TO WEIGH OR NOT TO WEIGH? RELATION TO DISORDERED EATING ATTITUDES AND BEHAVIORS AMONGST FEMALE COLLEGIATE ATHLETES

Kayla Carrigan, B.A.

Thesis Defense Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

May 2015

APPROVED:
Trent Petrie, Major Professor
Trish Kaminski, Committee Member
Ed Watkins, Committee Member
Vicki Campbell, Chair of the Department of Psychology
Mark Wardell, Dean of the Toulouse Graduate School
Carrigan, Kayla. To Weigh or not to Weigh? Relation to Disordered Eating Attitudes and Behaviors amongst Female Collegiate Athletes. Master of Science (Psychology), May 2015, 57 pp., references, 62 titles.

Collegiate and elite female athletes have been identified as a subpopulation at heightened risk for disordered eating and pathogenic weight management practices. It was hypothesized that this increases risk may be related to sport specific pressures (such as team conducted weigh-ins), or the use and frequency of self-weighing. It appears that mandatory, team conducted weigh-ins are not salient to female athletes in regards to experiencing internalization, body image concerns, dietary restraint, negative affect, and bulimic symptomatology. Results, however, indicate that frequency of engagement in self-weighing may be influential in the engagement of disordered eating symptoms. Specifically, athletes who weighed themselves three or more times per week reported significantly more internalization of general societal ideals and athletic body ideals. For body image concerns, athletes who weighed three or more times per week reported being more concerned with their body size/shape than all others. With respect to dietary behaviors, athletes who weighed themselves three or more times per week reported engaging in significantly more caloric restriction than did those who weighed less frequently. For negative affect, the athletes who weighed themselves three or more times per week reported significantly higher levels of both anger and guilt. Finally for bulimic symptomatology, athletes who weighed themselves three or more times a week had significantly higher levels than those who weighed once or twice or not at all.
Copyright 2015

By

Kayla Carrigan, B.A.
TABLE OF CONTENTS

I. INTRODUCTION ...................................................................................................................... 1

II. METHOD................................................................................................................................... 8

  Participants ............................................................................................................................... 8
  Demographics ....................................................................................................................... 8
  Measures .................................................................................................................................... 8
  Procedure .................................................................................................................................. 11
  Data Analysis ............................................................................................................................ 13

III. RESULTS .............................................................................................................................. 15

  Team Weigh-ins ..................................................................................................................... 15
  Self Weighing ........................................................................................................................ 16

IV. DISCUSSION ........................................................................................................................ 21

References .................................................................................................................................... 28

LIST OF TABLES

Table 1    Disordered Eating by Team Weigh-in Status .............................................................. 19

Table 2    Disordered Eating by Self-Weighing Status .............................................................. 20
CHAPTER I
REVIEW OF LITERATURE

Overview

Female athletes, particularly those at the collegiate and elite levels, have been identified as a subpopulation at increased risk for disordered eating (Berry & Howe, 2000; Byrne & McLean, 2002; Greenleaf, Petrie, Carter, & Reel, 2009; Sundgot-Borgen & Torstveit, 2004; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008; Williams, Sargent, & Durstine, 2003). One potential explanation for this increased risk is the unique pressures that athletes experience within their sport environment about weight, diet, body size and shape, and appearance (Anderson, Petrie, & Neumann, 2012; Byrne & McLean, 2002; Krane, Choi, Baird, Aimar, & Kauer, 2004; Monsma & Malina, 2004; Reel, Petrie, SooHoo, & Anderson, 2013). Although many body and appearance-related pressures exist for athletes, such as wearing revealing uniforms and hearing weight or appearance-disparaging comments from coaches, being weighed as a part of sport participation has been identified as a key factor in athletes development of disordered eating behaviors and body image concerns (Reel et al., 2013; Williams et al., 2003).

When athletes are weighed, particularly by coaches, and weights are publically displayed, they may be teased and ridiculed by teammates and coaches, become acutely sensitized to their weight, physique and appearance, and end up dissatisfied with their body size and shape. In response, athletes may experience negative emotions (e.g., sadness, anxiety, shame), restrict their caloric intake, and engage in other pathogenic weight control behaviors (e.g., excessive exercising, vomiting) in hopes of losing weight and reshaping their physique and appearance to meet the ideals that exist within their sport and society. Several studies (e.g., Reel et al., 2013) have linked sport-specific pressures about weight and appearance to disordered eating attitudes.
and behaviors (e.g., body image, dietary intent, bulimic symptomatology), yet to date, no study has addressed empirically the potential effects of being weighed as a part of sport participation on these outcomes despite it being identified as a potential risk factor (Bonci et al., 2008).

Sociocultural Models

Etiological models that emphasize gender socialization and social pressures about weight and appearance have been particularly influential and have guided research on disordered eating among women (Fitzsimmons-Craft, 2011; Keel & Forney, 2013; Polivy & Herman, 2002; Stice, 2002; Troop & Treasure, 2011). In such models, sociocultural pressures are communicated by friends, family members, and the media through comments and messages about appearance, and the presentation of images that are supposed to represent the beauty-ideal. These sociocultural pressures likely influence how women define themselves, understand the role of food in their lives, and view their own bodies, and subsequently play a role in the development and maintenance of body image concerns and disordered eating behaviors.

Within such sociocultural models, social pressures about appearance and exposure to Western society’s images of idealized beauty are hypothesized to lead to internalization of these ideals, creating a schema that becomes the standard against which women compare their bodies, appearance, eating behaviors, and their femininity (Anschutz, Engels, & Van Strien, 2008; Lieberman et al., 2001; McCabe & Ricciardelli, 2001; Polivy & Herman, 2002; Stice, 2002; Stice, Mazotti, Krebs, & Martin, 1998; Stice, Maxfield, & Wells, 2003; Stice, Schupak-Neuberg, Shaw, & Stein, 1994; Stice, Spangler, & Agras, 2001). With increased levels of body dissatisfaction, due to perceived discrepancies between their own bodies and the internalized ideal, women may react with negative emotions, such as anger, anxiety, and shame, and respond by restricting their caloric intake to lose weight and shift their bodies to be more closely aligned
with their thin-ideal. Over time, the presence of such negative affect, coupled with extreme caloric restriction, may increase their likelihood of developing bulimic and/or anorexic like eating and weight control behaviors. Research supports the connection between internalization of Western society’s ideals and the subsequent development of body image concerns (e.g., dissatisfaction, shame), negative affect, and self-reported dietary intent, which in turn have been linked to eating disorder symptomatology and the use of pathological weight management practices among women (Anschutz et al., 2008; Lieberman et al., 2001; McCabe & Ricciardelli, 2001; Polivy & Herman, 2002; Stice, 2002; Stice et al., 2001; Stice, Mazotti, Krebs, & Martin, 1998; Thompson & Stice, 2001).

Sport Specific Pressures and Team Weigh-ins

Acknowledging the importance of general sociocultural pressures in determining athletes’ internalization and body dissatisfaction and ultimately the development of eating disorders, Petrie and Greenleaf (2012) have suggested that pressures about body, weight, and appearance that exist within the sport environment and are communicated by coaches, teammates, judges, parents, and other sport personnel are influential as well. Initial research in this area identified pressures unique to the sport environment (e.g., uniform requirements, being weighed, being judged on aesthetic components, wearing revealing uniforms in public, etc.), determined how frequently such pressures occur, related them to eating disorder classification, and established a temporal connection to increased body dissatisfaction (Anderson et al., 2012; Byrne & McLean, 2002; Reel et al., 2013; Thompson & Sherman, 2011), yet only recently has the influence of sport pressures been delineated from those that exist within the broader society. In a sample of 414 female collegiate athletes, Reel et al. (2013) examined the pressures they experienced from family, media, friends (who were not teammates), and romantic partners to lose weight, be more
attractive, and to have the perfect body, as well as those pressures that were part of their sport environments (i.e., from coaches and teammates about weight, and about appearance and performance). They found that sport pressures had incremental effects, explaining variance in the athletes’ body dissatisfaction, dietary intent, and bulimic symptomatology beyond that accounted for by the general sociocultural pressures that all women experience. Thus, examining sport-specific pressures separately from general sociocultural messages about weight, food, and appearance makes sense given their unique contributions to athletes’ health and well-being.

Many unique pressures exist within sport environments that encourage an unhealthy focus on body, weight, eating, and appearance, such as wearing revealing uniforms or being scrutinized by fans, yet being weighed as part of a team or sport participation may be particularly salient and exceedingly damaging (Kerr et al., 2006; McNulty, 1997a; McNulty, 1997b; McNulty, 2001; Petrie & Greenleaf, 2007; Reel & Gill, 2006). Being weighed represents an ongoing source of stress and pressure for athletes because it keeps weight and physique in the forefront of athletes’ minds and encourages them to monitor their eating, exercising and weight, and in some instances, take extreme actions to be “in shape” when they step onto the scale. Although mandatory team weigh-ins have been identified as a unique sport pressure and have been suggested to underlie sport environments that have an unhealthy focus on weight and body size and promote the use of pathogenic weight control measures (Kerr et al., 2006; McNulty, 1997a; McNulty, 1997b; McNulty, 2001; Reel & Gill, 2001), to date no study has addressed this connection directly amongst collegiate athletes.

Research on the effects of mandatory weigh-ins and fitness evaluations, however, has been conducted in military samples, which can inform studies of athletes. Like in sports, McNulty (1997a) suggested that the military environment, with its expectation of annual weigh-ins and the
pressures related to how women look in their uniforms, contributes to the development of disordered eating attitudes and behaviors among personnel. McNulty (1997a) found that, in response to annual weigh-ins and fitness evaluations, active duty Navy nurses used numerous pathogenic weight management behaviors (e.g., binge eating, use of diuretics, excessive exercise, and skipping meals) to try and control their size and shape. In a subsequent study, McNulty (2001) examined 1,278 active duty service women from the Army, Navy, Air Force, and Marines and found that, during fitness periods, body measurement checks and annual weigh-ins, the use of laxatives, diuretics, diet pills, vomiting, and fasting increased for the women in all services. These findings suggest that in environments where weigh-ins and other body-related evaluations occur, even when only done annually, women become more body-focused and use pathogenic weight management practices to try to control and shape their bodies to fit the expectations that are present within the environment.

