

Association between athletic participation and the risk of eating disorder and body dissatisfaction in college students

Laura Blair¹,
Christopher R. Aloia¹,
Melinda W. Valliant¹,
Kathy B. Knight¹,
John C. Garner²,
Vinayak K. Nahar³

¹Department of Nutrition and Hospitality Management, University of Mississippi, 108 Lenoir Hall, University, Mississippi, USA, ²Department of Kinesiology and Health Promotion, College of Health and Human Services, Troy University, Troy, AL 36082, USA, ³Center for Animal and Human Health in Appalachia, College of Veterinary Medicine, DeBusk College of Osteopathic Medicine, and School of Mathematics and Sciences, Lincoln Memorial University, Harrogate, TN 37752, USA.

Address for correspondence:

Kathy B. Knight,
Department of Nutrition and Hospitality Management, Lenoir Hall, The University of Mississippi, USA. Tel.: O: (662) 915-5172, Fax: (662) 915-7039.
E-mail: kknight@olemiss.edu

WEBSITE: ijhs.org.sa

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Introduction

The dramatic lifestyle change going from high school to college is a stressor that has been shown to influence the risk of weight gain and disrupt eating patterns in college students.^{1,2} The stressors a college student faces include the pressure of greater personal responsibility, loss of social support, and increased academic demands, which, along with a college student's desire to maintain or achieve an ideal body, can lead to disordered eating. Greenleaf *et al.*³ studied the prevalence of eating disorders and disordered eating among 204 female NCAA Division I college athletes from 3 universities located in the Midwest, Southwest, and Mountain regions of the United States and found that disordered eating can lead to pathogenic eating behaviors, like binge eating. Although there are inconsistent findings, the general position in eating disorder research is that college athletes are more at risk for developing eating disorders than college non-athletes,⁴⁻⁸ and in other studies conducted with female NCAA Division I college

ABSTRACT

Objective: Given that females exhibit a greater prevalence of eating disorders, there is of yet no conclusive evidence whether participation in college athletics exacerbates eating disorders or body shape dissatisfaction. This study assessed how gender and participation in collegiate athletics are associated with increased risk for disordered eating attitudes and body shape concerns in college students.

Methods: This study used a cross-sectional research design. A total of 302 students at a Southern US university fully completed the eating attitudes test and the body shape questionnaire during class time or team meetings. Logistic regression was conducted to determine risk differentials for each group.

Results: Of 302 students, 65.6% were females and 63.2% were non-athletes. Athletic status was significant as well but became slightly less so with adjustment (unadjusted at OR = 3.14, $P < 0.001$ vs. adjusted OR = 3.22, $P < 0.001$). Moreover, it was found that that non-athletic female students are slightly more at risk for disordered eating and significantly more dissatisfied with their body shape (OR = 5.95, $P < 0.001$).

Conclusions: Although there seems to still be many unresolved issues regarding eating disorders, one thing is clear females are at higher risk, and it remains a significant challenge to college health services. College health practitioners should be made aware of the significant effect stress has on freshman in particular.

Keywords: Anorexia nervosa, body shape dissatisfaction, college students, collegiate athletes, eating attitudes, eating disorders

athletes from universities located in Ohio, Missouri, and Texas, female athletes are 2-3 times more likely to meet the criteria for an eating disorder than non-athletes.^{4,6,8} This is ironic in that female collegiate athletes show higher nutrition knowledge compared to non-athletes, but athletes are less likely to use this nutrition knowledge in their regular eating patterns compared to non-athletes.^{9,10} One possible reason for this finding is that athletes sometimes think of themselves as an "exception" to normal dieting because of the sport they play and their level of fitness compared to the general population.

