Denoma, J.M., Scaringi, A., Gordon, K.H., Van Orden, K.A., & Joiner, T.E. (2009). Eating disorder symptoms among undergraduate varsity athletes, club athletes, independent exercisers, and non-exercisers. *International Journal of Eating Disorders, 42*, 47-53.

International Federation of Rowing Association (FISA) (2009). Retrieved on November, 1st, 2009 from the World Rowing website: http://www.worldrowing.org

Johnson, M.D. (1994). Disordered eating in active and athletic women. *Clinics in Sports Medicine, 13,* 355-369.

Johnson, C., Powers, P.S., & Dick, R. (1999). Athletes and eating disorders: The National Collegiate Athletic Association study. *International Journal of Eating Disorders, 26,* 179-188.

Karlson, K.A., Becker, C.B., & Merkur, A. (2001). Prevalence of eating disordered behavior in collegiate lightweight women rowers and distance runners. *Clinical Journal of Sport Medicine, 11,* 32-37.

Kashubeck, S., Marchand-Martella, N., Neal, C., & Larson, C. (1997). Sorority membership, campus pressures, and bulimic symptomatology on college women: A preliminary investigation. *Journal of College Student Development, 38,* 40-48.

Kiernan, M., Rodin, J., Brownell, K.D., Wilmore, J.H., & Crandall, C. (1992). Eating and weight concerns in male and female runners at various levels of training. *Health Psychology, 11,* 418-421.

Kirk, G., Singh, K., & Getz, H. (2001). Risk of eating disorders among female college athletes and nonathletes. *Journal of College Counseling, 4,* 122.

Krane, V., Stiles-Shipley, J.A., Waldron, J., & Michalenok, J. (2001). Relationship among body satisfaction, social physique anxiety, and eating behaviors in female athletes and exercisers. *Journal of Sport Behavior, 24,* 3, 247-265.

Linville, P. W. (1987). Self-complexity as a cognitive buffer against stress related illness and depression. *Journal of Personality and Social Psychology, 52,* 663–676.

Leung, F., Geller, J., & Katzman, M. (1996). Issues and concerns associated with different risk models for eating disorders, *International Journal of Eating Disorders, 19*, 249-256.

Levitt, D.H. (2004). Drive for thinness and fear of fat among college women: Implications for practice and assessment. *Journal of College Counseling, 7*, 109-117.

Marchesini, G., Cuzzolaro, M., Mannucci, E., Dalle, G.R., Gennaro, M., & Tomasi, F. (2004). Weight cycling in treatment-seeking obese persons: Data from the QUOVADIS study. *International Journal of Obesity Related Metabolism Disorder, 28*, 1456–1462.

Marsh, H. W., & Kleitman, S. (2003). School athletic participation: Mostly gain with little pain. *Journal of Sport & Exercise Psychology, 25*, 205–228.

McHale, J. P., Vinden, P. G., Bush, L., Richer, D., Shaw, D., & Smith, B. (2005). Patterns of person and social adjustment among sport-involved and noninvolved urban middle-school children. *Sociology of Sport Journal, 22*, 119–137.

Meyer, D.F. (2005). Psychological correlates of help seeking for eating-disorder symptoms in female college students. *Journal of College Counseling, 8*, 20-30.

Mintz, L.B., O'Holloran, M.S., Mulholland, A.M., & Schneider, P.A. (1997). Questionnaire for eating disorder diagnosis: Reliability and validity of operationalizing DSM-IV into a self-report format. *Journal of Counseling Psychology, 44*, 63-79.

Montenegro, S.O. (2006). Disordered eating in athletes. *Athletic Therapy Today 11*, 1, 60-62.

Montgomery, M.J., & Cote, J.E. (2003). College as a transition to adulthood. In Adams, G.R.& Berzonsky, M.D. *Handbook of adolescence*. Oxford, UK: Blackwell.

National Collegiate Athletic Association. (2009). *National Collegiate Athletic Association Wrestling Administration*. Retrieved November, 27th, 2009 from http://www.ncaa.org/wps/ncaa?key=/ncaa/ncaa/sports+and+championship/wrestling

National Eating Disorder Association. (2010). Retrieved February, 3rd, 2010 from http://www.nationaleatingdisorders.org

Okun, M. A., Karoly, P., & Lutz, R. (2002). Clarifying the contribution of subjective norm to predicting leisure-time exercise. *American Journal of Health Behavior, 26,* 4, 296-205.

Okun, M. A., Ruehlman, L., Karoly, P., Lutz, R., Fairholme, C, & Schaub, R. (2003). Social support and social norms: Do both contribute to predicting leisure-time exercise? *American Journal of Health Behavior, 27,* 5, 493-507.