**Self-weighing**

Similarly, self-weighing has been related to increases in the use of pathological weight management practices, increases in disordered eating symptomatology, decreases in body esteem, and increases in negative affect, which includes depressive symptoms (Friend, Bauer, Madden, & Neumark-Sztainer, 2012; Mintz et al., 2013; Quick, Larson, Eisenberg, Hannan, & Neumark-Sztainer, 2012; Quick, Loth, MacLehose, Linde, & Neumark-Sztainer, 2013). For example, in a cross-sectional and longitudinal study of adolescent girls a higher frequency of self-weighing was associated with lowered body satisfaction and increased use of healthy (e.g., exercise, ate more fruits and vegetables, ate fewer high fat foods, drank less regular soda pop or sweetened beverages, etc.), unhealthy (e.g., fasted, ate very little, skipped meals, smoked cigarettes, etc.), and extreme (e.g., took diet pills, vomiting, used laxatives, used diuretics, etc.)
weight control behaviors (Friend et al., 2012). Friend et al. found that many girls were using both healthy and unhealthy behaviors to control their weight, and the use of self-weighing appeared to commonly co-occur with the use of these behaviors. In a related study, among young adult women, higher rates of self-weighing were associated with binge eating, depressive symptoms, and lower self-esteem (Quick et al., 2012). Objectification theory (Moradi, 2010; Moradi & Huang, 2008) offers an explanation for the association between self-weighing and disordered eating attitudes and behaviors. Over time, and with repeated exposure to sociocultural messages and pressures about weight, body, appearance, being sexualized, etc., women may come to view themselves as objects to be viewed and evaluated. From this “objectified” perspective, they may engage in body checking and body monitoring type behaviors, including self-weighing, to assess their value and worth. The question that remains unanswered, though, is what is the relation of self-weighing to female athletes’ beliefs and behaviors about themselves, their bodies, and food.

Goals and Objectives of the Research

Thus, I had two purposes in the current study. First, I wanted to determine the potential relation of being (or not being) weighed (as part of a sport team’s requirements) to female athletes’ reported levels of internalization, body image concerns, dietary intent, negative affect, and bulimic symptomatology. Second, I wanted to examine the association of self-weighing to these same variables among female athletes. I hypothesized that athletes who participated in weigh-ins as part of their sport participation (or who engaged in self-weighing) would score higher (indicating higher levels of disturbance) across all measures of disordered eating.
Hypotheses

Listed below were the specific hypotheses regarding how team weigh-ins and self-weighing may be related to disordered eating variables.

Hypothesis 1(a).

Athletes who underwent weighing as part of athletic participation would score higher (indicating higher levels of disturbance) across all measures of disordered eating.

Hypothesis 1(b).

Athletes who engage in self-weighing would score higher (indicating higher levels of disturbance) across all measures of disordered eating.
CHAPTER II

METHOD

Participants

Demographics.

Utilizing extant data, participants were 414 NCAA, Division I, female collegiate swimmers and divers ($n = 134$; 6 programs) and gymnasts ($n = 280$; 20 programs) drawn from 26 universities across all regions of the United States. Mean age was 19.14 years ($SD = 1.86$); the sample included 129 (31.2%) freshman, 120 (29%) sophomores, 99 (23.9%) juniors, and 66 (16%) seniors. In terms of race/ethnicity, 341 (82.4%) identified as Caucasian, 20 (4.8%) as Hispanic, 20 (4.8%) as Asian-American, 16 (3.9%) as African-American, and 1 (.2%) as American Indian; 12 (2.9%) identified as “Other;” four did not provide any race/ethnicity information. The majority of athletes reported living with teammates ($n = 272$, 65.7%); 123 (29.8%) lived with someone other than teammates and 19 (4.5%) lived at home.

Mean body mass index (BMI) was 22.55 kg/m² ($SD = 2.04$). According to The Centers for Disease Control and Prevention (CDC, 2010) guidelines, six (1.7%) of the athletes were underweight (BMI < 18.5 kg/m²), 373 (90.1%) were normal weight (BMI = 18.5 – 24.99 kg/m²), and 35 (8.5%) were overweight (BMI > 25.00 kg/m²).

Measures

Demographics. Participants provided information about their age, current academic status (Freshman, Sophomore, Junior, Senior), race/ethnicity, current living arrangements, height, weight, and status of weigh-ins, including (a) being on a team where they were weighed regularly – “Does your team conduct regular ‘weigh-ins,’ YES or NO, and (b) how often they weighed themselves – “On average, how many times do you weigh yourself per week?”
Internalization. The 9-item Internalization-General (IG) and the 5-item Internalization-Athletic (IA) factors from the Sociocultural Attitudes Toward Appearance Questionnaire-3 (SATAQ-3; Thompson, Van den Berg, Roehrig, Guarda, & Heinberg, 2004) were used. The IG factor assesses the extent to which individuals have internalized general societal messages about beauty, attractiveness, and body size/shape (e.g., “I would like my body to look like the people who are in the movies”), whereas the IA factors assesses the extent to which individuals have internalized body ideals that are athletic (e.g., “I wish I looked as athletic as sports stars”). Athletes rated their agreement with each item from 1 (completely disagree) to 5 (completely agree). Total score for each factor is the mean; higher scores indicate greater internalization in that area. Thompson et al. reported internal consistency (Cronbach’s alpha) of .96 and .95, respectively, in a sample of female undergraduates; alphas from the current study were .94 and .83. Extensive data concerning the factors’ validity has been provided (Thompson et al.).

Body Satisfaction. The 7-item Body Factor from the Body Parts Satisfaction Scale—Revised (BPSS-R; Petrie, Tripp, & Harvey, 2002) assesses satisfaction with one’s body size and shape through specific body parts that are typically associated with dissatisfaction in women (e.g., hips, thighs). For each item, the athletes rated their level of satisfaction ranging from 1 (extremely dissatisfied) to 6 (extremely satisfied). Total score is the mean; higher scores indicate more satisfaction. Petrie et al. reported Cronbach’s alpha of .90 in a sample of female undergraduates; alpha was .88 in the current sample. Petrie et al. also provided extensive information concerning the scale’s validity.

The 10-item Body Shape Questionnaire—Revised (BSQ-10-R; Mazzeo, 1999) assesses preoccupation with body size and shape. On items such as “I feel ashamed of my body,” athletes responded from 1 (never) to 6 (always). Total is the overall score; higher scores indicate
increased preoccupation. Cronbach’s alpha was .96 in a sample of female undergraduates (Mazzeo); alpha was .97 in the current sample. Mazzeo found that the BSQ-10-R correlated significantly with the Eating Attitudes Test \((r = .74)\) and the Bulimia Test—Revised \((r = .77)\), providing support for the scale’s validity.

**Dietary Restraint.** The 9-item Dietary Intent Scale (DIS; Stice et al., 1998) measures restrained eating patterns and dieting behaviors. On items such as “I skip meals in an effort to control my weight,” the athletes responded from 1 (never) to 5 (always). Total score is the mean; higher scores indicate more restraint. The DIS is internally consistent (Cronbach’s \(\alpha = .94\)) and has been shown to be reliable over a 1-month time period (.92) in a sample of female undergraduates (Stice et al., 1998). Cronbach’s alpha was .90 in the current sample. Regarding validity, Stice and Shaw (1994) reported that the DIS correlated with the Dutch Retrained Eating Scale \((r = .92);\) Van Strien, Frijters, Van Staveren, Defares, & Deurenberg, 1986), a behavioral measure of fat consumption \((r = –.32)\), and body dissatisfaction \((r = .48)\).

The 10-item Dutch Restrained Eating Scale (DRES; Van Strien et al., 1986) assesses behavioral restraint around food intake. Athletes rated each dieting behavior, such as “When you eat too much, you eat less than usual the next day,” from 1 (never) to 5 (always). Total score is the mean; higher scores indicated more restraint in eating behaviors. The DRES is internally consistent (Cronbach’s \(\alpha = .94\)) and reliable over a 1-month period (.92); alpha was .93 in the current study. The DRES has been found to correlate negatively with fat-gram intake (Stice, Fisher, & Lowe, 2004).

**Negative Affect.** Twenty-three items from the Positive and Negative Affect Schedule—Expanded Form (PANAS-X; Watson & Clark, 1992) assess levels of Fear (six items), Sadness (five items), Anger (six items), and Guilt (six items). Athletes rated each mood state from 1 (very
slightly or not at all) to 5 (extremely) A mean total score is derived for each affective state; higher scores indicate stronger negative mood. Cronbach’s alphas have ranged between .72 and .94, and 1-month test–retest reliabilities between .77 and .92 in samples of male and female undergraduates (Bagozzi, 1993). Cronbach’s alphas were .88 (Fear), .94 (Sadness), .88 (Anger), and .92 (Guilt) in the current study. Watson and Clark (1999) have provided extensive validity information for the scales.

Bulimic Symptoms. The 36-item Bulimia Test Revised (BULIT-R; Thelen, Mintz, & Vander Wal, 1996) assesses bulimic symptoms based on DSM-IV criteria (APA, 2000). On items such as “Do you feel you have control over the amount of food you consume,” athletes responded from 1 (absence of a disturbance) to 5 (extreme disturbance). Although athletes rated all 36 items, only 28 are part of the total score, which can range from 28 (no symptoms) to 140 (high level of symptoms). Thelen et al. (1996) reported Cronbach’s alpha (.98) and 2-month test–retest reliability (.95) in samples of female undergraduates, and provided extensive data concerning the scale’s validity. Cronbach’s alpha was .90 in the current study.

Procedure

Recruitment.

Following institutional review board approval, NCAA Division I gymnastic and swimming/diving head coaches were contacted to solicit their participation. The coaches were notified initially by e-mail regarding the study; follow-up contact was made via phone and e-mail. The coaches were told that the study was funded by an NCAA grant and the study’s purpose was to examine the physical and psychological well-being of collegiate female student athletes. Questionnaire packets, standardized instructions, and prepaid envelopes for return mailings were sent to the participating universities. To participate, coaches had to provide
permission for their teams to complete the questionnaires during the fall season, and to identify a contact person (e.g., athletic trainer) who would administer the surveys at that time. Of the 26 schools, surveys were distributed by athletic trainers ($n = 9$), team managers ($n = 1$), assistant coaches ($n = 3$), and head coaches ($n = 13$). For their assistance, each team contact was paid $150.00 after the completion of the data collection.

A few weeks before the data collection, which occurred during the last 2 weeks of September, team contacts were e-mailed to schedule their administration dates. Contacts were then mailed (1) specific number of surveys needed for that team, (2) standardized instruction, and (3) researcher’s contact information. Dr. Carlin Anderson, the principal investigator of the larger NCAA study, called contacts before data collection to answer any questions they might have.

At the data collection, each athlete received an unsealed envelope that contained the consent form and questionnaires. Athletes did not put their names or any other identifying information on the questionnaires. Team contacts read instructions and then had the athletes sign the consent form. Participation was voluntary, though no athlete refused to complete the questionnaires. Team contacts left the area so the athletes could complete the questionnaires in private.