Although the eating behaviors of male athletes have not been scrutinized as much as female athletes, reviews of literature done by researchers at Harvard University, USA,¹¹ and Telemark University College, Bø and Norwegian School of Sport Sciences, Oslo, Norway,¹² have shown that about 50% of male athletes would like in some way to change their body shape. Baum recognized that there has been an increase in male athletes who are preoccupied with their

body image, especially in the sports of football, baseball, and track, and field.¹³ Male athletes sometimes suffer from reverse anorexia a condition in which an individual becomes obsessive about increasing muscle mass, which often leads to the use of harmful anabolic steroids.¹³⁻¹⁵ In a study by Franco and coworkers at the Medical College of Ohio, Toledo, USA, males made up only 5-10% of anorexia nervosa patients,¹⁶ while Bratland-Sanda, from Telemark University College, Bø, Norway, and Sundgot-Borgen from the Norwegian School of Sport Sciences, Oslo, Norway,¹² reported that disordered eating rates are from 0% to 16% in males.¹² Furthermore, a study on female college athletes and non-athletes at Smith College, Northampton, MA, USA, about weight, desired weight, meal patterns, methods of gaining/losing weight, and past or current eating problem behaviors, found that non-athletes were more likely to eat fewer meals per week, reported more often that they were too heavy, and reported using more weight loss methods.¹⁷

Given that females exhibit a greater prevalence of eating disorders there is of yet no conclusive evidence whether participation in college athletics exacerbates eating disorders or body shape dissatisfaction. The object of this investigation was to determine if participation in college athletics independently increased the risk or modified the risk for disordered eating behaviors and body dissatisfaction more than their female and male, college counterparts who did not participate in a collegiate sport.

Methods

Participants and sampling

For this study, college students at a Southern US University were recruited using convenience sampling. Participants were included if (a) currently enrolled at the university, (b) they could read English, (c) they were aged 18 years or older, and (d) could provide informed consent. Participants were excluded if did not meet aforementioned inclusion criteria.

Study design and data collection procedure

This cross-sectional study was conducted in the fall semester of 2011. The cross-sectional design is beneficial in being low-cost, easy to administer and implement. Subject recruitment and survey administration occurred for 3 months during class time or team meetings. Coaches and instructors were enlisted by email with a copy of the protocol attached. One of the researchers described the purpose of the study and the design to the group. Students were informed that their participation in the study was optional, and consent was given. Students willing to participate then completed a cover letter with the sport they play in college (if applicable), their college classification, and their gender. If their sport was not listed on the cover letter, an "other" option was available to check. Along with the cover letter, the students also completed a survey.

Instruments

This study compared self-reported eating behaviors and attitudes using the 26-question eating attitudes test (EAT-26) and the body shape questionnaire (BSQ). These instruments used to measure characteristics associated with eating disorders are surveys that have been validated in a variety of populations.¹⁸⁻²⁰ Although the EAT-26 does not have the capacity for diagnosing clinical eating disorders it has proven effectiveness in identifying those who may be at risk for an eating disorder.^{4,18-20} The mean test-retest reliability estimate for the EAT-26 was 0.87.²¹ To validate the BSQ; the 51 question instrument was given to four all-female groups: (1) Eating disorder patients, (2) family planning clinic attendees, (3) occupational therapy students, and (4) undergraduate students. The BSQ was correlated with the body dissatisfaction subscale of the EDI and with the total EAT score among the patients with bulimia nervosa; and with the EAT total score among the occupational therapy students. Among patients, the BSQ correlated moderately highly with the score on the EAT and very highly with the EDI body dissatisfaction score. Among group 3, the occupational therapy students, the BSQ correlated highly with the score on the EAT.²⁰

The BSQ has also been validated in Spanish²⁰ and Swedish²² and continues to be a reliable measure for assessing body dissatisfaction and low self-esteem.²⁰ For BSQ, high test-retest reliability, very high internal consistency, ranging from 0.94 to 0.97 and high split-half reliability (above 0.93) was reported in the previous studies.^{22,23} Both of these instruments have been used jointly to identify the participants at risk for an eating disorder.

Statistical analysis

After the data were entered into a statistical software program, Chi-square (χ^2) analysis was used to identify and compare sample populations with the excluded participants. Test scores were then individually calculated for each participant according to the scoring rubrics for the EAT-26^{18,24} and the BSQ.^{20,24,25} The individual scores were dichotomized into two variables as high and low scores for the EAT-26 and the BSQ. The research followed similar cutoffs used in the prior studies.^{17,20,24,26} Dichotomizing the test scores into high and low scores allowed for the use of logistic regression to determine risk differentials for each group, and thus to test our hypothesis. A *P*-value of 0.05 and less was considered statistically significant. All analyses were performed on a personal computer using IBM® SPSS® Statistics 22. IBM Corporation Armonk, New York 10504-1722 United States.

