

Prevalence of Disordered Eating: A Comparison of Male and Female Collegiate Athletes and Nonathletes

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Eating disorder prevalence rates among athletes vary greatly because of the different ways in which researchers have measured and classified them, and the extent to which they are higher than those found among nonathletes remains unresolved. The present study examined prevalence of eating disorders, body image issues, and weight control behaviors using a valid diagnostic measure. Participants included 146 male and 156 female NCAA Division I student-athletes and a matched sample of 170 male and 353 female collegiate nonathletes. Overall, eating disorder prevalence rates and use of pathogenic weight control behaviors were lower among nonathletes than athletes. Rates for athletes in the current study were lower than previous studies. These findings are likely due to the lack of anonymity the athletes had when completing questionnaires, as data were collected through athletes' preseason physicals, whereas nonathletes completed questionnaires anonymously over the Internet. Recommendations for athletic departments' screening for eating disorders are made.

Keywords: eating disorders; body image; pathogenic weight control; athletes

Athletes have been identified as an at-risk population for the development of body image concerns and eating disorders (EDs) because they are subject to not only general societal appearance ideals, but also body, weight, eating, and performance pressures that are unique to the sport environment (Petrie & Greenleaf, 2007). These "sport-specific" pressures can include specific judging criteria, sport weight limits, coach/teammate expectations, and tight or revealing uniforms. Historically, such pressures have been more present for female athletes, but male athletes report experiencing them as well (Galli & Reel, 2009). However, the focus for women tends to be on thinness and appearance whereas men's strivings are typically toward leanness, strength, and muscularity.

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Given these pressures, it is not surprising that athletes experience disordered eating, sometimes at rates higher than found among nonathletes (Smolak, Murnen, & Ruble, 2000). For example, Sundgot-Borgen and Torstveit (2004) found that 20% of elite female athletes and 8% of elite male athletes met criteria for an eating disorder, compared with 9% and 0.5% of female and male controls. In studies with collegiate athletes in the United States, Petrie and colleagues (Greenleaf, Petrie, Carter, & Reel, 2009; Petrie, Greenleaf, Carter, & Reel, 2007; Petrie, Greenleaf, Reel, & Carter, 2008, 2009) reported clinical rates that ranged from 2%–5.7% (females) and 0%–1% (males), and subclinical rates of 18.3%–25.5% (females) and 16.6%–19.2% (males). Results from two different meta-analyses (Hausenblas & Carron, 1999; Smolak et al., 2000) showed that male and female athletes have higher rates of eating pathology (e.g., indices of anorexic and bulimic symptoms) than nonathletes; for female athletes, the risk was greatest in dance or performance sports (e.g., ballet dancers, aerobics instructors, cheerleaders) and among elite level athletes.

Researchers (Carter & Rudd, 2005; Johnson, Powers, & Dick, 1999) also have found that between 6.2%–16.2% of female and 4.8%–12.6% of male collegiate athletes binge eat. To compensate for these binges, female and male athletes, respectively, reported vomiting (1.7%–8.7% vs. 0.2%–3.3%) and using diet pills (1.4%–4.6% vs. 0.4%–0.7%). In more recent studies (Greenleaf et al., 2009; Petrie et al., 2008), female and male collegiate athletes, respectively, reported exercising one or more hours per day specifically to burn calories (40.7% vs. 46.9%), fasting or strict dieting two or more times in the past year (15.6% vs. 14.2%), and using laxatives once a week or more (1% vs. 7.9%). These findings suggest that even though athletes generally are more body satisfied than nonathletes (DiBartolo & Shaffer, 2002; Hausenblas & Carron, 1999), they still are at-risk, though this risk appears to be highest at the subclinical level.

Limitations, however, exist in past prevalence studies among athletes, including the use of unvalidated self-report measures and not having an age-matched comparison group drawn from the same environment (Petrie & Greenleaf, 2007). Thus, the purpose of the current study was to compare male and female collegiate athletes with age-matched controls from the same university using a valid, diagnostic measure for eating disorders to determine clinical and subclinical prevalence rates and the potential influence of race/ethnicity (and for the athletes, sport type) on these rates. Second, we examined the athletes' and nonathletes' use of pathogenic weight control behaviors (e.g., vomiting) and how they felt about their bodies in terms of size, shape, and weight to determine their levels of satisfaction.