To further increase the likelihood of the athletes’ responding honestly, when done providing information, athletes sealed the questionnaires and consent forms in the envelope, and then wrote an X across the flap for privacy. The team contact collected the sealed envelopes, and returned them to Dr. Carlin Anderson in the provided postage-paid mailing carton. Inspection of the envelopes revealed that none had been tampered with before returned to the data collector. Data Analysis.
Across the 26 teams, contacts identified 503 athletes who were active and on the team rosters. Of the 503 surveys that were sent, 454 were returned. Of these, 24 were blank and 16 had significant missing data (e.g., entire questionnaires were left blank) and were discarded, giving a participation rate of 91%. No other missing data were noted. Because the purpose of this investigation was to examine the relation between a “weighing environment” and the disordered eating behaviors of collegiate female athletes, those athletes who experienced “weigh-ins” or engaged in self-weighing were identified. In terms of team weigh-ins, 41.1% (170) of athletes reported being on teams that weighed them or conducted regular “weigh-ins;” 58.9% (244) of the athletes were not. Regarding self-weighing behavior, the athletes’ frequency was grouped based on past research (Friend, Bauer, Madden, & Neumark-Sztainer, 2012; Quick, Loth, MacLehose, Linde, & Neumark-Sztainer, 2013; Welsh, Sherwood, VanWormer, Hotop, & Jeffery, 2009): (a) did not weigh \( n = 139 \), (b) weighed one to two times per week \( n = 157 \), and (c) weighed three or more times per week \( n = 117 \).

Distributional properties of the data (i.e., skewness, kurtosis, outliers) were examined and all were found to be within acceptable levels (e.g., skewness < 2.0), except for the BULIT-R. Examination of the BULIT-R revealed that the scores fit within the normal distribution, and the higher skew value was likely due to the larger sample (Tabachnick & Fidell, 2013). Thus, no transformations of the data were made. Second, using an ANOVA, I determined the extent which athletes’ BMI varied in relation to their weighing status. Finally, using a series of multivariate analyses of covariance (MANCOVA), I examined the relations between “weighing” status and the disordered eating variables: internalization (SATAQ-3 IG, SATAQ-3 IA), body satisfaction (BPSS-R, BSQ-10-R), dietary restraint (DIS, DRES), and negative affect (using PANAS-X subscales of fear, anger, guilt, and sadness). When bulimic symptomatology was the outcome, I
used an ANCOVA. The analyses were run first with team weigh-in status as the independent variable (weighed vs not weighed). I then ran the analyses again but with self-weighing serving as the independent variable (did not weigh, weighed 1-2 times per week, or weighed 3 or more times per week). I used BMI as the covariate to control for the effects of actual physical size on the psychosocial variables. Past research with female athletes has demonstrated that BMI is a significant predictor of a wide range of disordered eating attitudes and behaviors, such as body dissatisfaction and bulimic symptomatology (e.g., Greenleaf et al., 2010). Alpha was set at .01 for all analyses.
CHAPTER III
RESULTS

Team Weigh-ins.

There were no significant differences in BMI between athletes who were weighed ($M = 22.61$, $SD = 1.89$) and those who were not ($M = 22.50$, $SD = 2.15$), $F(1, 412) = .265$, $p = .607$, partial $\eta^2 = .001$. Whether or not these female athletes were undergoing weigh-ins as part of their sport participation was unrelated to their actual body composition as represented by their BMI.

The MANCOVAs and ANCOVA testing the associations between team weigh-ins and all disordered eating variables were nonsignificant, although the covariate was significant for each one: (a) Internalization – BMI, Wilk’s $\Lambda = .973$, $F(2, 410) = 5.73$, $p = .004$, partial $\eta^2 = .027$, and weigh-in status, Wilk’s $\Lambda = .995$, $F(2, 410) = .928$, $p = .396$, partial $\eta^2 = .005$; (b) Body Satisfaction – BMI, Wilk’s $\Lambda = .909$, $F(2, 410) = 20.46$, $p < .001$, partial $\eta^2 = .091$, and weigh-in status, Wilk’s $\Lambda = .996$, $F(2, 410) = .740$, $p = .478$, partial $\eta^2 = .004$; (c) Dietary Restraint – BMI, Wilk’s $\Lambda = .950$, $F(2, 410) = 10.73$, $p < .001$, partial $\eta^2 = .050$, and weigh-in status, Wilk’s $\Lambda = .993$, $F(2, 410) = 1.54$, $p = .215$, partial $\eta^2 = .007$; (d) Negative Affect – BMI, Wilk’s $\Lambda = .968$, $F(4, 408) = 3.35$, $p = .010$, partial $\eta^2 = .032$, and weigh-in status Wilk’s $\Lambda = .993$, $F(4, 408) = .775$, $p = .549$, partial $\eta^2 = .007$, and (e) Bulimic Symptomatology – BMI, $F(1, 411) = 20.52$, $p < .001$, partial $\eta^2 = .048$, and weigh-in status, $F(1, 411) = .001$, $p = .978$, partial $\eta^2 = .000$. After accounting for the potential influence of their actual body size, whether or not the athletes were weighed as part of their teams’ requirement was unrelated to the extent to which they internalized general societal and athletic body ideals, were satisfied with their bodies, restricted
their caloric intake, experienced a range of negative affect, and reported bulimic symptomatology. See Table 1.

Self-Weighing.

There were no significant differences in BMI between athletes who weighed themselves zero, one to two, and three or more times a week, \(F(2, 410) = .957, p = .385, \text{partial } \eta^2 = .005\).

The number of times females weighed themselves per week was unrelated to their actual body composition as represented by their BMI.

For internalization, the main effect was significant, Wilk’s \(\Lambda = .951, F(4, 816) = 5.17, p = .000, \text{partial } \eta^2 = .025\), as was BMI as the covariate, Wilk’s \(\Lambda = .974, F(2, 408) = 5.35, p = .005, \text{partial } \eta^2 = .026\). Follow-up ANCOVAs revealed significant differences on the internalization of general, \(F(2, 409) = 9.03, p = .000, \text{partial } \eta^2 = .042\), as well as athletic, \(F(2, 409) = 4.31, p = .014, \text{partial } \eta^2 = .021\), body ideals. For general societal ideals, the female athletes who weighed themselves three or more times per week reported significantly higher levels of internalization than those who weighed themselves one to two times per week; athletes who did not weigh themselves had the significantly lowest internalization scores. For the athletic body ideals, athletes who weighed themselves three or more times per week had significantly higher scores than both those who weighed one to two times per week and those who did not self-weigh. See Table 2 for the adjusted means and standard errors.

For body satisfaction, the main effect was significant, Wilk’s \(\Lambda = .899, F(8, 812) = 5.56, p = .000, \text{partial } \eta^2 = .052\), as was BMI as the covariate, Wilk’s \(\Lambda = .890, F(4, 406) = 12.57, p = .000, \text{partial } \eta^2 = .110\). Follow-up ANCOVAs revealed significant effects for body dissatisfaction, \(F(2, 409) = 6.39, p = .002, \text{partial } \eta^2 = .030\), and body shape concerns, \(F(2, 409) = 19.08, p = .000, \text{partial } \eta^2 = .085\). Those who self-weighed three or more times a week, or one
to two times per week reported similar levels of body dissatisfaction; both groups, however, were significantly more dissatisfied with their bodies than the athletes who did not self-weigh. The athletes who weighed themselves three or more times a week reported more concerns about their body size and shape than did both those who weighed one to two times a week; the athletes who did not self-weigh reported the lowest level of body image concerns. See Table 2 for the adjusted means and standard errors.

Concerning dietary restraint, BMI was significant, Wilk’s $\Lambda = .949$, $F(2, 408) = 10.87$, $p = .000$, partial $\eta^2 = .051$, as was self-weighing status, Wilk’s $\Lambda = .844$, $F(4, 816) = 18.11$, $p = .000$, partial $\eta^2 = .082$. Follow-up ANCOVAs revealed significance for both the DIS, $F(2, 409) = 35.29$, $p = .000$, partial $\eta^2 = .147$, and DRES, $F(2, 409) = 33.45$, $p = .000$, partial $\eta^2 = .141$. For the DIS, athletes who weighed themselves three or more times per week reported significantly higher scores than those who weighed themselves one to two times a week; athletes who did not self-weigh had the significantly lowest scores. Concerning the DRES, there were significant differences between the three self-weighing groups: weighed three or more times per week, was higher than one to two times per week, which was greater than the group who did not self-weigh. See Table 2 for the adjusted means and standard errors.

For negative affect, BMI was significant, Wilk’s $\Lambda = .970$, $F(4, 406) = 3.15$, $p = .014$, partial $\eta^2 = .030$, as was self-weighing status, Wilk’s $\Lambda = .958$, $F(8, 812) = 2.19$, $p = .026$, partial $\eta^2 = .021$. Follow-up ANCOVAs were significant for anger, $F(2, 409) = 6.43$, $p = .002$, partial $\eta^2 = .030$, and guilt, $F(2, 409) = 6.91$, $p = .001$, partial $\eta^2 = .033$, but not for sadness, $F(2, 409) = 3.06$, $p = .048$, partial $\eta^2 = .015$, and fear, $F(2, 409) = 2.42$, $p = .090$, partial $\eta^2 = .012$. For anger, the athletes who weighed themselves three or more times per week reported significantly higher levels than both those who weighed themselves one to two times a week and those who did not
engage in self-weighing; these two groups did not differ significantly from each other. Regarding guilt, the athletes who weighed themselves three or more times a week had significantly higher scores on this dimension of the PANAS than either those who did not self-weigh or those who weighed themselves one to two times a week. See Table 2 for the adjusted means and standard errors.