Oppliger, R.A., Nelson-Steen, S.A., & Scott, J.A. (2003). Weight loss practices of college wrestlers. *International Journal of Sport Nutrition and Exercise Metabolism, 13,* 29-46.

Pedersen, S., & Seidman, E. (2004). Team sports achievement and self-esteem development among urban adolescent girls. *Psychology of Women Quarterly, 28*, 412–422.

Peebles, R., Hardy, K.K., Wilson, J.L., & Lock, J.K. (2010). Are diagnostic criteria for eating disorders markers of medical severity? *Pediatrics, 125*, 5, 193-201.

Pelletier, L.G., Fortier, M.S., Vallerand, R.J., Tuson, K.M., Briere, N.M., & Blaise, M.R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). *Journal of Sport & Exercise Psychology, 17,* 35-53.

Petrie, T.A., & Greenleaf, C. (2007). Eating disorders in sport: From theory to research to intervention. In G. Tenenbaum & R. Eklund (Eds.) *Handbook of sport psychology* (3rd ed., pp.352-378). Hoboken, NJ: Wiley.

Petrie, T.A., & Greenleaf, C., Reel, J., & Carter, J. (2008). Prevalence of eating disorders and disordered eating behaviors among male college athletes, *Psychology of Men and Masculinity, 9,* 4, 267-277.

Petrie, T. A., & Rogers, R. L . (2001). Extending the discussion of eating disorders to include men and athletes. *The Counseling Psychologist, 29,* 743-753.

Petrie, T. A., & Sherman, R. (1999). Recognizing and assisting athletes with eating disorders. In R. Ray & DM Wiese-Bjornstal (Eds.). *Counseling in sports medicine* (pp. 205–226). Champaign, IL: Human Kinetics.

Pike, K.M. (1995). Bulimic symptomatology in high school girls: Toward a model of cumulative risk. *Psychology of Women Quarterly, 19,* 373-396.

Powers, P.S., & Johnson, C. (1996). Small Victories: Prevention of eating disorders among athletes. *Eating Disorders, 4,* 364-377.

Pratt, M. G. (2000). To be or not to be? Central questions in organizational identification. In D. A. Whetten & P. C. Godfrey (Eds.). *Identity in organizations: Building theory through conversations* (pp. 171–207). Thousand Oaks, CA: Sage.

Reinking, M.F. & Alexander, L.E. (2005). Prevalence of Disordered-Eating Behaviors in Undergraduate Female Collegiate Athletes and Nonathletes. *Journal of Athletic Training, 40,* 1, 47-51.

Rosen, L.W., McKeag, D.B., Hough, D.O., & Curley, V. (1986). Pathogenic weight-control behavior in female athletes. *The Physician and Sports medicine, 14,* 79-86.

Round Table (1981). Weight reduction in wrestling. *The Physician and Sports medicine, 9, 78-92.*

Rowe, J. W., & Kahn, R. L. (1998). *Successful aging.* New York: Dell.

Ryan, R.M., & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55,* 68-78.

Saarni, S.E., Rissanen, A., Sarna, S., Koskenvuo, M., & Kaprio, J. (2006). Weight cycling of athletes and subsequent weight gain in middleage. *International Journal of Obesity, 30,* 1639-1644.

Sanford-Martens, T.C., Davidson, M.M., Yakushko, O.F., Martens, M.P., Hinton, P., & Beck, N. (2005). Clinical and subclinical eating disorders: An examination of collegiate athletes. *Journal of Applied Sport Psychology, 17,* 79-86.

Sallis, J. F., Grossman, R. M., Pinski, R. B., Patterson, T. L., & Nader, P. R. (1987). The development of scales to measure social support for diet and exercise behaviors. *Preventive Medicine, 16,* 6, 825-836.

Sherman, R.T., & Thompson, R.A. (2001). Athletes and disordered eating: Four major issues for the professional psychologist. *Professional Psychology: Research and Practice, 32,* 27-33.

Smolak, L., Murnen, S.K., & Ruble, A.E. (2000). Female athletes and eating problems: A meta-analysis. *International Journal of Eating Disorders, 27,* 371-380.

Sossin, K., Gizis, F., Marquat, L., & Sobal, J. (1997). Nutrition beliefs, attitudes, and resource use of high school wrestling coaches. *International Journal of Sport Nutrition, 7,* 219-228.

Spillane, N.S., Boerner, L.M., Anderson, K.G., & Smith, G.T. (2004). Comparability of eating disorder inventory-2 between women and men. *Assessment, 11,* 2, 85-93.

Steen, S.N., & Brownell, K.D. (1990). Patterns of weight loss and regain in wrestlers: Has the tradition changed? *Medicine and Science in Sports and Exercise, 22,* 762-768.