Method

Participants

Participants included 156 female and 146 male National Collegiate Athletic Association (NCAA) Division I student-athletes from a university located in the southern United States; the sample represented all the athletes at this university from all sports (e.g., football, basketball, women's swimming, track and field). M_{ages} were 19.47 ($SD = 1.38$) and 19.73 ($SD = 1.61$) years for female and male athletes, respectively. Female and male athletes classified themselves as White/NonHispanic ($n = 101$,

64.7%; $n = 62$, 42.5%); Black/NonHispanic ($n = 33$, 21.2%; $n = 66$, 45.0%); Hispanic ($n = 11$, 7.1%; $n = 8$, 5.5%); Native American ($n = 3$, 1.9%; $n = 1$, 0.7%); Asian-American ($n = 1$, 0.6%; $n = 2$, 1.4%); and Other ($n = 3$, 1.9%; $n = 6$, 4.1%).

In addition, 353 female and 170 male nonathletes from the same university participated. M_{ages} were 20.18 ($SD = 2.25$) and 20.28 ($SD = 2.19$) years for women and men, respectively. Female and male nonathletes identified themselves as White/NonHispanic ($n = 224$, 63.5%; $n = 102$, 60.0%); Black/NonHispanic ($n = 60$, 17.0%; $n = 29$, 17.1%); Hispanic ($n = 25$, 7.1%; $n = 16$, 9.4%); Native American ($n = 41$, 11.6%; $n = 23$, 13.5%); and Asian-American ($n = 3$, 0.8%; $n = 0$, 0.0%).

Instruments

Demographics. Participants provided information on sex, age, race/ethnicity, and sport.

Disordered eating, weight control behaviors, and body image. The 50-item Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997) assesses the presence or absence of an eating disorder based on *DSM-IV* criteria (APA, 1994) as well as provides information about pathogenic weight control behaviors (e.g., vomiting, laxative use) and body image concerns (e.g., feel fat, body size influences esteem). Participants complete questions about eating behaviors, compensatory weight control behaviors, body image, and menstrual history (females only). Based on their responses, individuals are classified as asymptomatic (no symptoms), symptomatic (some symptoms), or eating disordered (meet criteria for clinical disorder). Mintz et al. have provided extensive information about the measure's reliability and predictive validity, and the Q-EDD has been used successfully to identify eating disorders in samples of male and female athletes (e.g., Petrie et al., 2009).

Procedure

Approval was obtained from the university's Institutional Review Board for Human Subjects Research, athletic department, and sports medicine director. As part of their preparticipation health-screening, the athletes completed the demographics questionnaire and Q-EDD. Nonathletic undergraduate students were recruited from psychology and kinesiology courses and completed the same measures through a secure web site.

Results

Eating Disorder Prevalence

Women. Based on their Q-EDD responses, female participants were classified as follows:

- asymptomatic (athletes— $n = 144$ [93.5%]; nonathletes— $n = 229$ [64.9%])
- symptomatic (athletes— $n = 10$ [6.5%]; nonathletes— $n = 103$ [29.2%])
- eating disordered (athletes— $n = 0$ [0.0%]; nonathletes— $n = 22$ [5.9%])

Symptomatic and eating disorder prevalence was significantly higher, and asymptomatic significantly lower, for the female nonathletes compared with the athletes, $\chi^2(1, N = 510) = 45.98, p < .001$. Within the eating disorder category, the 22 female nonathletes were classified with: bulimia nervosa ($n = 1$), subthreshold bulimia ($n = 9$), menstruating anorexia ($n = 2$), nonbinging bulimia ($n = 6$), and binge eating disorder ($n = 4$).

There was no significant relationship between Q-EDD classification (asymptomatic vs. symptomatic/clinical) and race/ethnicity (minority vs. nonminority) for athletes, $\chi^2(1, N = 150) = 2.02, p = .155$, or nonathletes, $\chi^2(1, N = 353) = 0.59, p = .44$. There also was no significant relationship between Q-EDD classification and sport type (endurance sports $n = 60$ vs. ball sports $n = 78$ vs. skill sports $n = 12$) for the female athletes, $\chi^2(2, N = 150) = 1.27, p = .53$.