For the BULIT-R, BMI, $F(1, 409) = 19.84, p = .000$, partial $\eta^2 = .046$, and weighing status, $F(2, 409) = 8.34, p = .000$, partial $\eta^2 = .039$, were significant. The athletes who weighed themselves three or more times a week reported significantly higher levels of bulimic symptomatology than did either those who weighed themselves one to two time a week or those who did not self-weigh. See Table 2 for the adjusted means and standard errors.
Table 1

*Adjusted Means and Standard Errors for Disordered Eating Variables by Team Weigh-in Status*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weighed (n = 170)</th>
<th>Not Weighed (n = 244)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adj. Mean</td>
<td>SE</td>
<td>Adj. Mean</td>
</tr>
<tr>
<td>Internalization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>2.77</td>
<td>.073</td>
<td>2.78</td>
</tr>
<tr>
<td>Athletic</td>
<td>3.74</td>
<td>.060</td>
<td>3.64</td>
</tr>
<tr>
<td>Body Satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BPSS Total score</td>
<td>3.93</td>
<td>.074</td>
<td>3.90</td>
</tr>
<tr>
<td>BSQ Total score</td>
<td>25.09</td>
<td>.863</td>
<td>24.31</td>
</tr>
<tr>
<td>Dietary Restraint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIS Total score</td>
<td>2.31</td>
<td>.064</td>
<td>2.16</td>
</tr>
<tr>
<td>DRES Total score</td>
<td>2.74</td>
<td>.069</td>
<td>2.60</td>
</tr>
<tr>
<td>Negative Affect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>2.24</td>
<td>.063</td>
<td>2.17</td>
</tr>
<tr>
<td>Anger</td>
<td>1.87</td>
<td>.061</td>
<td>1.92</td>
</tr>
<tr>
<td>Guilt</td>
<td>1.91</td>
<td>.073</td>
<td>1.93</td>
</tr>
<tr>
<td>Sadness</td>
<td>2.23</td>
<td>.082</td>
<td>2.17</td>
</tr>
<tr>
<td>Bulimic Symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BULIT-R</td>
<td>49.60</td>
<td>1.25</td>
<td>49.54</td>
</tr>
</tbody>
</table>

*Note.* SATAQ-3 IG = Sociocultural Attitudes Towards Appearance Scale – 3 Internalization-General (scores range from 1 [completely disagree] to 5 [completely agree]; SATAQ-3 IA = Sociocultural Attitudes Towards Appearance Scale – 3 Internalization-Athletic (scores range from 1 [completely disagree] to 5 [completely agree]; BPSS-R = Body Parts Satisfaction Scale-Revised Body Factor (scores range from 1 [extremely dissatisfied with body] to 6 [extremely satisfied with body]); BSQ-10-R = Body Shape Questionnaire (scores range from 10 [never] to 60 [always]; DIS = Dietary Intent Scale (scores range from 1 [never engage in dieting behaviors] to 5 [always engage in dieting behaviors]); DRES = Dietary Restrained Eating Scale (scores range from 1 [never engage in disordered eating behavior] to 5 [always engage in disordered eating behavior]); PANAS-X = Positive Affect Negative Affect Schedule-Expanded (scores range from 1 [very slightly or not at all experience negative emotions] to 5 [extremely experience negative emotions]); BULIT-R = Bulimia Test-Revised (scores range from 28 [few bulimic behaviors] to 140 [a lot of bulimic behaviors])
Table 2

Adjusted Means and Standard Error for Disordered Eating Variables by Self-Weighing Status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Don’t Weigh (n = 139)</th>
<th>1-2 times (n = 157)</th>
<th>3 or more (n = 117)</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.54a .079</td>
<td>2.78b .075</td>
<td>3.04c .086</td>
<td>9.03**</td>
</tr>
<tr>
<td>Athletic</td>
<td>3.57a .066</td>
<td>3.66a .062</td>
<td>3.85b .072</td>
<td>4.31*</td>
</tr>
<tr>
<td>Body Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BPSS Total score</td>
<td>4.14a .081</td>
<td>3.84b .076</td>
<td>3.73b .088</td>
<td>6.39*</td>
</tr>
<tr>
<td>BSQ Total score</td>
<td>21.19a .917</td>
<td>24.10b .862</td>
<td>29.49c .998</td>
<td>19.08**</td>
</tr>
<tr>
<td>Dietary Restraint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIS Total score</td>
<td>1.88a .066</td>
<td>2.17b .062</td>
<td>2.70c .072</td>
<td>35.29**</td>
</tr>
<tr>
<td>DRES Total score</td>
<td>2.32a .072</td>
<td>2.58b .067</td>
<td>3.17c .078</td>
<td>33.45**</td>
</tr>
<tr>
<td>Negative Affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>2.11 .069</td>
<td>2.18 .065</td>
<td>2.33 .076</td>
<td>2.42</td>
</tr>
<tr>
<td>Anger</td>
<td>1.75a .066</td>
<td>1.89a .062</td>
<td>2.10b .072</td>
<td>6.43*</td>
</tr>
<tr>
<td>Guilt</td>
<td>1.74a .080</td>
<td>1.91a .075</td>
<td>2.18b .087</td>
<td>6.91*</td>
</tr>
<tr>
<td>Sadness</td>
<td>2.03 .090</td>
<td>2.23 .085</td>
<td>2.35 .098</td>
<td>3.06</td>
</tr>
<tr>
<td>Bulimic Symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BULIT-R</td>
<td>46.62a 1.36</td>
<td>48.51a 1.28</td>
<td>54.54b 1.48</td>
<td>8.34**</td>
</tr>
</tbody>
</table>

Note. SATAQ-3 IG = Sociocultural Attitudes Towards Appearance Scale – 3 Internalization-General (scores range from 1 [completely disagree] to 5 [completely agree]; SATAQ-3 IA = Sociocultural Attitudes Towards Appearance Scale – 3 Internalization-Athletic (scores range from 1 [completely disagree] to 5 [completely agree]; BPSS-R = Body Parts Satisfaction Scale-Revised Body Factor (scores range from 1 [extremely dissatisfied with body] to 6 [extremely satisfied with body]); BSQ-10-R = Body Shape Questionnaire (scores range from 10 [never] to 60 [always]; DIS = Dietary Intent Scale (scores range from 1 [never engage in dieting behaviors] to 5 [always engage in dieting behaviors]); DRES = Dietary Restrained Eating Scale (scores range from 1 [never engage in disordered eating behavior] to 5 [always engage in disordered eating behavior]); PANAS-X = Positive Affect Negative Affect Schedule-Expanded (scores range from 1 [very slightly or not at all experience negative emotions] to 5 [extremely experience negative emotions]); BULIT-R = Bulimia Test-Revised (scores range from 28 [few bulimic behaviors] to 140 [a lot of bulimic behaviors])

a, b Adjusted means that do not share a superscript are significantly different from one another

* p < .01, ** p < .0001
CHAPTER IV
DISCUSSION

Previous research has suggested that participating in structured, required weigh-ins may contribute to pathogenic eating and weight management behaviors as well as body image concerns (Kerr et al., 2006; McNulty, 1997a; McNulty, 1997b; McNulty, 2001; Reel & Gill, 2001), yet my results did not support this connection. Across all the disordered eating constructs – Internalization, Body Image Concerns, Dietary Restraint, Negative Affect, and Bulimic Symptomatology – after controlling for the athletes’ BMI, those who were weighed as part of their sport participation scored similarly to those who were not weighed. Further, whether or not the athletes were weighed was unrelated to their current body composition (i.e., BMI) and what they were doing about their weight (lose weight vs. stay the same weight). These findings suggest that the specific behavioral act of being weighed, at least as part of being on a collegiate gymnastics’ or swimming/diving team, may not be as salient to female athletes in determining their body image and eating behaviors as to women in other environments (e.g., military) or as to other sport related pressures they experience.

Although being weighed has been identified as a sport-specific pressure, other pressures, such as verbal comments by coaches and teammates regarding body size, shape and overall weight, may be more influential in determining whether or not female athletes are trying to lose weight (Reel et al., 2013; Thompson & Sherman, 2011). Research confirms that these other sport-specific pressures play a role in female athletes developing negative beliefs about their body size and shape and a desire to lose weight (Berry & Howe, 2000; Byrne & McLean, 2002; Kerr et al., 2006; Petrie et. al., 2009), and are related to disordered eating behaviors and pathogenic weight management, including bulimic symptoms, food and/or fluid restriction,
unsupervised dieting, fasting, use of diet pills, and vomiting (Kerr et al., 2006). Further, among 17 elite gymnasts and 51 non-elite gymnasts, an association between frequency of dieting and reported pressure from coaches to lose weight has been documented (de Bruin, Oudejans, & Bakker, 2007), which suggests that increases in eating pathology may, in part, be influenced by the direct (and even indirect) comments that are made by coaches and teammates. Because athletes tend to hold their coaches and teammates in high regard, negative comments made to an athlete about her body size, shape, or weight by these individuals may be taken as fact, and the athlete may come to believe that she needs to alter her appearance to fit their desires and instructions. Although not found among the athletes in my study, being weighed as part of a team may have more deleterious effects on athletes from other sports, where leanness or appearance are less central. Thus, future research should examine the potential influence of being weighed on the development and maintenance of disordered eating attitudes and behaviors in female athletes from other sports, and consider the relative influence of weight-related comments versus weigh-ins on athletes’ psychological health.

In the second part of my study, I examined the relation of self-weighing to the athletes’ disordered eating attitudes and behaviors. Similar to being weighed as part of their sport, self-weighing was unrelated to the athletes’ BMI. Regardless of the number of times the athletes weighed themselves each week, there were no significant differences in their body mass. For all the disordered eating constructs, however, significant differences emerged. Even after controlling for the effects of the athletes’ BMI, a higher frequency of self-weighing was related to increases in internalization, dietary restraint, negative affect (i.e., anger and guilt), body image concerns, and bulimic symptomatology, which corroborates findings from past research (Friend et al., 2012; Mintz et al., 2013; Quick et al., 2012; Quick et al., 2013).
Consistent with objectification theory (Fredrickson & Roberts, 1997; Moradi, 2010; Moradi & Huang, 2008), self-weighing may be conceptualized as a form of body checking and body surveillance. When women self-weigh they are monitoring their bodies and evaluating their worth in relation to a predetermined societally-based ideal weight they want to obtain. Failure to make the desired weight may be associated with a negative evaluation of self and body, and an increased use of behaviors designed for weight loss (e.g., dieting).

For both general and athletic body ideals, those athletes who weighed themselves most frequently (three or more times a week) reported the highest levels of internalization, which is consistent with objectification theory’s prediction that internalization leads directly to increases in body surveillance and monitoring (Moradi, 2010; Moradi & Huang, 2008). Over time, as women experience sexual objectification and pressures about being thin and attractive from outside sources, they begin to objectify themselves and internalize these messages. Women then begin to compare their own bodies to the societal standards that have become part of their self-schema, viewing themselves and their bodies as objects that they monitor and check, such as through self-weighing. Thus, the more female athletes have internalized these ideals, the more likely they are to weigh themselves to evaluate their bodies and determine the progress they are making toward attaining them. Self-weighing provides the illusion that the body is an object that women should be able to manipulate and change at their will, potentially leading to the use of more extreme (and pathogenic) weight management behaviors when more normal weight control strategies fail.

