original research

Eating Disorder Risk and the Role of Clothing in Collegiate Cheerleaders' Body Images

Toni M. Torres-McGehee, PhD, ATC*; Eva V. Monsma, PhD*; Thomas P. Dompier, PhD, ATC†; Stefanie A. Washburn, MS, ATC*

*Department of Physical Education and Athletic Training, University of South Carolina, Columbia; †Datalys Center, Indianapolis, IN

Context: With increased media coverage and competitive opportunities, cheerleaders may be facing an increase in eating disorder (ED) prevalence linked to clothing-related body image (BI).

Objective: To examine ED risk prevalence, pathogenic weight control behaviors, and variation in clothing-specific BI across position and academic status among collegiate cheerleaders.

Design: Cross-sectional study.

Setting: National Collegiate Athletic Association Division I and II institutions.

Patients or Other Participants: Female collegiate cheerleaders (n = 136, age = 20.4 ± 1.3 years, height = 160.2 ± 8.1 cm, weight = 57.2 ± 8.3 kg).

Main Outcome Measure(s): Participants self-reported height, weight, and desired weight and completed the Eating Attitudes Test. Body image perceptions in 3 clothing types (daily clothing, midriff uniform, full uniform) were assessed using sex-based silhouettes (body mass index = 18.3 kg/m² for silhouette 1, 23.1 kg/m² for silhouette 4).

Results: The ED risk for cheerleaders was estimated at 33.1%. However, when body mass index was controlled using backward stepwise logistic regression, flyers had greater odds (odds ratio = 4.4, 95% confidence interval = 1.5, 13.2, P = .008) of being at risk compared with bases, but no difference was noted between the base and back-spot positions (odds ratio = 1.9, 95% confidence interval = 0.5, 6.6, P = .333). A main effect of BI perceptions was seen (P < .001), with a significant interaction by clothing type ($F_{2,133}$ = 22.5, P < .001, η^2 = 0.14). Cheerleaders desired to be smaller than their perceived BIs for each clothing type, with the largest difference for midriff uniform (2.6 ± 0.8 versus 3.7 ± 0.9), followed by full uniform (2.7 ± 0.8 versus 3.5 ± 0.9) and daily clothing (2.8 ± 0.8 versus 3.5 ± 0.9).

Conclusions: Cheerleaders, especially flyers, appear to be at risk for EDs, with greatest BI dissatisfaction when wearing their most revealing uniforms (ie, midriffs). Universities, colleges, and the national governing bodies of these squads need to focus on preventing eating disorders and BI dissatisfaction and promoting self-esteem.

Key Words: athletes, body image dissatisfaction, self-esteem

Key Points

- Among these cheerleaders, flyers displayed the greatest body image dissatisfaction when dressed in their most revealing uniforms.
- Programs to prevent body image dissatisfaction and disordered eating and promote self-esteem should be undertaken by colleges and universities and national governing institutions.
- Holding cheerleaders to the same standards as other varsity athletes may help to reduce the prevalence of unhealthy behaviors to control or lose weight. Medical personnel should oversee screening for eating disorders.

Although the prevalence of eating disorders among athletes varies,[1–4] collegiate cheerleaders remain an understudied population in the literature on eating disorder risk. However, prevalence rates may be among the highest in athletes given the appearance demands of this aesthetic sport. Previous researchers estimated that 35% of female athletes were at risk for anorexia nervosa and 38% for bulimia nervosa[3] and that 31% of elite females in thin-build sports compared with 5.5% of the control population[5] and 25% of elite female athletes in endurance sports, aesthetic sports, and weight-class sports had clinical eating disorders compared with 9% of the general population.[6] Recently, Torres-McGehee et al[7] estimated that 29.7% of collegiate auxiliary units (dancers, color guard, majorettes) were at risk for eating

disorders and reported elevated body image dissatisfaction, suggesting that eating disorder prevalence may be a function of body image. Body image dissatisfaction may be an even greater concern among cheerleaders because of frequent media coverage, regular evaluations of their aesthetic qualities (ie, physiques), and physically demanding training regimes.