Steen, S.N., Oppliger, R.A., & Brownell, K.D. (1988). Metabolic effects of repeated weight loss and regain in adolescent wrestlers. *Journal of the American Medical Association, 260,* 47-50.

Stice, E., Telch, C.F., & Rizvi, S.L. (2000). Development and validation of the eating disorder diagnostic scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychological Assessment, 12,* 2, 123-131.

Sundgot-Borgen, J. (1994a). Eating disorders in female athletes. *Sports Medicine, 17,* 176-188.

Sundgot-Borgen J. (1994b). Risk and trigger factors for the development of eating disorders in female elite athletes. *Medicine and Science in Sports and Exercise, 26,* 414–419.

Sundgot-Borgen, J., & Torstveit, M.K. (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sports Medicine, 14,* 25-32.

Squire, S. (1983). *The slender balance*. New York: Pinnacle.

Swoap, R. A., & Murphy, S. M. (1995). Eating disorders and weight management in athletes. In S. M. Murphy (Ed.). *Sport psychology interventions,* pp. 307-329. Champaign, IL: Human Kinetics.

Sykora, C., Grilo, C.M., Wilfley, D.E., & Brownell, K.D. (1993). Eating, weight, and dieting disturbances in male and female lightweight and heavyweight rowers. *International Journal of Eating Disorders, 14,* 2, 203-211.

Taub, D.E., & Blinde, E.M. (1992). Eating disorders among adolescent female athletes: Influence of athletic participation and sport team membership. *Adolescence, 27,* 833-848.

Terry, P. & Waite, J. (1996). Eating attitudes and body shape perceptions among elite rowers: effects of age, gender and weight category. *Australian Journal of Science and Medicine in Sport, 28,* 3–6.

Terry, P.C., Lane, A.M., Warren, L. (1999). Eating attitudes, body shape perceptions and mood of elite rowers. *Journal of Science and Medicine in Sport, 2*, 67–77.

Thiel, A., Gottfried, H., & Hesse, F.W. (1993). Subclinical eating disorders in male athletes: A study of the low weight category in rowers and wrestlers. *Acta Psychiatrica Scandinavia, 88,* 259–265.

Thome, J.L., & Espelage, D. (2004). Relations among exercise, coping, disordered eating, and psychological health among college students. *Eating Behaviors, 5,* 337-351.

Thompson, R.A., & Sherman, R. (1993). *Helping athletes with eating disorders.* Champaign, IL: Human Kinetics.

Thompson, J. K., Coovert, M. D., & Stormer, S. M. (1999). Body image, social comparison, and eating disturbance: a covariance structure modeling investigation. *International Journal of Eating Disorders, 26,* 43-51.

Thompson, R. A., & Sherman, R. T. (1999). Athletes, athletic performance, and eating disorders: Healthier alternatives. *Journal of Social Issues, 55*, 2, 317-337.

United States Rowing (USRowing) (2009). Retrieved on October 24th, 2009 from: http://www.usrowing.org/index.aspx

Vallerand, R.J., & Fortier, M.S. (1998). Measures of intrinsic and extrinsic motivation in sport and physical activity: A review and critique. In J.L. Duda (Eds.). *Advancements in sport and exercise psychology measurement* (pp. 81-101). Morgantown, WV: Fitness Information Technology.

Venditti, E.M., Wing, R.R., Jakicic, J.M., Butler, B.A., & Marcus, M.D. (1996). Weight cycling, psychological health, and binge eating in obese women. *Journal of Consulting Clinical Psychology, 64,* 400–405.

Wallner, S.J., Luschnigg, N., Schnedl, W.J., Lahousen, T., Sudi, K., & Crailsheim, K. (2004). Body fat distribution of overweight females with a history of weight cycling. *International Journal of Obesity Related Metabolic Disorders, 28,* 1143–1148.

Wann, D. L., & Hamlet, M. A. (1994). The Joiners Scale: Validation of a measure of social-complexity. *Psychological Reports, 74,* 1027–1034.

Wann, D. L., & Hamlet, M. A. (1996). Being a "joiner" and psychological well-being. *Psychological Reports, 79,* 1186.

Wann, D.L. (2006). Understanding the positive social psychological benefits of sport team identification: The team identification-social psychological health model. *Group Dynamics: Theory, Research and Practice, 10*, 4, 272-296.

National Collegiate Athletic Association. (2009). *Weight Management Education*. Retrieved November, 16th, 2009 from http://www.ncaa.com/sports/m-wrestl/spec-rel/010102aab.html

Wertheim, E.H., Paxton, S.J., Schutz, H.K., & Muir, S.J. (1997). Why do adolescent girls watch their weight? An interview study examining sociocultural pressures to be thin. *Journal of Psychosomatic Research, 48*, 10-20.