Results

Overall, 331 students participated in this study, of which, 29 had missing data on one or more of the questionnaires administered. These participants were excluded from the

analyses, leaving a sample of 302. Included and excluded samples were divided by gender, athletic participation, and class level. A χ^2 tests were conducted to assess possibility of selective bias due to the exclusion of participants. Results of χ^2 tests were nonsignificant (Table 1), suggesting that the possibility of selectivity bias introduced by exclusion of those participants was minimal.

Demographics characteristics of the sample are shown in Table 1. Of 302 included participants, 104 were males, and 198 were females. 111 were athletes and 191 were non-athletes. The final sample of students used for this study included 43 freshmen, 86 sophomores, 93 juniors, and 80 seniors.

For EAT-26, findings of logistic regression were presented in Table 2. This finding illuminates an association between gender and eating disorders when not adjusted, with females being more than 2 times at greater risk for disordered eating than males. Athletic status was also significant when not adjusted but then the significance was reduced with adjustment (unadjusted at OR = 2.54, $P = 0.02$ vs. adjusted OR = 1.90, $P = 0.18$). To

answer if athletic status modified or interacted with the gender an interaction term was created by multiplying gender and athletic participation and added to the model (unadjusted at OR = 4.08, $P = 0.06$ vs. adjusted OR = 1.11, $P = 0.09$). The results showed that significance for the interaction is greatly reduced when adjusting for other predictor variables. Finally, it was found that college freshman had the highest observed risk with an unadjusted (OR = 5.87, $P = 0.11$). Although it is not quite significant, there is a clear trend that places freshman at higher risk levels than other college classification.

With regard to BSQ, results of logistic regression were presented in Table 3. Findings indicate that gender plays the greater role in body shape dissatisfaction with females being more than 5 times at greater risk for being dissatisfied with the body shape than males. Athletic status was significant as well but became slightly less so with adjustment (unadjusted at OR = 3.14, $P < 0.001$ vs. adjusted OR = 3.22, $P < 0.001$). To address whether athletic status modified or interacted with the gender, an interaction term was created by multiplying gender and athletic participation (unadjusted at OR = 2.77, $P = 0.06$ vs. adjusted OR = 0.20, $P = 0.05$). The results showed that significance for the interaction is greatly reduced when adjusting for other predictor variables. Finally, results revealed that college freshman had the highest risk for body shape dissatisfaction with an adjusted OR of 11.12 and a $P = 0.02$, that is 11 times greater than their comparison group.

Table 1: Demographics characteristics of the sample

Group	Sample population $n=302$	Excluded population $n=29$	P value
Gender			
Males	104	10	0.912
Females	198	19	
Athletic participation			
Athletes	111	13	0.253
Non-athletes	191	16	
Class level			
Freshman	43	4	0.989
Sophomore	86	9	
Junior	93	9	
Senior	80	7	

Discussion

This study investigated the relationship between gender and athletic participation using two validated and widely used questionnaires, the EAT-26 and the BSQ. The results indicate that gender and athletic status are independent of each other for increasing the risk of disordered eating but that there was a slight effect modification for body shape dissatisfaction. The findings demonstrate that females were at 5 times greater risk for body shape dissatisfaction and although not

Table 2: Logistic regression for the EAT-26

Predictors	EAT-26 unadjusted OR (95%, CI)	P value	EAT-26 adjusted OR (95%, CI)	P value
Gender				
Female ($n=198$)	2.27 (1.04, 4.92)	0.04*	2.09 (0.75, 4.60)	0.19
Male ($n=104$)	Ref	-	Ref	-
Athletic participation				
No ($n=191$)	2.54 (1.17, 5.51)	0.02*	1.90 (0.75, 4.10)	0.18
Yes ($n=111$)	Ref	-	Ref	-
Athletic status by gender	4.08 (0.95, 17.52)	0.06	1.11 (0.17, 7.24)	0.09
Class level				
Freshman ($n=43$)	8.91 (1.13, 70.27)	0.04*	5.87 (0.70, 48.97)	0.11
Sophomore ($n=86$)	0.75 (0.35, 1.62)	0.46	0.71 (0.32, 1.58)	0.39
Junior ($n=93$)	1.76 (0.74, 4.22)	0.20	1.52 (0.62, 3.73)	0.36
Senior ($n=80$)	Ref	-	Ref	-