During the last decade, cheerleading squads have become more dynamic, competitive, and athletic and required greater physical demands and advanced skills (eg, tumbling, building pyramids, tossing). Media attention in the form of television coverage, close-ups, and associated preferences for scanty uniforms may be related to mechanisms underlying body image and eating disorder relationships in cheerleaders. Not only are cheerleaders expected to represent their institutions

at athletic events, they are required to coordinate spirit-raising events and maintain academic success. As in most aesthetic sports, the pressures to be thin and to look physically fit[5–7] are prominent in cheerleading because of the subjective evaluation embedded in selection and competition success. Cheerleaders are commonly judged not only on performance but also on overall appearance. Moreover, weight expectations (personal or others') may vary with squad position. For example, a base or a back spot may need to be stronger and, thus, heavier to adequately toss, catch, and hold a flyer, who is likely selected because of small size and may be expected to maintain the lightest weight possible to prevent injury to the base. Bases and back spots (who weigh more) may be constantly compared with flyers (who weigh less) and therefore feel more self-conscious about their bodies. Body image dissatisfaction and eating disorder prevalence likely vary by position, but we know of no researchers who have considered such position-specific differences.

Most studies of eating disorders and body image in cheerleaders are limited to adolescent participants[8–11] or contained very small sample sizes of collegiate cheerleaders (eg, Black et al [n = 9],[1] Greenleaf et al [n = 1],[2] Reel and Gill [n = 76][10]) or heterogeneous samples of lean-sport athletes, including cheerleaders,[12] that did not include estimates of eating disorder prevalence. A previous investigation[11] showed that adolescent cheerleaders did not appear to be at higher risk for eating disorders compared with girls in general; however, collegiate cheerleaders were not studied. Although research on collegiate cheerleaders is limited, these females may carry forward the same risk factors for eating disorder risk as do adolescent cheerleaders or girls in general. This notion was supported by Reel and Gill[10] when they demonstrated that body dissatisfaction predicted eating disorders in a sample of both adolescent and collegiate cheerleaders. Interestingly, 53% of the collegiate sample indicated that revealing team uniforms contributed to weight pressures,[10] suggesting that body image may depend on clothing type. It is reasonable to assume that body image dissatisfaction might be higher among cheerleaders when they are wearing open midriff uniforms compared with daily clothing or full uniforms.

Cheerleaders who may be increasingly dissatisfied with their body image in revealing uniforms may be at greater risk for disordered eating and the female athletic triad of low energy availability, menstrual cycle dysfunction, and compromised bone health.[13] Thus, the primary purposes of our study were to estimate eating disorder risk and examine pathogenic weight control behaviors in a sample of collegiate cheerleaders, comparing relative risk by position (ie, bases, flyers, back spots) and academic status. A second purpose was to determine the magnitude of body image dissatisfaction for clothing type (daily clothing, midriff uniform, or full uniform) across position and academic status. Based on the findings of Reel and Gill,[10] we expected body image dissatisfaction to be greatest with wearing of the midriff uniform.

METHODS

Participants

Thirty National Collegiate Athletic Association (NCAA) Division I and 10 Division II cheerleading coaches were contacted for access to female cheerleaders; 24 and 2 coaches, respectively, responded (65% team response rate). This yielded 340 possible cheerleading participants. Of those, 136 cheerleaders (40%) participated in the study (age range = 18 to 23 years, age = 20.4 ± 1.3 years, height = 160.2 ± 8.1 cm, weight = 57.2 ± 8.3 kg). They were categorized by position (54 bases, 61 flyers, 21 back spots) and academic status (48 freshmen, 42 sophomores, 21 juniors, 25 seniors).

Instrumentation

Personal Demographic and Anthropometric Data. Basic demographic data were collected through a questionnaire that included cheerleading position (ie, base, flyer, back spot) and academic status (ie, freshman, sophomore, junior, senior). Participants self-reported height, current weight, highest weight, lowest weight, and ideal weight. Although the potential for reporting bias exists and females are more likely to underreport their weight, previous authors[14] found that self-reported height and weight are generally valid in younger adults.

Eating Attitudes Test. The Eating Attitudes Test (EAT-26) was administered to screen for eating disorder characteristics and behaviors. This is a well-validated instrument, with reliability (internal consistency) of α = .90.[15] The α coefficient of the current study was .88. Although not diagnostic, the EAT-26 is commonly used as a screening tool to identify early characteristics and behaviors indicating the potential presence of an eating disorder.[15] It includes 3 subscales: dieting, bulimia, and food preoccupation/oral control. Five supplemental questions identify risky behaviors, such as binge eating; vomiting to control weight or shape; use of laxatives, diet pills, or diuretics to lose or to control weight; exercising more than 60 minutes per day to lose or control weight; and loss of 20 pounds or more in the past 6 months. The first 4 supplemental questions are evaluated on a Likert scale (1 = never, 2 = once a month or less, 3 = 2–3 times per month, 4 = once per week, 5 = 2–6 times per week, or 6 = once a day or more); the question about weight loss of 20 pounds or more was answered with yes or no. An individual is categorized as at risk for eating disorder attitudes and behaviors if the associated EAT-26 score is greater than 20 or if she meets the risk criteria for 1 supplemental question. If the EAT-26 score is lower than 20 and the individual does not meet the risk for behavioral criteria on the supplemental questions, then she is considered not at risk for eating disorder characteristics and behaviors.