Men. Men were classified as follows:

- asymptomatic (athletes— $n = 122$ [87.8%]; nonathletes— $n = 138$ [81.2%])
- symptomatic (athletes— $n = 17$ [12.2%]; nonathletes— $n = 31$ [18.2%])
- eating disordered (athletes— $n = 0$ [0.0%]; nonathletes— $n = 1$ [0.6%])

There was no significant difference between male athletes and nonathletes on eating disorder classification, $\chi^2(1, N = 316) = 2.49, p = .114$. The one eating disordered male nonathlete fell into the subthreshold bulimia category.

There was no significant relationship between Q-EDD classification and race/ethnicity for male athletes, $\chi^2(1, N = 136) = 0.002, p = .97$, or nonathletes, $\chi^2(1, N = 170) = 1.64, p = .20$, nor for athletes with respect to sport type (endurance sports $n = 33$ vs. ball sports $n = 102$; $\chi^2(1, N = 137) = 0.17, p = .895$).

Pathogenic Weight Control Behaviors

Women. Responses to specific Q-EDD questions provided information on weight control behaviors. Regarding binge eating, 3.2% ($n = 5$) and 9.6% ($n = 34$) of female athletes and nonathletes, respectively, reported doing so. Of those who binge ate, 40% ($n = 2$) of the female athletes and 74% ($n = 25$) of the nonathletes said they felt out of control when doing so. Regarding the use of different weight control behaviors, nonathletes reported more frequent use than athletes with dieting, vomiting, laxatives, diuretics, fasting, appetite control pills, chewing and spitting food, enemas, and exercising to lose weight (see Table 1).

Men. Regarding binge eating, 9.6% ($n = 14$) of athletes and 7.1% ($n = 12$) of nonathletes reported doing so; 28.6% ($n = 4$) of the athletes and 8.3% ($n = 1$) of the nonathletes felt out of control during a binge. Similar to the women, the male nonathletes reported more frequent use of all weight control behaviors (see Table 1).

Body Image Concerns

Women. More nonathletes (72.0%; $n = 254$) than athletes (30.3%; $n = 40$) said that certain parts of their body were too fat, $\chi^2(1, N = 508) = 77.32, p < .0001$, and more nonathletes said that they felt fat all over (nonathletes [25.2%; $n = 89$]; athletes [4.5%; $n = 7$]; $\chi^2(1, N = 509) = 30.37, p < .0001$).

Table 1 Frequency of Compensatory Behaviors by Sex and Athletic Status

Compensatory Behavior	Women		Men	
	Athletes (156) % (n)	Nonathletes (353) % (n)	Athletes (146) % (n)	Nonathletes (170) % (n)
Vomit	0.0 (0)	4.5 (16)	1.4 (2)	1.8 (3)
Laxatives	0.0 (0)	2.5 (9)	0.7 (1)	1.8 (3)
Diuretics	0.0 (0)	2.0 (7)	0.0 (0)	1.2 (2)
Fast	0.0 (0)	13.3 (47)	0.0 (0)	3.5 (6)
Chew and spit	0.0 (0)	1.4 (5)	0.0 (0)	0.6 (1)
Enema	0.0 (0)	0.3 (1)	0.0 (0)	0.0 (0)
Appetite control pills	0.6 (1)	10.2 (36)	0.0 (0)	2.4 (4)
Diet strictly	3.2 (5)	19.8 (70)	1.4 (2)	8.2 (14)
Exercise to lose weight	35.3 (55)	79.1 (280)	21.9 (32)	48.2 (82)
Misses 3 consecutive menstrual periods ^a	6.2 (6)	11.9 (20)	-	-

Note. The values are the percentage of participants reporting use of compensatory behavior.

^aMissed periods were not due to use of hormone-based birth control.