Wilmore, J.H. (1996). Eating disorders in the young athlete: In O. Bar-Or (Ed.), *The child and adolescent athlete* (vol. VI of the Encyclopedia of Sports Medicine) (pp. 287-303). Cambridge, MA: Blackwell Science.

Womble, L.G., Williamson, D.A., Martin, C.K., Zucker, N.L., Thaw, J.M., Netemeyer, R. (2001). Psychosocial variables associated with binge eating in obese males and females. International Journal of Eating Disorders, *30,* 217–221.

Appendix A

E-mail Request for Participation to Coaches

Dear Coach,

My name is Brianna Kearns and I am a 2nd year Master's student at Barry University in Miami Shores, Florida. As a former rower and current women's rowing coach, I am interested in examining the prevalence of eating disorders, as well as differences in eating behaviors among competitive lightweight and open-weight collegiate rowers.

As a coach of a highly competitive rowing program, I am contacting you in an effort to receive participants for my research. I ask that you please forward the information below to your current rowers (lightweights and open-weights), as well as the attached cover letter that further explains my research. I would also be happy to contact your athletes myself if it is more convenient for you to provide me with their e-mail addresses. Participation in this research is completely voluntary and anonymous, and I will have no way of identifying what university the rower attends.

Your assistance in forwarding this information to your athletes or providing me with their e-mail addresses is greatly appreciated. If you have any questions or concerns regarding this information, or if you are interested in receiving the results of this study, please do not hesitate to contact me via email at Brianna.kearns@mymail.barry.edu.

Sincerely,

Brianna Kearns

Appendix B

E-mail Request for Participation to Rowers

Dear Collegiate Rowers,

As a member of a highly competitive rowing program, your participation in a rowing-related research project is requested. Please read the cover letter explaining the nature of the study that is attached. You can also find this cover letter at the bottom of this e-mail. Then click the link provided to begin:
http://www.surveymonkey.com/s/rowing

Your participation is greatly appreciated.

Sincerely,

Brianna Kearns

Appendix C

Barry University
Cover Letter

Dear Research Participant:

Your participation in a research project is requested. The title of the study is "Prevalence of Eating Disorders, Eating Disorder Symptoms and Social Contagion Effects of Eating Behaviors among Collegiate Rowers". The research is being conducted by Brianna Kearns, a candidate for a Master's degree, under Dr. Jennifer Gapin in the Department of Sport and Exercise Sciences at Barry University. It is seeking information that will be useful in the field of sport psychology. The aim of the research is to examine eating behaviors among rowers. In accordance with this aim, the following procedure will be used: A questionnaire created by the author, the Questionnaire for Eating Disorder Diagnoses (Q-EDD; Mintz, O'Holloran, Mulholland, & Schneider, 1997), and 3 subscales of the Eating Disorder Inventory-2 (Garner, 1991) follow this letter. I am recruiting approximately 1000 collegiate rowers for this study.

If you decide to participate in this research, you will be asked to complete an online survey related to rowing experiences and eating behaviors. Participation is expected to take approximately 20 minutes.

Your consent to be a research participant is strictly voluntary and should you decline to participate or should you choose to drop out at any time during the study, there will be no adverse effects on your academic or athletic standing.

The risks of involvement in this study are minimal and may include psychological and/or emotional stress. I understand that it is not possible to identify all potential risks in an experimental procedure, but I believe that reasonable safeguards have been taken to minimize both the known and the potential, but unknown risks. Furthermore, you may withdraw your consent and discontinue you participation at any time. If you are concerned about your own or other's eating and/or exercise behaviors, I encourage you to contact your university's counseling and/or health centers, or reference the following websites:

http://www.nationaleatingdisorders.org
http://www.renfrew.org
http://ncaa.org (Academics and Athletes; Health and Safety tabs)

Although there are no direct benefits to you, your participation in this study may help our understanding of eating behaviors and trends among rowing teams, and potentially provide information for future research and methods of treatment and/or therapy.

As a research participant, information you provide is anonymous, that is, no names or other identifiers will be collected. SurveyMonkey.com allows researchers to suppress the delivery of IP addresses during the downloading of data, and in this study no IP address will be delivered to the researcher. However, SurveyMonkey.com does collect IP addresses for its own purposes. If you have concerns about this you should review the privacy policy of SurveyMonkey.com before you begin.

By completing and submitting this electronic survey you are acknowledging that you are at least 18-years-old and that you voluntarily agree to participate in the study.

If you have any questions or concerns regarding the study or your participation in the study, or if you would like to receive the results of this study, you may contact me, Brianna Kearns, by

email at Brianna.kearns@mymail.barry.edu. You may also contact the Institutional Review Board point of contact, Barbara Cook, by phone at (305) 899-3020 or by email at bcook@mail.barry.edu.

Thank you for your participation.