Consistent with objectification theory (Fredrickson & Roberts, 1997; Moradi, 2010; Moradi & Huang, 2008) and existing research (Bessenoff & Snow, 2006; Friend et al., 2012; Mercurio & Rima, 2011; Mintz et al., 2013; Quick et al., 2012; Quick et al., 2013), self-weighing
was associated with both emotional responses (body satisfaction and negative affect) and behavioral manifestations (dietary intent and bulimic symptomatology) of disordered eating. For body image concerns, self-weighing was related to more dissatisfaction (specifically for athletes weighing three or more times a week) and higher levels of concern about body size and shape (specifically for athletes weighing one to two, and three or more, times per week). Friend et al. (2012) found that self-weighing was associated with an increased attention to body and weight among female adolescents and with decreased body satisfaction and increased use of unhealthy weight control behaviors. Engaging in self-weighing provides a visual (and relatively frequent) reminder of how close athletes are to their weight goals. Because most weight goals are unrealistic, being based on unattainable societal beauty ideals, self-weighing is a reminder of athletes’ failure to attain the desired number on the scale and a reason to be dissatisfied and disgusted with their bodies.

For negative affect, self-weighing was related significantly only to feelings of anger and guilt. Athletes who weighed themselves three or more times a week reported being more angry and guilty than did those who weighed themselves one to two times a week or did not weigh themselves at all. Relatedly, Bessenoff and Snow (2006), using a sample of 687 female undergraduates, found that increased self-weighing was related to increases in negative affect (e.g., embarrassment) and body shame. Similarly, among undergraduate women, self-weighing was associated with increased negative emotions toward the physical self, and negative psychological health outcomes including self-criticism (Mercurio & Rima, 2011). Like the dissatisfaction they feel toward their bodies, athletes may feel negatively toward themselves (specifically angry and guilty) as a result of the constant monitoring of their weight and the ever present reminder that they likely have not met their weigh goals. Over time, female athletes may
begin to feel guilty about this failure and ultimately angry at themselves for not being able to control their bodies as they think they should. This negative affect might be reciprocally related to increases in self-weighing behaviors. That is, the more upset women are at themselves the more likely they may be to weigh themselves in hopes of seeing if they have met their weight goal. Thus, a dangerous cycle of weighing and negative affect may be created.

The athletes who weighed themselves most frequently experienced increased scores on the measures of dietary intent and restriction. For bulimic symptomatology, the athletes who engaged in more frequent self-weighing (three or more times per week) had higher levels than did those who weighed one to two times a week or did not self-weigh. Athletes participating in sports where there is pressure surrounding weight, body shape and size, and appearance may decide to diet and restrict their food intake to cope with these pressures, or engage in other behavioral methods in attempts to change their body (e.g., binging, purging, etc). Dietary restraint and engagement in bulimic behaviors (e.g., purging) are behavioral means through which athletes may try bring their bodies closer to their desired weight and visual ideal of a lean, athletic-build. Self-weighing provides immediate verification of success or failure, and frequent self-weighing orients female athletes toward their bodies and reminds them of what they actually weigh. When this weight is discrepant from their ideal (which it frequently will be) they may respond by eating fewer calories, or binging and purging in hopes of eventually changing the numbers on the scale. Like negative affect, dieting and other purging behaviors may be reciprocally related to weighing. The more female athletes diet, the more likely they will be to want to check their weight to determine if limiting their caloric intake is having the desired effect. Regardless of the outcome (weight goes up, stays the same, or goes down), the athletes’
self-weighing behaviors are reinforced because the scale provides them with information that allows them to evaluate their weight, their bodies, and themselves.

Based on my results, mandatory, team conducted weigh-ins do not appear to be salient to female athletes in regards to experiencing internalization, body image concerns, dietary restraint, negative affect, and bulimic symptomatology. The frequency with which they engaged in self-weighing, however, was related to all the disordered eating variables. Self-weighing is a method of body checking and body surveillance that, consistent with objectification theory (Fredrickson & Roberts, 1997; Moradi, 2010; Moradi & Huang, 2008), may lead women to become overly conscious of and dissatisfied with themselves and their bodies and propel them to use extreme weight control behaviors to lose weight. It is important to note, however, that even those athletes who weighed themselves three or more times (and had the most pathological scores) generally scored only at the mid-point on any measure. For example, the athletes who self-weighed three or more times per week scored had a mean score of 3.04 (on a 5-point scale) on the internalization general subscale and a 3.15 (on a 5-point scale) on the dietary restraint scale. Thus, these athletes are reporting higher levels of distress than those who do not self-weigh (and for some measures those who weigh 1-2 times per week), but their mean scores do not reflect severe pathology.

This study has several limitations that warrant discussion. First, data were collected primarily through the use of self-report measures, which can reflect individual bias to appear that one does not participate in disordered eating behavior, particularly given the sensitive nature of the questions. To minimize such bias, questionnaires were coded only by number and athletes sealed their responses into envelopes that were opened only by the researchers. Second, the data were based on a cross-sectional methodology, so causal or temporal patterns could not be
determined. Future research may want to examine if, over time, different types of weighing lead to the development of disordered eating attitudes and behaviors or if the presence of these thoughts and feelings lead athletes to more closely monitor their bodies through weighing. Additionally, although this sample provided data from 414 collegiate athletes from 26 universities, it was not a population-based, representative sample. Thus, generalizability is limited to similar groups of female collegiate athletes from the sports of gymnastics and swimming/diving. Future studies may want to examine the relation of being weighed to disordered eating in sports that are not aesthetic or endurance, such as softball or soccer. For female athletes in nonaesthetic, nonlean sports, being weighed may be a more salient pressure.

The current study has implications for individuals working in collegiate athletic departments as well as sport psychologists working with athletes. Although there was no relation between being weighed as part of a team and a range of disordered eating attitudes and behaviors, weighing still should be done for only medically-related reasons and conducted by sports medicine personnel (Bonci et al., 2008). Even more important may be for professionals to be aware of their athletes’ self-weighing behaviors, because this behavior appears closely linked to the presence of disordered eating symptoms. As my findings suggest, it is not the simple act of self-weighing, but how frequently that behavior occurs that is most salient. Monitoring athletes’ self-weighing behaviors may help in early identification of those at increased risk for disordered eating. Disordered eating has the highest mortality of psychology disorders, particularly anorexia nervosa (Franko et al., 2013; Miller et al., 2005), so being able to effectively and quickly identify female athletes at risk for its development becomes crucial for mental and physical health, as well as safety. Collegiate female athletes should be monitored and screened when they report increased engagement in self-weighing, particularly for unhealthy weight management practices.
References


APPENDIX

EXTENDED LITERATURE REVIEW
To Weigh or Not to Weigh? Relation to Disordered Eating Attitudes and Behaviors Amongst Female Collegiate Athletes

Female athletes, particularly those at the collegiate and elite levels, have been identified as a subpopulation at increased risk for disordered eating (Berry & Howe, 2000; Byrne & McLean, 2002; Greenleaf, Petrie, Carter, & Reel, 2009; Sundgot-Borgen & Torstveit, 2004; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008; Williams, Sargent, & Durstine, 2003). One potential explanation for this increased risk is the unique pressures these athletes face from their sport environment, specifically related to weight, diet, body size and shape, and appearance (Anderson, Petrie, & Neumann, 2012; Byrne & McLean, 2002; Krane, Choi, Baird, Aimar, & Kauer, 2004; Monsma & Malina, 2004; Reel, Petrie, SooHoo, & Anderson, 2013). In response to these pressures, which may come from coaches, teammates, judges, parents and even the uniforms worn, athletes may engage in disordered eating behaviors and unhealthy weight-management practices in hopes of shaping their bodies to meet the ideal for their sport and society.

Although many body and appearance-related pressures exist for athletes, being weighed as a part of sport participation has been suggested as a key reason athletes develop disordered eating behaviors and body image concerns (Reel et al., 2013; Williams et al, 2003). When athletes are weighed, particularly if by coaches, and weights are publically displayed, they may become acutely sensitized to their body size and shape, often ending up dissatisfied with their weight and appearance as they compare themselves to others in their sport or female ideals that are portrayed in the media. They also may become more focused on their bodies’ appearance as opposed to its functionality. In response to such elevated concerns, athletes may experience negative emotions (e.g., sadness, anxiety), restrict their caloric intake, and engage in other
pathogenic weight control behaviors (e.g., vomiting). Although several studies (e.g., Reel et. al., 2013) have examined the relation of general sport pressures about weight and appearance to disordered eating attitudes and behaviors (e.g., body image, dietary intent, bulimic symptomatology), to date, no study has addressed the connection between these outcomes and the specific pressure of being weighed as a part of sport participation.

**Prevalence of Eating Disorders in the General Population**

**Anorexia Nervosa.** According to *The Diagnostic and Statistical Manual 5th Edition* (American Psychiatric Association, 2013), individuals diagnosed with anorexia nervosa have a significantly low body weight and a distorted body image, and engage in excessive dieting that leads to severe weight loss with a pathological fear of becoming fat. (American Psychiatric Association, 2013).

Female adolescents, in particular, are at risk for the development of anorexia nervosa. Hoek and Hoeken (2003) reported a point prevalence rate of 0.3% for this group. In their review of the literature, they found incidence rates to be highest for girls, ages 15-19 years. Similarly, Kjelsas, Bjornstrom, and Gotestam (2004), based on self-report questionnaire data, reported a lifetime prevalence of 0.7% for Norwegian female adolescents aged 14-15 years. Similar to rates found in female adolescents, researchers have reported a lifetime prevalence of anorexia nervosa in adult women ranging from 0.9%-2.0% (Favaro, Ferrara, & Santonastaso, 2003; Hudson, Hiripi, Pope, & Kessler, 2007).

Although prevalence is relatively low, among psychiatric disorders, anorexia nervosa has the highest mortality rate (Miller et al., 2005). For example, in a longitudinal study of 246 women with anorexia and bulimia nervosa, 7.5% of the participants died due to complications with their anorexia (Franko et al., 2013). In addition to the risk of death, individuals suffering
from anorexia nervosa are more likely to experience damage to the brain and bone tissue as well as the organ systems of the body than individuals who are not (Rome & Ammerman, 2003). Further, individuals with anorexia nervosa are at an increased risk for experiencing medical complications, such as cardiovascular, gastrointestinal, renal, hematological, skeletal, endocrine, metabolic, and dermatological complications, and these individuals have a difficult time recovering from said complications (Sharp & Freeman, 1993).

**Bulimia Nervosa.** Bulimia nervosa includes a cycle of binge-eating followed by compensatory weight management practices (i.e., vomiting, excessive exercise, use of diuretics and/or laxatives, etc.). Although it is common for individuals suffering from bulimia nervosa to be within, or slightly above, normal weight ranges, these individuals are preoccupied with appearance and weight (APA, 2013). Individuals suffering from bulimia often have significant and permanent loss of their dental enamel, an increased risk for dental cavities, inflamed salivary glands, the occurrence of cardiac and skeletal myopathies, and may experience menstrual irregularities (women), fluid and electrolyte imbalances, and esophageal and gastric complications (APA, 2013).