There was a significant multivariate effect for athlete vs. nonathlete, Wilks's Lambda = .903, $F(3, 497) = 17.75$, $p < .0001$, partial $\eta^2 = .097$, as well as for BMI, which served as the covariate, Wilks's Lambda = .923, $F(3, 497) = 13.76$, $p < .0001$, partial $\eta^2 = .077$. Nonathletes, compared with the athletes, indicated that body weight and/or shape had a more negative influence on their self-worth (nonathletes— $M = 3.2$, $SD = 1.17$; athletes— $M = 2.55$, $SD = 1.07$), $F(1, 499) = 33.49$, $p < .0001$, partial $\eta^2 = .06$, and expressed significantly greater concern about becoming fat (nonathletes— $M = 3.16$, $SD = 1.38$; athletes— $M = 2.35$, $SD = 1.15$), $F(1, 499) = 41.03$, $p < .0001$, partial $\eta^2 = .076$, and gaining weight (nonathletes— $M = 3.12$, $SD = 1.30$; athletes— $M = 2.29$, $SD = 1.02$), $F(1, 499) = 51.62$, $p < .0001$, partial $\eta^2 = .094$.

Men. More nonathletes (38.2%; $n = 65$) than athletes (14.6%; $n = 21$), $\chi^2(1, N = 313) = 22.24$, $p < .0001$, said that certain parts of their body were too fat; nonathletes (2.4%; $n = 4$) and athletes (1.4%; $n = 2$) did not differ on feeling fat all over, $\chi^2(1, N = 314) = 0.41$, $p = .52$.

There also was a significant multivariate effect for athlete vs. nonathlete, Wilks's Lambda = .969, $F(2, 303) = 4.90$, $p < .01$, partial $\eta^2 = .031$, as well as for BMI, Wilks's Lambda = .956, $F(2, 303) = 6.91$, $p < .01$, partial $\eta^2 = .044$. Nonathletes ($M = 2.11$, $SD = 1.12$) reported more concerns about becoming fat than did the athletes ($M = 1.73$, $SD = 1.14$), $F(1, 304) = 9.80$, $p < .005$, partial $\eta^2 = .031$; the two groups did not differ significantly with respect to the influence of body weight and/or shape on feelings of self-worth (nonathletes— $M = 2.42$, $SD = .99$; athletes— $M = 2.29$, $SD = 1.10$), $F(1, 304) = 1.10$, $p = .30$, partial $\eta^2 = .004$.

Discussion

Based on the Q-EDD, a valid measure of ED diagnosis, the majority of the female athletes and nonathletes were asymptomatic. Fewer female athletes than nonathletes, though, were classified as either eating disordered or symptomatic. Although prevalence rates for the nonathletes were comparable to past research (Cohen & Petrie, 2005; Sanford-Martens et al., 2005), athletes reported lower levels than expected.

There are two potential explanations for this lower prevalence rate. First, the athlete sample did not include "high-risk" sports, such as gymnastics (Smolak et al., 2000); in other studies where higher prevalence rates have been reported (e.g., Greenleaf et al., 2009; Petrie et al., 2009), athletes from these sports participated. Thus, overall rates may have been lower due to the sports that comprised our sample. A second and more compelling explanation is that the athletes' data were collected as part of the athletic department's eating disorder screening process so the athletes' responses were not anonymous. In a study that also collected Q-EDD data as part of a larger, nonanonymous screening process, Carter and Rudd (2005) found lower prevalence rates, which support the idea that a lack of anonymity may contribute to underreporting symptoms.

Even though prevalence was higher among male nonathletes than male athletes, the male athlete rates were consistent with past research (e.g., Carter & Rudd, 2005; Petrie et al., 2007; Petrie et al., 2008). No male athletes and 0.6% of male nonathletes were classified as having an eating disorder, whereas 12.2% of athletes and 18.2% of nonathletes were symptomatic. Carter and Rudd, who

used a similar methodology, found that none of their male athletes met criteria for an eating disorder, and only 9.3%–11.5% were classified as symptomatic. Other studies (e.g., Petrie et al.) also have reported no male athletes meeting criteria for an eating disorder, though rates for the symptomatic classification (19.2%) have been slightly higher.