Sincerely,

Brianna Kearns

Appendix D

Questionnaire for Eating Disorder Diagnoses (Q-EDD; Mintz, O'Halloran, & Mulholland, 1997)

Please complete the following questions as honestly as possible. The questions refer to current behaviors and beliefs, meaning those that have occurred in the past **3 months**.

Sex:
___ Male
___ Female

Age: ___

School Status:
___ Freshman
___ Sophomore
___ Junior
___ Senior
___ Graduate/5th year
___Other (specify)

Race/Ethnicity:
___ Caucasian/White
___ African-American/Black
___Hispanic/Latino/Mexican-American
___ American Indian
___ Asian American/Pacific Islander
___ Other
Specify: ___

Present Height: ____ feet ____ inches

Present Weight: ____ pounds

My body-frame is:
___Small
___Medium
___Large

I would like to weigh ____ pounds.

1. Do you experience recurrent episodes of binge eating, meaning eating in a discrete period of time (e.g., within any 2-hour period) an amount of food that is definitely larger than most people would eat during a similar amount of time?

___Yes

___No

If Yes: Continue to answer the following questions.

If No: Skip to Question 4.

2. Do you have a sense of lack of control during the binge eating episodes (i.e., the feeling that you cannot stop eating or control what or how much you are eating?)

___Yes

___No

3. Choose the answers within the *two* sets of **[bold brackets]** below that best fit for you:

"On the average, I have had **[1, 2, 3, 4, 5, 6 or more]** binge eating episodes a WEEK for at least **[1 month, 2 months, 3 months, 4 months, 5 months, 6-12 months, more than one year]"**

4. Please choose the appropriate responses below concerning things you may do accurately to prevent weight gain. If you choose *yes* to any question, please indicate *how often* on average you do this and *how long* you have been doing this.

a.) Do you make yourself vomit to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

b.) Do you take laxative to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

c.) Do you take diuretics (water pills) to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

d.) Do you fast (skip food for 24 hours) to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month\

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

e.) Do you chew food but spit it out to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

f.) Do you give yourself an enema to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

g.) Do you take appetite control pills to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

h.) Do you diet strictly to prevent weight gain? ___Yes ___No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

i.) Do you exercise a lot beyond normal practice requirements and team expectations? _Yes _No

How often do you do this?

___Daily ___Twice/Week ___Once/Week ___Once/Month

How long have you been doing this?

__1 month ___2 months ___3 months ___4 months ___5-11 months ___More than a year

5. If you answered *yes* to "exercise a lot beyond normal practice requirements and team expectations", please answer questions #5a, 5b, 5c, and 5d. If you answered *no* to "exercise a lot beyond normal practice requirements and team expectations", please skip to question #6.

5a. Fill in the blanks below:

I _____ (types of exercise beyond normal practice requirements and team expectations; e.g., jog, swim) for an average of _____ hours at a time.

5b. My exercise beyond normal practice requirements and team expectations sometimes significantly interferes with important activities. ___Yes ___No

5c. I exercise beyond normal practice requirements and team expectations despite injury and/or medical complications. ___Yes ___No

5d. Is your primary reason for exercising beyond normal practice requirements and team expectations to counteract the effects of binging or to prevent weight gain?__Yes __No

For the following questions, choose the response that best reflects your answer:

6. Does your weight and/or body shape influence how you feel about yourself?

1	2	3	4	5
Not At All	A Little	A Moderate Amount	Very Much	Extremely or Completely

7. How afraid are you of becoming fat?

1	2	3	4	5
Not At All	A Little	A Moderate Amount	Very Much	Extremely or Completely

8. How afraid are you of gaining weight?

1	2	3	4	5
Not At All	A Little	A Moderate Amount	Very Much	Extremely or Completely

9. Do you consider yourself to be:

1	2	3	4	5	6
Grossly Obese	Moderately Obese	Overweight	Normal Weight	Low Weight	Severely Underweight

10. Certain part of my body (e.g., my abdomen, buttocks, thighs) are too fat. ___Yes ___No

11. I feel fat all over. ___Yes ___No

12. I believe that how little I weight is a serious problem. ___Yes ___No

13. I have missed at least 3 consecutive menstrual cycles (not including those missed during a pregnancy). ___Yes ___No

Appendix E

Eating Disorder Inventory-2 (EDI-2; Garner, 1991)

Drive for Thinness Subscale (7 items)

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

1. I eat sweets and carbohydrates without feeling nervous. ① ② ③ ④ ⑤ ⑥
2. I think about dieting. ① ② ③ ④ ⑤ ⑥
3. I feel extremely guilty after overeating. ① ② ③ ④ ⑤ ⑥
4. I am terrified of gaining weight. ① ② ③ ④ ⑤ ⑥
5. I exaggerate or magnify the importance of weight. ① ② ③ ④ ⑤ ⑥
6. I am preoccupied with the desire to be thinner. ① ② ③ ④ ⑤ ⑥
7. If I gain a pound, I worry that I will keep gaining. ① ② ③ ④ ⑤ ⑥