Researchers have found that the lifetime prevalence of bulimia nervosa ranges from 1% to 4.6% in women (Favaro et al, 2003; Hoek & Hoeken, 2003; Hudson et al, 2007; Kjelsas et al, 2004). Using face-to-face interviews with 1306 female participants aged 18 to 25 years, Favaro et al, (2003) found a lifetime prevalence of 4.6% for bulimia nervosa. In a review of the prevalence and incidence of eating disorders, Hoek and Hoeken (2003) reported a lifetime prevalence of bulimia nervosa to be 1%. Similarly Kjelsas et al, (2004) and Hudson et al., (2007) found the lifetime prevalence of bulimia nervosa to be 1.2% and 1.5% respectively.
Similar to anorexia nervosa, individuals suffering from bulimia nervosa often experience psychological and physiological complications, including infertility, cardiopulmonary symptoms, hypotension, dry skin, “Russell’s sign” (a thickening or scarring over the back of the hand caused by self-induced vomiting and friction of the hand against the teeth), Parotid gland swelling (face may appear swollen or “fat”), erosion of dental enamel, sensitive teeth, tachycardia (increased heart rate), hair loss, gallstones, constipation, esophageal problems, and edema (Mehler, Birmingham, Crow, & Jahraus, 2010). Additionally, those suffering from bulimia nervosa are at increased risk for experiencing nutritional deficiencies, weight cycling, changes in mood, body dissatisfaction, and lowered self-esteem (Comerci, 1990; Mitchell, Specker, & de Zwaan, 1991), though the risk of death is lower than has been found amongst those suffering from anorexia (Franko et al., 2013).

**Binge-Eating Disorder.** Bulimia nervosa can be differentiated from binge-eating disorder (BED) in that individuals suffering from BED experience recurrent episodes of binge eating, but without the use of pathological compensatory behavior (APA, 2013). The binge-eating episodes experienced by individuals include three or more of the following symptoms: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone because of feeling embarrassed by how much one is eating, and feeling disgusted with oneself, depressed, or very guilty after the binge (APA, 2013). Point prevalence of binge-eating disorder among male and female adults, age18 or older, is 0.8% and 1.6% respectively, with the gender ratio being more similar than in bulimia nervosa or anorexia nervosa (APA, 2013).

**Other Specified Feeding or Eating Disorder.** Oftentimes, individuals appear to be suffering from an eating disorder, yet they do not fit the criteria to be diagnosed with one of the
clinical disorders. When symptoms characteristic of a feeding and eating disorder that cause clinically significant distress or impairment in social, occupational, or other important areas of functioning predominate but do not meet full criteria for any of the disorders in the feeding and eating disorders diagnostic category exist, individuals can be diagnosed with Other Specified Feeding or Eating Disorder (OSFED). Examples of OSFED include atypical anorexia nervosa (characterized by anorexia nervosa criteria yet the individual’s weight is within or above the normal range), bulimia nervosa of low frequency and/or limited duration (characterized by bulimia nervosa criteria except the binge eating and compensatory behaviors occur, on average, less than once a week and/or for less than three months), binge-eating disorder of low frequency and/or limited duration (characterized by criteria for binge-eating disorder except that the binge occurs, on average, less than once a week and/or for less than three months), purging disorder (characterized by recurrent purging in attempts to influence one’s weight or shape without the use of binge eating), and night eating syndrome (characterized by recurrent night eating that causes significant distress and/or impairment in functioning, not better explained by external influences) (APA, 2013). This category was previously identified as EDNOS (Eating Disorder not Otherwise Specified) in The Diagnostic and Statistical Manual, and prevalence rates will be discussed in EDNOS terms (APA, 2003).

Lifetime prevalence of EDNOS in women has been found to range from 2.4% to 14.6% (Kjelsas et al, 2004; Machado, Machado, Goncalves, & Hoek, 2007). With a sample of 59 female students, Ravaldi et al, (2006) found a point prevalence of 8.5%. When examining the severity of dieting and bingeing behaviors in college women, Kurth, Krahn, Nairn, and Drewnowski (1995), using a combined interview and survey study, found a point prevalence of
13%. Similarly, with a sample of 1026 adolescent girls, Kjelsas et al. (2004) found a lifetime prevalence of 14.6%.

Similar to medical and psychological complications experienced by individuals suffering from anorexia nervosa and bulimia nervosa, individuals with EDNOS are at risk for physiological complications due to their eating habits (e.g., high or low blood pressure, slowed heart rate, amenorrhea, osteoporosis, kidney damage, tooth decay, organ failure, depression, and decreased self-esteem). Depending on the extent of one’s eating behavior, symptoms may closely mimic those experienced by individuals suffering from anorexia nervosa or bulimia nervosa (Peebles, Hardy, Wilson, & Lock, 2010; Van Son, Hoek, Hoeken, Schellevis, & Van Furth, 2012).

**Subclinical disordered eating.** Eating disorders are conceptualized to occur along a continuum, ranging from clinical disorders to subclinical manifestations to normal eating. When individuals engage in certain disordered eating behaviors and hold related attitudes, but do not do so at a frequency or duration to meet criteria for any one clinical eating disorder, including OSFED, then these individuals are described as experiencing “subclinical” symptoms (Bunnell, Shenker, Nussbaum, Jacobson, Cooper, & Phil, 1990; Mintz, O’Halloran, Mulholland, & Schneider, 1997; Peck & Lightsey, 2008; Scarano & Kalodner-Martin, 1994; Tylka & Subich, 1999). The key difference between individuals suffering from clinical eating disorders and those suffering from subclinical disordered eating is a matter of degree and not of kind. The use of pathogenic weight management techniques (i.e., subclinical symptoms) may lower available energy, negatively influence menstrual functioning and bone health, and increase the risk of lowered self-esteem, as well as depressive and anxiety disorders (Torres-McGehee, Monsma, Gay, Minton, & Mady-Foster; 2011).
Rates of subclinical symptoms tend to be higher than those found in clinical diagnoses (Cohen & Petrie, 2005; Greenleaf et al., 2009; Tylka, 1999). For example, Tylka (1999) examined undergraduate women and found that 45% of her sample could be classified as symptomatic (subclinical) based on their responses to the Questionnaire for Eating Disorder Diagnosis (QEDD). Similarly, Cohen and Petrie (2005) reported a subclinical prevalence rate of 38.9% in their sample of female undergraduates vs. 9.6% who were classified as experiencing a clinical eating disorder when using the QEDD. Relatedly, Tylka and Subich (2002) found that 78% of their female undergraduate sample used some form of maladaptive weight control technique (e.g., vomiting, using laxatives, using appetite suppressants, caloric restriction, enemas, increased exercise, etc.) and viewed those techniques as effective methods for healthy weight loss.

Individuals suffering from subclinical eating disorders also are likely to experience personality and psychological problems similar to what is found amongst those who have clinical eating disorders. For example, Touchette et al. (2011) found that adolescent girls who were classified as having a subclinical eating disorder were more likely to suffer from comorbid psychological disorders (i.e., major depression, dysthymia, separation anxiety, and generalized anxiety disorders) than those who were classified as noneating disordered. Similar to those with clinical eating disorders, individuals with subclinical eating disorders were unhappier about their weight, participated in pathogenic weight management practices more often, viewed their own bodies as fatter, and had a larger weight fluctuation than individuals without eating problems (Melve & Baerheim, 1994). Furthermore, female undergraduates who had been classified as having a subclinical eating disorder were similar to those with clinical eating disorders on measures of negative affect, negative thinking, body image concerns, and internalization of
societal ideals; both groups scored higher than the women who were asymptomatic (Cohen & Petrie, 2005).

**Summary.** Research has shown that the prevalence of clinical eating disorders amongst girls and women has ranged from .3% to 14.6%; higher rates are associated with bulimia nervosa and EDNOS. Rates of subclinical eating disturbances are even higher, ranging up to 45%. Women with clinical and subclinical eating disorders experience a range of physical symptoms and comorbid psychological disorders and symptoms, and are more similar to each other than to women who are asymptomatic.

**Prevalence of Eating Disorders in Female Athletes**

Within the broader population of women, athletes have been identified as a subgroup that is at increased risk for the development of disordered eating and eating disorders due to unique pressures within the sport environment. Over the last 20 years, researchers have examined samples of athletes to determine prevalence rates of eating disorders in this specific population.

**Anorexia nervosa.** Using self-report measures and follow-up clinical interviews with a sample of 660 female elite athletes representing eight sport types (technical, endurance, aesthetic, weight class, ballgame, power, antigravitation, and motor), Sundgot-Borgen and Torstveit (2004) found a point prevalence of 2%; the highest rate occurred in aesthetic sports (12%) compared to only 4% for athletes in endurance sports (technical, weight class, ballgame, power, and antigravitational sports did not have athletes experiencing anorexia nervosa). Similarly, Byrne and McLean (2002) reported higher prevalence of anorexia nervosa (5% vs. 0%) amongst thin-build female elite athletes (i.e., gymnastics, ballet, light-weight rowing, diving, swimming, and long distance running) compared to those women who participated in normal-build sports (i.e., tennis, volleyball, hockey, and basketball).
Amongst U.S. collegiate athletes, Johnson, Powers, and Dick (1999) found that 34.75% of the women were “at risk” for the development of anorexia nervosa, though none met DSM-IV criteria for this clinical eating disorder. Risk was determined by a BMI less than or equal to 20 kg/m or amenorrhea or elevation on either the Drive for Thinness or Body Dissatisfaction subscales of the EDI-2 measure. In separate studies of female varsity student-athletes at large NCAA Division I universities, researchers have reported point prevalence rates of 0% (Carter & Rudd, 2005; Greenleaf et al., 2009), even in sports (i.e., gymnastics and swimming/diving) that have been considered at increased risk (Anderson & Petrie, 2012).

**Bulimia nervosa.** Consistent with findings from nonathlete samples, bulimia nervosa occurs more frequently than anorexia nervosa in female athletes (Byrne & McLean, 2002; Sundgot-Borgen & Torstveit, 2004). For example, Sundgot-Borgen and Torstveit (2004) reported an overall prevalence of 6%, and rates that varied across sport types, including ballgame (4%), technical (4%), endurance (10%), weight class (11%), and aesthetic (12%). Similarly, Byrne and McLean (2002) reported variation in prevalence across thin-build (ballet, gymnastics, light-weight rowing, long distance running, diving, and swimming; 10%) and normal-build (basketball, hockey, tennis, and volleyball; 2%) elite female athletes. When examining a sample of 669 female elite athletes, including those who had qualified for a national team at either a junior or senior level or were members of a recruiting squad for that team, Torstveit et al. (2008) identified 8.1% as bulimic, in comparison to 4.2% of non-athlete controls.