Despite data being collected from the male and female athletes in the same manner, the lack of anonymity appears to have had a stronger negative effect on the women's disclosure (the fact that the nonathletes, who were able to report their symptoms anonymously, had prevalence rates comparable to past research supports this contention). It is likely that women are aware of eating disorders and their related symptoms, historically having been considered a "woman's" problem. As a result, the female athletes would likely recognize such issues in a health screening questionnaire and know how to respond to underreport, which is a typical behavior among women who complete self-report eating disorder measures (Beglin & Fairburn, 1992). It also may have been that the female athletes were embarrassed or feared repercussions from their coaches and/or other athletic department personnel if they reported engaging in pathogenic eating and weight control behaviors (Brownell & Rodin, 1992). Therefore, the women responded in a manner that hid their symptoms and made them appear healthier than they actually may have been. Because disordered eating attitudes and behaviors are not considered to be as central a health concern among men (Cafri et al., 2005), the male athletes' sensitivity to the issue was likely lower and their responses more honest than those of the female athletes. Thus, anonymous reporting appears to be more salient for female than male athletes if researchers want to obtain the most accurate prevalence rates possible.

It is interesting to note that even with the lack of anonymity in their reports, 6.5% of female athletes and 12.2% of male athletes reported engaging in unhealthy eating and weight control behaviors at sufficient levels of frequency and number to be considered symptomatic. The athletes' willingness to endorse pathogenic weight control behaviors might be an indication of how normative these behaviors are within sport cultures, and thus the stigma about disclosing them may be low. Engel et al. (2003) found that athletes' perceptions of weight control behaviors as "normal" in their sport environment predicted disordered eating behavior. That is, athletes may have been more comfortable purging because they perceived teammates were, and thus the stigma for engaging in this unhealthy behavior was reduced. Generally speaking, when unhealthy behaviors are widely accepted within a sport team or within a broader culture of an athletic department, athletes may not fear repercussions for reporting them, despite the behaviors being unhealthy and, in other contexts, stigmatized.

Regarding the prevalence of pathogenic weight control behaviors and body image concerns, a greater number of female and male nonathletes than athletes reported binge eating and using compensatory behavior, such as vomiting or dieting. The use of compensatory behaviors among female and male athletes also was lower in the current study than has been reported in previous research with collegiate athlete samples (Carter & Rudd, 2005; Greenleaf et al., 2009; Johnson et al., 1999; Petrie et al., 2008). For example, among female and male collegiate athletes, respectively, 3.0% vs. 6.5% vomit, 1.0% vs. 7.9% use laxatives, 1.5% vs. 7.0% use diuretics, 40.7% vs. 46.9% exercise to burn calories, and 15.6% vs. 14.2% fast or

diet strictly (Greenleaf et al., 2009; Petrie et al., 2008). Even so, consistent with this research, the athletes (and nonathletes) in the current study relied primarily on fasting, dieting, and exercising to burn calories, manage weight, and/or counteract the effects of a binge. Although exercise generally is considered a healthy behavior, when done to excess, it can lead to overuse injuries and, in female athletes, menstrual dysfunction (Beals & Manore, 1999). Thus, athletic trainers and coaches need to recognize that excessive exercise can be pathological and does not simply represent a strong commitment to sport (Thompson & Sherman, 1999).

Even after controlling for actual body composition, as expected, nonathletes were more dissatisfied with their bodies than were the athletes. Specifically, female and male nonathletes reported that weight or body shape had a more negative influence on their self-worth than it did for the athletes. Nonathletes also expressed greater fears of becoming fat or gaining weight, felt certain parts of their bodies were too fat, and felt fat all over, compared with athletes. These findings are consistent with past research (e.g., DiBartolo & Shaffer, 2002; Hausenblas & Downs, 2001; Hausenblas & McNally, 2004), and not surprising in that athletes are more physically active and physically fit than nonathletes and have bodies that more closely approximate the societal ideal. Even so, over 30% of the female and 14% of male athletes reported feeling parts of their bodies were too fat. These findings are concerning for several reasons. First, given that body dissatisfaction is related to disordered eating among athletes (Anderson, Petrie & Neumann, 2011), the high rate of body dissatisfaction in the current study may be an indication of future problems. In addition, when athletes retire from sport (due to graduation or other reasons) and their physical activity levels decrease due to other demands (e.g., jobs, families), their bodies change (e.g., weight gain, loss of muscle; Stirling, Cruz, & Kerr, 2012). Given these bodily changes and athletes' intense focus on physical training over the course of their sport careers, body dissatisfaction also may increase as would the use of weight control behaviors, such as restricting food intake, counting calories, and exercising excessively to lose weight. All of these behaviors could increase the risk of developing a clinical or subclinical eating disorder. Second, the relatively high rate of body dissatisfaction among athletes, despite having bodies that often resemble the societal ideal, may speak to a culture within athletics that sets unrealistic standards and is overly focused on weight, appearance, leanness, and muscularity (Petrie & Greenleaf, 2007). When athletes internalize these sport environmental messages about body size and shape, they may experience increased body dissatisfaction, higher levels of dietary restraint, and more disordered eating symptoms (Anderson et al., 2011).