Perfectionism Subscale (6 items)

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

1. Only outstanding performance is good enough in my family. ① ② ③ ④ ⑤ ⑥
2. As a child, I tried very hard to avoid disappointing my parents or teachers. ① ② ③ ④ ⑤ ⑥
3. I hate being less than best at things. ① ② ③ ④ ⑤ ⑥
4. My parents have expected excellence from me. ① ② ③ ④ ⑤ ⑥
5. I feel that I must do things perfectly or not do them at all. ① ② ③ ④ ⑤ ⑥
6. I have extremely high goals. ① ② ③ ④ ⑤ ⑥

Body Dissatisfaction Subscale (9 items)

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

1. I think that my stomach is too big.	① ② ③ ④ ⑤ ⑥
2. I think that my thighs are too large.	① ② ③ ④ ⑤ ⑥
3. I think that my stomach is just the right size.	① ② ③ ④ ⑤ ⑥
4. I am satisfied with the shape of my body.	① ② ③ ④ ⑤ ⑥
5. I like the shape of my buttocks.	① ② ③ ④ ⑤ ⑥
6. I think my hips are too big.	① ② ③ ④ ⑤ ⑥
7. I think my thighs are just the right size.	① ② ③ ④ ⑤ ⑥
8. I think my buttocks are too large.	① ② ③ ④ ⑤ ⑥
9. I think my hips are just the right size.	① ② ③ ④ ⑤ ⑥

Appendix F

Training Information and Eating Behaviors

General Information

Are you on athletic scholarship?:

___ Yes

___ No

If yes, is it a partial or full scholarship?:

___ Partial

___ Full

Do you live with any teammates?

___ Yes

___ No

If yes, how many? ___

Total number of hours spent with your teammates *outside* of training per week (including recreation, studying, etc):

In season (September through May): ____

Off season (June through August): ____

1) Rowing Experience

Total Rowing Experience at the College Level (in months): ____

Total Rowing Experience in your Lifetime (in months): ____

Do you *primarily* compete in Open-Weight or Lightweight?:

___ Open-weight

___ Lightweight

If Lightweight, how many months experience do you have rowing lightweight?: ___

Who determined you would row lightweight? {Check all that apply}

___ Personal choice

___ Coach

___ Parents

___ Athletic trainer

___Other

Specify: ___

Would you prefer to row lightweight or open-weight?:

___ Lightweight

___ Open-weight

Why do you have this preference?: _____

Average number of training hours **per week** for your college rowing program (rowing, erging, lifting, etc):

In season (September through May): ____

Off season (June through August): ____

2) Weight Change and Fluctuation Patterns

How much does your weight typically fluctuate per week while in season, in pounds (September through May)?:

a) 0-2 lbs; b) 3-5 lbs; c) 6-10 lbs; d) 11-15 lbs; e) 16-20 lbs; f) 21+ lbs.

How much does your weight typically fluctuate per week out of season, in pounds (June through August)?:

a) 0-2 lbs; b) 3-5 lbs; c) 6-10 lbs; d) 11-15 lbs; e) 16-20 lbs; f) 21+ lbs.

3) Eating, Dieting, and Weight Loss Methods

Please check all of the following eating, dieting and weight loss methods that you are currently engaging in, or have engaged in within the past 3 months. If checked, please indicate the frequency of occurrence using the following scale:

1) rarely 2) occasionally 3) frequently 4) always

Also, please note the comment area provided below each behavior in order to give you the option to further clarify or explain.

___restrictive dieting *(e.g., avoiding certain foods; counting calories)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___fasting *(e.g., not eating/drinking for a certain period of time)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___vomiting *(e.g., throwing up, typically after consuming food/drink)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___laxatives *(e.g., food, compounds, or drugs used to induce bowel movements)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___enemas *(e.g., inserting liquids into the rectum and anus resulting in evacuation of the lower intestinal tract)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___diet pills *(e.g., drugs that alter appetite, metabolism, or absorption of calories)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___water pills or diuretics *(e.g., drugs that elevate the rate of urination)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___excessive exercise (beyond normal practice requirements and/or team expectations)

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___binge eating *(e.g., discretely consuming large amounts of food, coupled with a sense of loss of control and emotional distress)*

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

___other (specify)

How often do you do this?