*Significant of the level 0.05

Table 3: Logistic regression for the BSQ

Predictors	BSQ unadjusted OR (95%, CI)	P value	BSQ adjusted OR (95%, CI)	P value
Gender				
Female (n=198)	3.66 (1.72, 7.90)	<0.001*	5.95 (2.22, 16.18)	<0.001*
Male (n=104)	Ref	-	-	-
Athletic participation				
No (n=191)	3.14 (1.55, 6.33)	<0.001*	3.22 (1.31, 7.93)	<0.001*
Yes (n=111)	Ref	-	Ref	-
Athletic status by gender	2.77 (0.95, 8.08)	0.06	0.20 (0.39, 1.01)	0.05*
Class level				
Freshman (n=43)	11.12 (1.37, 90.15)	0.02*	7.46 (0.86, 59.69)	0.07
Sophomore (n=86)	1.05 (0.50, 2.19)	0.90	0.91 (0.42, 2.00)	0.82
Junior (n=93)	1.83 (0.83, 4.04)	0.14	1.77 (0.74, 4.22)	0.20
Senior (n=80)	Ref	-	-	-

*Significant of the level 0.05

significant, there is a trend toward higher risk for eating disorders than male college students, when controlling for other factors. That said, students who did not participate in a collegiate sport were at greater risk for body shape dissatisfaction. These results are consistent with DiBartolo and Shaffer's finding that non-athletes are at greater risk for eating disorders and body shape dissatisfaction.¹⁷ This paper's findings also highlight the perseverance of the relationship, between body shape dissatisfaction and female college students, especially, when compared with Klemchuk *et al.* study,²⁷ which also found high levels of body dissatisfaction among female college students. Another important finding is that the interaction between body dissatisfaction among female students who did not participate in a collegiate sport was significantly higher than female students who did participate after adjusting for other factors. A possible explanation for that collegiate athletes are physically active and have a team to belong to, these physical and psycho-social benefits may contribute to a reduction in stress, anxiety and offer an increase to self-esteem which may lead to a healthier bodily satisfaction.^{1,28,29} However, Hausenblas and McNally,³⁰ reported that athletes, who had higher rates of activity than lower active non-athletes had a higher prevalence of eating disorders. Our study's conclusion is not in agreement with the prevailing attitude that female athletes are at greater risk. Unfortunately, these results need to be tempered with the fact that this study had a relatively small sample size.

The fact that college classification yielded such high-risk levels for college freshman for body shape dissatisfaction and some risk for disordered eating should be addressed in future studies. The findings of college classification could also point to a deeper underlying behavior or affect, like stress, anxiety or depression as being more of a factor than gender or athletic status. This line of research has been thoroughly discussed and cogently explained in Frangos and Frangos's paper assessing eating disorder risk: The pivotal role of achievement anxiety,

depression and female gender.³¹ Their comprehensive path model identifies anxiety, particularly academic anxiety as a significant association for eating disorder risk. Although the results of the EAT-26 were not as significant as those from the BSQ, there was a high degree of concordance and directional similarities.

Limitations

This study employed a convenience sample, which does not guard against the chance of possible selection bias; which could have been a factor in this study and being a cross-sectional design, no causal attributions can be made as to why one group may be at a higher risk than another. Another limitation to note is that all results were self-reported, which could lead participants to under-report or over-report symptoms of an eating disorder, affecting results. Moreover, all participants were on the same college campus, and this could limit the generalizability of the results.

Conclusion

Body dissatisfaction remains a strong and stable affect among female college students. This paper also found that risk for body dissatisfaction is significantly greater in students who do not participate in collegiate athletics than those students who play college sports. When interaction between gender and athletic participation was assessed, it was found that the interaction term significantly modified the risk for body shape dissatisfaction but the significance of the interaction term was reduced when included as a predictor for eating disorders. Another important finding was that freshman students were at great risk for both eating disorders and body shape dissatisfaction. Although there seems to still be many unresolved issues regarding eating disorders, one thing is clear females are at higher risk, and it remains a significant challenge to college health services. College health practitioners should

be made aware of the significant effect stress has on freshman in particular.

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