Among female collegiate athlete samples, initial research documented prevalence rates that ranged from 1.1% to 4.1% (Johnson et al., 1999; Petrie & Stoever, 1993). Johnson et al. (1999) examined 1,445 student athletes from 11 Division I universities, and found that 1.1% of the female athletes met criteria for bulimia nervosa; 38% were considered to be “at risk.” In a
sample of 218 female gymnasts from 17 public and 4 private NCAA Division I universities, Petrie and Stoever (1993) reported a 4.1% lifetime rate. More recent studies with female collegiate athletes that have used the QEDD, however, have reported point prevalence rates of 0% across large, diverse samples (e.g., Anderson & Petrie, 2012; Carter & Rudd, 2005; Greenleaf et. al., 2009).

**Eating disorder not otherwise specified.** Similar to the general population, athletes experience higher rates of EDNOS than AN or BN (Byrne & McLean, 2002; Carter & Rudd, 2005; Sundgot-Borgen & Torstveit, 2004). For example, in their sample of 155 elite female athletes who participated in ballet, gymnastics, light-weight rowing, long distance running, diving, swimming, hockey, basketball, tennis, and volleyball, Byrne and McLean (2002) reported an overall prevalence of 8% for EDNOS; thin-build athletes’ rate was 16% in comparison to normal build athletes (6.5%) and non-athletes (4.5%). Similarly, 8% of all Norwegian elite female athletes were diagnosed with EDNOS (Sundgot-Borgen & Torstveit, 2004), and rates varied from 5% (endurance sports) to 13% (weight class sports). When examining 669 elite female athletes, Torstveit, et al. (2008) found that 19.9% met the criteria for EDNOS, in comparison to 17.2% for non-athlete controls.

Among female collegiate athlete samples, prevalence has ranged from 2.0% to 6.3% (Anderson & Petrie, 2012; Greenleaf et al., 2009; Johnson et al., 1999; Sanford-Martens, Davidson, Yakushko, Martens, & Hinton, 2005). In a sample of 204 female NCAA Division I college athletes who participated in 17 different sports, Greenleaf et al. (2009) identified 2.0% as experiencing EDNOS. Similarly Sanford-Martens et al. (2005), within a sample of 158 NCAA Division I female collegiate students (representing 9 sports), reported a prevalence rate of 5.1%. When using less strict criteria to assess for the endorsement of disordered eating symptoms,
2.85% and 9.2%, respectively, of female collegiate athletes fit the subclinical diagnostic categories for Anorexia Nervosa and Bulimia Nervosa (Johnson et al., 1999). In a sample of 414 NCAA female gymnasts and swimmers, Anderson and Petrie (2012) found 6.3% (n = 26) met the criteria for EDNOS, which included subthreshold bulimia nervosa (n = 20), nonbingeing bulimia (n = 4), and binge eating disorder (n = 2).

**Subclinical disordered eating.** Subclinical prevalence rates range from 12.1% to 25.5%, which are higher than those reported for clinical diagnoses (Carter & Rudd, 2005; Greenleaf et al., 2009; Greenleaf, Petrie, Reel, & Carter; 2010; Sundgot-Borgen, 1994; Williams et al., 2003). For example, Greenleaf et al. (2010) identified 25.5% of their female collegiate athlete sample who were symptomatic (or experiencing symptoms at the subclinical level), which is slightly higher than the 17% rate reported by Carter and Rudd (2005); athletes in lean sports endorsed a higher number of subclinical symptoms than their non-lean sport counterparts (18.8% compared to 12.1%; Greenleaf et al., 2010) Williams et al. (2003), in a sample of 587 female collegiate student-athletes, found that 20.1% were “subclinical,” which was defined as meeting or exceeding the pre-existing cut points on the EAT-26, the Body Dissatisfaction (BD) subscale, or the Drive for Thinness (DT) subscale. Amongst elite female athletes, 22.4% have been classified as being at risk for developing a clinical disorder (Sundgot-Borgen, 1994). Additionally, Torres-McGehee, Monsma, Gay, Minton, and Mady-Foster (2011), in a sample of 138 collegiate equestrian athletes, found that 42% were considered to be at-risk based on EAT-26 scores. Similarly, in a sample of 442 female collegiate athletes, Greenleaf et al. (2009) classified 18.3% of the women as symptomatic (based on their QEDD responses) and 5.7% as eating disordered.

When examining prevalence rates of subclinical disordered eating, researchers also have identified the frequency with which specific pathogenic eating and weight control behaviors
occur. For example, Greenleaf et al. (2010) reported the frequencies of the female athletes in their sample who: binge ate at least once per week (18.63%), exercised at least 2 hours per day specifically to burn calories (25.50%), fasted or dieted strictly at least two times in the past year (15.69%), vomited at least 2-3 times a month (2.94%), used diuretics 2-3 times a month (1.47%), and/or used laxatives 1-2 times a week (0.98%). In a different sample of collegiate athletes (Carter & Rudd, 2005), the women reported using laxatives (.2%), diuretics (.6%), fasting (2.6%), appetite control pills (1.2%), strict dieting (7.8%), and/or muscle supplements (6.8%) in the last 3 months. Finally, when considering different ways female collegiate athletes lose weight, Johnson et al. (1999) reported lifetime prevalence rates of 23.9% (vomiting), 11.72% (laxatives), 3.89% (diuretics), 14.3% (diet pills), and 6.59% (saunas or steam rooms).

**Summary.** Athletes do suffer from clinical eating disorders, though experience bulimia nervosa and EDNOS with greater frequency than anorexia nervosa (Byrne & McLean, 2002; Carter & Rudd, 2005; Sundgot-Borgen & Torstveit, 2004); rates of subclinical eating problems are even higher than for clinical concerns (Carter & Rudd, 2005; Greenleaf et al., 2009; Greenleaf et al., 2010; Johnson et al., 1999; Sundgot-Borgen, 1994; Williams et al., 2003). As a population that experiences disordered eating at relatively high rates, research into the psychosocial variables that contribute to this risk becomes necessary. Psychosocial models of the development of eating disorders for women and female athletes have been developed, and will be discussed in the following sections.

**Psychosocial Model of the Development of Disordered Eating**

Many theories and models have been established to address and explain the development of disordered eating including biological, psychological/personality, familial/genetic, and sociocultural (Cohen, 2006; Collier & Treasure, 2004; Easter, 2012; Fedoroff & Guthrie, 1991;
Hargreaves & Tiggemann, 2002; Hesse-Biber, Leavy, Quinn & Zoino, 2006; Kluck, 2008; Kluck, 2010; Lieberman, Gauvin, Bukowski & White, 2001; Mazzeo & Bulik, 2009; Miller & Pumariega, 2001; Neumark-Sztainer, Story, Falkner, Beuhring & Resnick, 1998; Rolls, Fairburn & Harrison, 2003; Stice, 1998; Tiggemann, 2003; Tiggemann & McGill, 2004; Tylka & Sabik, 2010; Wildes, Emery & Simons, 2001). However, models that emphasize gender socialization and social pressures about weight and appearance have been particularly influential and have guided research in this area among women (Fitzsimmons-Craft, 2011; Keel & Forney, 2013; Polivy & Herman, 2002; Stice, 2002; Troop & Treasure, 2011). In such models, sociocultural pressures for women to lose weight, be thin, be attractive, eat only certain foods, and have a certain body size and shape are communicated by friends, family members, and the media (e.g., magazines, TV shows, social media) through commentaries about appearance and the publication of images that are supposed to represent the beauty-ideal. These sociocultural pressures that women experience are likely to influence how they view their own bodies and play a role in the development and maintenance of disordered eating behaviors. Internalization of the pressures appears to be the factor that mediates the relation between social pressures and the development of body image concerns and disordered eating behaviors (Keel & Forney, 2013; Stice, 2002).

Within such sociocultural models, social pressures about appearance and exposure to Western society’s beauty-ideals are hypothesized to lead to internalization of these ideals, creating a schema that becomes the standard against which women compare their bodies, appearance, and eating behaviors and then determine their level of femininity and attractiveness (Anschutz, Engels, & Van Strien, 2008; Lieberman et al., 2001; McCabe & Ricciardelli, 2001; Polivy & Herman, 2002; Stice, 2002; Stice, Mazotti, Krebs, & Martin, 1998; Stice, Maxfield, &
When women internalize the sociocultural pressures and idealized perceptions of thinness and make them part of their self-schema, and then make comparisons between their actual self and their ideal, they often experience heightened and negative disturbances in their perceptions of their bodies, weight, size, shape, appearance, and physical attractiveness. With increased levels of body dissatisfaction, women are hypothesized to react with negative emotions, such as anger, anxiety, and shame, and to respond by restricting their caloric intake to lose weight and shift their bodies to be more closely aligned with their thin-ideal. Over time, the presence of such negative affect, coupled with extreme caloric restriction, can increase their likelihood of developing bulimic and/or anorexic like eating and weight control behaviors as they vacillate between restriction and episodes of binge eating.

Research supports the connection between internalization of Western society’s ideals and the subsequent development of body image concerns (e.g., dissatisfaction, shame), negative affect, and self-reported dietary intent, which have been linked to eating disorder symptomatology and the use of pathological weight management practices (Anschutz et al., 2008; Lieberman et al., 2001; McCabe & Ricciardelli, 2001; Polivy & Herman, 2002; Stice, 2002; Stice et al., 2001; Stice, Mazotti, Krebs, & Martin, 1998; Thompson & Stice, 2001). For example, Thompson and Stice (2001) examined the role of internalization of the sociocultural thin-ideal in the development of disordered eating attitudes and behaviors, such as body-image, eating disturbance, dieting, and negative affect, and determined that internalization was a risk factor. Specifically, women with higher levels of sociocultural internalization endorsed more symptoms of extreme dieting, negative affect, and negative body image. Through their review of the literature on the causes of eating disorders, Polivy & Herman (2002) concluded that
internalization of a thin-ideal likely increases one’s body dissatisfaction, and body dissatisfaction can be viewed as an essential precursor to the development of eating disorders. In his review of longitudinal and experimental research, Stice (2002) determined that internalization, sociocultural pressures, body dissatisfaction, negative affect and dietary intent were risk factors, meaning that they preceded and contributed to the development of eating disordered symptoms.