1) rarely 2) occasionally 3) frequently 4) always

Comment:_____

Please answer the next set of questions using the following scale:

1) never 2) rarely 3) occasionally 4) frequently 5) always

How often do you find yourself engaging in the *same* weight loss behaviors as your teammates? *(e.g., you vomit because a teammate vomits; you take laxatives because a teammate takes laxatives; you exercise excessively beyond normal practice requirements because a teammate does)*

How often do you find yourself engaging in weight loss behaviors *with* your teammates? *(e.g., you vomit at the same time or in the same area with a teammate; you take water pills or diuretics with a teammate; you fast with a teammate)*

Do you believe you engage in certain eating and exercise behaviors because your teammates do? *(In other words, if your teammate was not engaging in certain behaviors or stopped engaging in certain behaviors, do you believe you would also not be engaging in those behaviors or stop engaging in them?)*

Have the members of your team ever had a *positive* influence on your eating/dieting behaviors?: *(e.g., encouraged healthy, nutritious eating; supported you in reaching a healthy weight; helped you not feel guilty about eating; worked out with when needed outside of normal practices)*

___ Yes
___ No

If yes, please check off the all of the *positive* influences members of your team have had on your eating/dieting behaviors. Also, please note the comment area provided below each behavior in order to give you the option to further clarify or explain:

Eating Behaviors

___the quality of food ingested
(e.g., eating more fruits and vegetables; eating less junk food; eating a healthy variety of foods)

Comment: _____

___the quantity of food ingested
(e.g., eating enough food before and/or after practices, races)

Comment: _____

___routines or habits associated with eating
(e.g., good eating habits, eating well before races)

Comment: _____

___psychological concerns surrounding eating
(e.g., helping you to not feel guilty about eating)

Comment: _____

___other (specify)

Comment: _____

Dieting Behaviors

___weight and body shape considerations of dieting
(e.g., supported you in losing weight; helped you tone/strengthen certain body areas)

Comment: _____

___the use of exercise for weight control (beyond required practices and/or team expectations)
(e.g., worked out with you; helped you develop an exercise program)

Comment: _____

___other (specify)

Comment: _____

Have the members of your team ever had a *negative* influence on your eating/dieting behaviors?: *(e.g., eating junk food together; eating too much; poor eating habits during a race; pressuring you to lose/gain weight when you are already at a healthy weight; persuading you to exercise too much)*

___ Yes
___ No

If yes, check off all of the *negative* influences members of your team have had on your eating behaviors. Also, please note the comment area provided below each behavior in order to give you the option to further clarify or explain:

Eating Behaviors

___the quality of food ingested
(e.g., eating junk food)

Comment:_____

___the quantity of food ingested
(e.g., eating too much food or too little food)

Comment:_____

___routines or habits associated with eating
(e.g., eating unhealthy before a practice or race)

Comment:_____

___psychological concerns surrounding eating
(e.g., making you feel guilty about eating healthy food)

Comment:_____

___other (specify)

Comment:_____

Dieting Behaviors

___weight and body shape considerations of dieting
(e.g., criticized your weight/body shape)

Comment:_____

___the use of exercise for weight control (beyond required practices and/or team expectations)
(e.g., pressured you to exercise excessively beyond normal practice requirements)

Comment:_____

___other (specify)

Comment:_____

Tables

Table 1
Participant Demographics

Variable	Total Number (*n*)	Percentage (%)
Age (years)		
18	20	15.04%
19	47	35.34%
20	26	19.55%
21	25	18.80%
22	14	10.53%
23	1	.75%
Gender		
Male	57	42.86%
Female	76	57.14%
Weight Category		
Open-Weight	64	48.12%
Lightweight	69	51.88%
Race/Ethnicity		
White/Caucasian	119	89.47%
Asian-American/ Pacific Islander	7	5.26%
Other	7	5.26%
School Status		
Freshman	55	41.35%
Sophomore	25	18.80%
Junior	23	17.29%
Senior	29	21.80%
5th Year/Graduate Student	1	.75%
Weight Category		
Low Weight	9	6.77%
Normal	115	86.47%
Overweight	7	6.77%
Athletic Scholarship		
Yes	17	12.78%
No	116	87.22%

Note. Total number of participants = 133.
*Weight categories are determined by BMI scores. Low Weight = 18.1-20, Normal Weight = 20.1-25, and Overweight = 25.1-30.