The current study had limitations that warrant discussion. First, although a valid self-report measure of eating disorders was used, the fact that the athlete data were collected as part of the athletic department's health screening likely limited the reporting of eating disorder symptoms and behaviors. Thus, athlete data from the current study may underrepresent the extent to which male, and particularly female, athletes experience disordered eating. In future studies, researchers may want to, if possible, ensure anonymity for all participants, not just the nonathletes, though we recognize that this approach may not be possible if done in conjunction with ongoing health screening programs. Second, although a matched sample was obtained, participants were drawn from only one university. Thus, the generalizability of the results is limited to schools with similar athlete and nonathlete student

populations. Third, the current study did not consider that some participants in the nonathlete group may participate in sports outside of the university or identify as an athlete and therefore may more closely resemble the athletes. Thus, in future studies, researchers may want to assess athlete status or athletic identity among nonathletes to ensure there are true differences between these groups.

Despite these limitations, our findings have implications for professionals who work with athletes and athletic departments and assist in the screening of eating disorders. Although the presence of clinical eating disorders in athletes is relatively low, they do exist and, even more so, symptoms of disordered eating are present. Both clinical and subclinical eating disorders are important to identify because of the additional health risks associated with such behaviors. The National Athletic Trainer's Association recommends that athletic departments screen athletes for disordered eating with the goal of early detection and to provide assistance for athletes who are identified (Bonci et al., 2008). When athletic departments screen for eating disorders, as was the case with the current study, athletes' responses generally will not be anonymous. Therefore, using measures where socially desirable responses are less obvious may facilitate more honest responding. Although measures intended for diagnosis, such as the Q-EDD, are valuable for determining eating disorder prevalence rates in traditional psychological studies where confidentiality and anonymity is guaranteed, the content of the questions is obvious and may contribute to the underreporting that was seen in the current study. The use of less obvious eating disorder screening measures, such as the Physiologic Screening Test (PST; Black et al., 2003), which combines self-report questions with physiologic measurements, or the Female Athlete Screening Test (FAST; McNulty, Adams, Anderson, & Affenito, 2001), which assesses thoughts and behaviors surrounding eating and exercise, may assist in more accurate, honest reporting and allow for the early identification of athletes who are at-risk for disordered eating. Future research may want to compare the relative utility of these different measures of disordered eating development to determine if the athlete specific, and less obvious measures, provide any advantages over the Q-EDD.

Conclusion

In the current study, we examined eating disorder prevalence using a measure based on DSM-IV criteria, as well as focused on the issues of body image and pathogenic weight control behaviors. Participants included male and female NCAA Division I student-athletes and a matched sample of male and female nonathletes from the same university. Overall, eating disorder prevalence rates and use of pathogenic weight control behaviors were lower among nonathletes than athletes; rates for athletes in the current study were lower than found in previous studies. Our findings are likely explained by the lack of anonymity athletes had when completing questionnaires, as data were collected through preseason physicals required of all student athletes at this university. Nonathletes reported higher levels of body dissatisfaction than athletes, which was expected given athletes lower BMI and having bodies that more closely resemble the societal ideal (likely due to high levels of physical activity). However, a significant minority of male and female athletes still reported being body dissatisfied, suggesting that despite the physical and psychological benefits

associated with high levels of physical activity and fitness, the sport cultures' focus on body, weight, and performance may have deleterious effects for some athletes. It is recommended that athletic departments screen for eating disorders with the goal of early detection, though sports medicine personnel (e.g., athletic trainers) may want to consider using less face-valid measures of disordered eating to be able to identify the larger number of athletes who likely are engaging in disordered eating behaviors.

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