Sports, athletes, and models of disordered eating. Psychosocial models, based on the above cited research, also have been developed and used to describe eating disorders amongst athletes (Petrie & Greenleaf, 2012). Acknowledging the importance of general sociocultural pressures in determining athletes’ internalization and body dissatisfaction and ultimately the development of eating disorders, Petrie and Greenleaf (2012) also suggested that pressures about body, weight, and appearance that exist within the sport environment and are communicated by coaches, teammates, judges, parents, and other sport personnel are influential. Thus, sociocultural models for athletes include, yet delineate from general sociocultural factors, the pressures from within the sport environment that may increase athletes’ risk and play a role in the development of body image concerns and disordered eating attitudes and behaviors.

Thompson and Sherman (2010) identified several sport-specific pressures, such as wearing revealing team uniforms, being evaluated by peers, teammates, coaches and judges about body weight, shape and appearance, being scrutinized by the crowd or audience, believing that lighter and slimmer athletes have performance advantages, and being pressured by coaches to lose weight or maintain a low body weight. In a study of female collegiate swimmers, Reel and Gill (2001) reported that 51.6% agreed that they experience weight pressures in their sport. Specifically, the swimmers said that revealing team uniforms (45.2%), believing that lower weight improves sport performance (42%), teammates noticing their weight (16.1%), being
scrutinized by the crowd (12.9%), and believing that the lightest swimmers had performance advantages (9.7%) were salient pressures. Similarly, Steinfeldt, Zakrajsek, Bodey, Middendorf, and Martin (2013) found that, among female collegiate volleyball players, revealing team uniforms were a source of pressure and distraction that negatively impacted their on-court performance. The players expressed being worried about how they looked in their spandex uniforms and feeling discomfort because the uniforms were so tight. Overall, the women said that the uniforms were associated with decreases in body esteem and a negative influence on their performance on the court.

In a sample of female gymnasts, parents, and coaches, gymnasts reported experiencing pressures about their weight from coaches and the sport environment (Kerr et al., 2006). The gymnasts who had received negative comments about their weight from coaches reported significantly higher rates of disordered eating than did those who had not heard such comments. Further, the gymnasts identified the experiences of daily weigh-ins, fat tests, public posting of weights, and punishment (if they were deemed “overweight” by coaches) as sources of pressure to lose weight. Similarly, in a sample of 442 female collegiate athletes, those who were classified as eating disordered and symptomatic reported perceiving more pressures from teammates, judges, parents, and friends to lose weight than did the athletes who were asymptomatic (Greenleaf et al., 2009). With respect to coaches, the eating disorder group reported feeling more pressure than did either the symptomatic, or asymptomatic, athletes.

Among NCAA, Division-I female collegiate gymnasts (n = 219) and swimmers and divers (n = 106), Anderson, Petrie, and Neumann (2012) examined longitudinally the stability and relations of sport pressures, body satisfaction, and dietary restraint. Findings from their study indicated that the female athletes’ experience of sport pressures and self-reported dietary restraint
remained relatively stable over the course of their competitive seasons (approximately 5 months). More specifically, they found that Time 1 sport pressures (e.g., concerning weight loss and having a thin body) predicted increases in body dissatisfaction, but not dietary restraint, at Time 2. These findings indicate that sport pressures to be thin, lose weight, and be attractive have long-term negative effects, in particular as they relate to athletes’ body image.

Research has identified pressures unique to the sport environment, determined how frequently such pressures occur, related them to eating disorder classification, and determined that they can lead to changes in body image concerns over time (Anderson et al., 2012; Byrne & McLean, 2002; Reel et al., 2013; Thompson & Sherman, 2011). Still, a question remains unanswered; specifically, how unique are sport pressures from those that exist within the broader society about weight, body, and appearance? Reel et al. (2013) examined this question in a sample of 414 female collegiate athletes. Athletes reported on the pressures they experienced from family, media, friends (who were not teammates), and romantic partners to lose weight, be more attractive, and to have the perfect body, as well as those that were part of their sport environments (i.e., pressures from coaches and sport about weight, pressures about appearance and performance). They found that these sport pressures were unique with respect to the general sociocultural pressures that all women experience, explaining additional variance in the athletes’ body dissatisfaction, dietary intent, and bulimic symptomatology (Reel et al., 2013). Thus, examining sport-specific pressures separately from general sociocultural messages about weight, food, and appearance makes sense given their unique contributions to athlete health and well-being.

Many unique pressures exist within the sport environment that encourage an unhealthy focus on body, eating, and appearance, yet being weighed as part of a team or sport participation may
be particularly salient and exceedingly damaging (Kerr et al., 2006; McNulty, 1997a; McNulty, 1997b; McNulty, 2001; Petrie & Greenleaf, 2007; Reel & Gill, 2006). Being weighed, which generally involves public or private weigh-ins as part of team participation, can create an ongoing source of stress and pressure for athletes (Kerr et al., 2006). Although mandatory team weigh-ins have been identified as a unique sport pressure and have been suggested to underlie sport environments that have an unhealthy focus on weight and body size and promote the use of pathogenic weight control measures (Kerr et al., 2006; McNulty, 1997a; McNulty, 1997b; McNulty, 2001; Reel & Gill, 2001), to date no study has addressed this connection directly amongst collegiate athletes.

Research on the effects of mandatory weigh-ins and fitness evaluations, however, have been conducted in military samples and provide direction for research with athletes. Like in sports, McNulty (1997a) suggested that the military environment, with its expectation of annual weigh-ins and the pressures related to how women look in their uniforms, are likely contributors to the development of disordered eating attitudes and behaviors amongst personnel. To address this issue, McNulty (1997a) sampled 706 active duty Navy nurses. She found that 44.4% skipped meals, 19.2% binge ate, 16.9% excessively exercised, 8.5% used diet pills, 7.1% used laxatives, 3.0% vomited, and 0.9% chewed and spit out their food; these pathogenic weight management behaviors were reportedly done with the intent of controlling their size and shape and in response to annual weigh-ins and fitness evaluations. Expanding her research to men, McNulty (1997b) sampled 1,425 active duty Navy personnel who also were undergoing annual weigh-ins and fitness evaluations. She found that, in preparation for weigh-ins, weight-restriction requirements, or fitness periods, there was increased use of different pathogenic weight control behaviors: (a) laxatives increased from 3.4% regularly to 14.4% during fitness testing periods and weigh-ins,
(b) diuretics increased from 2.1% to 15%, (c) diet pills increased from 3.5% to 14.9%, (d) vomiting increased from 3.7% to 15%, and (e) fasting, that is skipping more than one meal per day, increased from 14.7% to 30.1%.

In a subsequent study, McNulty (2001) examined 1,278 active duty service women from the Army, Navy, Air Force, and Marines and found that, during fitness periods, body measurement checks, and times of weigh-ins, the use of laxatives, diuretics, diet pills, vomiting, and fasting increased for the women in all services. Specifically, during the three months prior to a height/weight and PRT (Physical Readiness Training) cycle, (a) 35.4% of the women reported using water pills/diuretics at least daily, (b) of the women who reported participating in vomiting, 3% vomited daily, and 30.4% vomited up to six times a week, (c) 25% of the sample reported taking diet pills between three and six times a week, with 48% using them once or more a day, (d) 17.9% indicated the use of laxatives daily or multiple times a day, and (e) 8% reported fasting and exercising. In this sample, eating disorders existed among all ranks and ages across all services, and there was an increase in all pathogenic weight management practices during times of height/weight measurement and PRT cycles (McNulty, 2001). However; both clinical eating disorders (AN, BN, and, EDNOS) and pathogenic weight management behaviors (use of laxatives, diuretics, diet pills, vomiting, and fasting for standards) were significantly higher among women in the Marines than any other branch of service (McNulty, 2001).

In a related study of the influence of military environments, Beekley et.al. (2009) found that EAT-26 scores, and percentage of females at risk for an eating disorder, continually increased during the first three years they were at the United States Military Academy. Though the overall percentage of eating disorders was lower in the female cadets than found among women in the general population and elite athletes, the pervasive focus on weight through mandatory weigh-
ins, uniform fittings, required physical fitness testing, and height and weight standards, may have led to an increase in the cadets’ focus on their bodies over time and the proliferation of their disordered eating symptoms, as reflected in their EAT-26 scores (Beekley et al., 2009). The results from these studies (Beekley et al., 2009; McNulty, 1997a, 1997b, 2001;) suggest that in environments where body size, shape, and weight are deemed important, weigh-ins, fitness tests, and body measurement checks may lead women to become more body focused and use pathogenic weight management practices to try to control and shape their bodies to fit the expectations being communicated from their environments.

In a similar vein, research has found that self-weighing is related to increased pathological weight management practices, increased disordered eating symptomatology, decreased body esteem, and increased negative affect, which includes depressive symptoms (Friend, Bauer, Madden, & Neumark-Sztainer, 2012; Mintz et al., 2013; Quick, Larson, Eisenberg, Hannan, & Neumark-Sztainer, 2012; Quick, Loth, MacLehose, Linde, & Neumark-Sztainer, 2013). For example, in a study of 2,778 male and female adolescents, Quick et al. (2013) investigated the relation between self-weighing frequency and weight-related behaviors and psychological well-being. Girls who were frequent self-weighers (defined as self-weighing “every week,” “a few times per week,” “every day,” or “more than once a day”) had lower self-esteem, greater body dissatisfaction, were more likely to follow a diet, and engage in unhealthy weight management behaviors (e.g., fasting, caloric restriction, smoking) than the girls who weighed themselves infrequently (defined as self-weighing “less than once a month,” “every month,” or “a few times per month”). Similarly, Friend et al. (2012) examined cross-sectional and longitudinal associations between frequency of self-weighing and body mass index, body satisfaction, weight control behaviors, and binge eating. Frequency of self-weighing was not related to the adolescent
girls’ BMI; however, a higher frequency of self-weighing was associated with lowered body satisfaction and increased use of healthy (e.g., exercise, ate more fruits and vegetables, ate fewer high fat foods, drank less regular soda pop or sweetened beverages, etc.), unhealthy (e.g., fasted, ate very little, skipped meals, smoked cigarettes, etc.), and extreme (e.g., took diet pills, vomiting, used laxatives, used diuretics, etc.) weight control behaviors. Specifically, 89.6% of the girls who weighed themselves daily used unhealthy weight management behaviors compared to 64% of the girls who did not weigh themselves. Among young adult women, higher rates of self-weighing were associated positively with binge eating and depressive symptoms, and inversely with self-esteem (Quick et al., 2012). Clearly, weighing, whether mandatory (and conducted by others) or voluntary (and done by self), is associated with many negative consequences in relation to weight management practices, body image, mood, and psychological well-being. The question that remains unanswered, though, is to what extent do weigh-ins within a sport environment relate to disordered eating attitudes and behaviors for female athletes?