Table 2
Demographics in Relation to Questionnaire for Eating Disorder Diagnosis Classification

Variable	Asymptomatic (*n* = 63)	Symptomatic (*n* = 65)	Eating Disordered (*n* = 5)
Age (years)			
Mean	19.70	19.72	21.20
Gender			
Male	26.98%	55.38%	80%
Female	73.02%	44.62%	20%
Rowing Category			
Open-Weight	65.08%	36.51%	0%
Lightweight	34.92%	64.62%	100%
Race/Ethnicity			
Non-minority	92.06%	89.23%	60%
Minority	7.94%	10.77%	40%
Weight Category			
Low Weight	4.76%	9.23%	0%
Normal	84.13%	87.69%	100%
Overweight	11.11%	3.08%	0%
School Status			
Freshman	36.51%	49.23%	0%
Sophomore	25.39%	12.31%	20%
Junior	17.46%	13.85%	60%
Senior	19.05%	24.62%	20%
5th Year/Grad. Student	1.59%	0%	0%

Note. Non-minority status = White/Caucasian. Minority status = Asian-American/Pacific Islander and Other
*Weight categories are determined by BMI scores. Low Weight = 18.1-20, Normal Weight = 20.1-25, and Overweight = 25.1-30.

Table 3
Descriptive Statistics for the EDI-2 Subscales by Gender and Weight Classification

Scale	Variable	Mean *(M)*	Standard Deviation *(SD)*	Number *(n)*
Drive for Thinness				
	Open-Weight Total			
	Male	1.23	2.05	*n*= 26
	Female	2.11	4.01	*n*= 38
	Total	1.75	3.36	*n*= 64
	Lightweight Total			
	Male	5.26	5.31	*n*= 31
	Female	5.05	5.51	*n*= 38
	Total	5.14	5.38	*n*= 69
	Gender Total			
	Male	3.42	4.59	*n*=57
	Female	3.58	5.01	*n*= 76
	Total	3.51	4.82	*n*= 133
Perfectionism				
	Open-Weight Total			
	Male	6.73	4.34	*n*= 26
	Female	6.37	3.64	*n*= 38
	Total	6.52	3.92	*n*= 64
	Lightweight Total			
	Male	7.97	4.36	*n*= 31
	Female	6.89	4.16	*n*= 38
	Total	7.38	4.25	*n*= 69
	Gender Total			
	Male	7.40	4.36	*n*= 57
	Female	6.63	3.89	*n*= 76
	Total	6.96	4.10	*n*= 133
Body Dissatisfaction				
	Open-Weight Total			
	Male	2.00	2.55	*n*= 26
	Female	4.03	4.19	*n*= 38
	Total	3.20	3.73	*n*= 64
	Lightweight Total			
	Male	3.29	3.71	*n*= 31
	Female	6.03	5.82	*n*= 38
	Total	4.80	5.14	*n*= 69
	Gender Total			
	Male	2.70	3.27	*n*= 57
	Female	5.03	5.14	*n*= 76
	Total	4.03	4.57	*n*= 133

Note. After scoring, Drive for Thinness scores (*n* = 7) can range from 0-21; Perfectionism scores (*n* = 6) can range from 0-18; and Body Dissatisfaction scores (*n* = 9) can range from 0-27.

Table 4
Frequency of Disordered Eating Behaviors

Behavior	Rarely (*n*)	Occasionally (*n*)	Frequently (*n*)	Always (*n*)	Total *n* = 133 (*n*; %)
Restrictive Dieting	7	20	29	25	81; 60.90%
Excessive Exercise	4	25	13	4	46; 34.58%
Fasting	9	23	10	2	44; 33.08%
Binge Eating	11	17	11	0	39; 29.32%
Laxatives	2	6	1	0	9; 6.77%
Vomiting	5	1	1	0	7; 5.26%
Water Pills/Diuretics	2	1	0	1	4; 3.01%
Diet Pills	0	0	1	0	1; .75%
Enemas	1	0	0	0	1; .75%
Other	1	3	2	0	6; 4.51%

Note. Other behaviors included exercising in sweat suits, decreasing salt-intake, spitting, and excessive sauna use.

Table 5
Frequency of Engaging in Behaviors Due to Teammate Influence

Frequency	Never	Rarely	Occasionally	Frequently	Always
1. Engage in *same* behaviors as teammates	65.41%	18.05%	10.53%	4.51%	1.50%
2. Engage in behaviors *with* teammates	72.18%	12.03%	9.77%	3.01%	3.01%
3. Engages in behaviors *because* teammates	66.17%	20.30%	8.27%	3.76%	1.50%

Table 6

Percentage of Weekly Weight Fluctuations for Rowers In-Season and Out-of-Season in Relation to the Q-EDDDiagnoses

Variable	Asymptomatic (*n* = 63)	Symptomatic (*n* = 65)	Eating Disordered (*n* = 5)
In Season			
0-2 lbs	63.49%	15.38%	0%
3-5 lbs	30.16%	55.38%	20%
6-10 lbs	6.35%	23.08%	40%
11-15 lbs	0%	6.15%	40%
Out of Season			
0-2 lbs	53.97%	32.31%	40%
3-5 lbs	42.86%	60.00%	60%
6-10 lbs	3.17%	4.62%	0%
11-15 lbs	0%	3.08%	0%