Gender-Specific BMI Figural Stimuli Silhouette (SIL). The Figural Stimuli Survey was used to assess body disturbance based on perceived and desired body images (Figure).[16] In a sample of 16 728 white females ranging in age from 18–100 years, Bulik et al[17] extended the work of Stunkard et al[16] by associating specific BMI anchors with each image, thereby enhancing the practical use of the scale. The Figural Stimuli Survey scale (Figure) consists of sex-specific BMI figural stimuli SILs associated with Likert-type ratings of oneself against 9 SILs; each SIL is associated with a number that represents a specific BMI ranging from 18.3–45.4 kg/m^2 (ie, SIL 1 = 18.3, SIL 2 = 19.3, SIL 3 = 20.9, SIL 4 = 23.1).[17] In previous research,[18] the sex-specific BMI figural stimuli SIL test-retest analysis
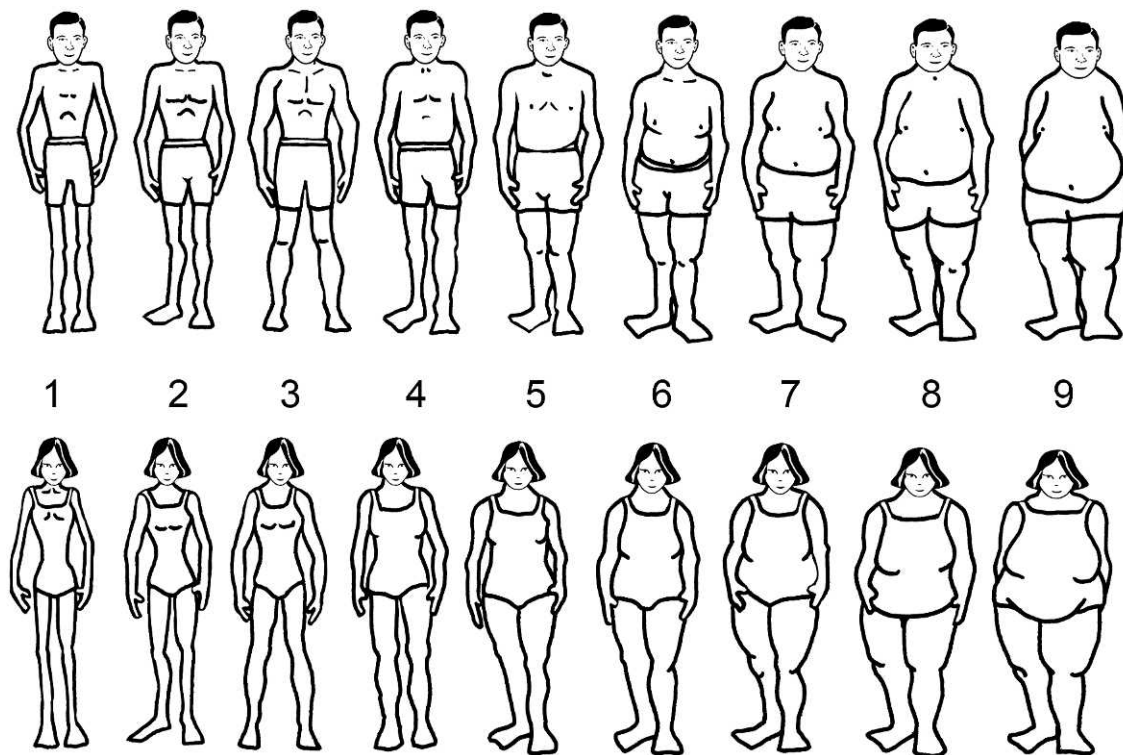
Figure. Standard figural stimuli reprinted with permission from Stunkard et al.[16] Body mass anchors: silhouette 1 = 18.3, 2 = 19.3, 3 = 20.9, 4 = 23.1, 5 = 26.2, 6 = 29.9, 7 = 34.3, 8 = 38.6, 9 = 45.4.[17]

for females' current body image was $r = 0.85$ ($P < .0001$) and for ideal body image was $r = 0.82$ ($P < .0001$). Validity coefficients using Pearson r correlations ranged from 0.69–0.84 for comparisons between perceived BMI values and actual BMI measures.[19]

Consistent with earlier investigations,[7,20] we used SIL surveys as a basis of comparison for questions about perceived and desired body image in daily clothing versus uniform (full or midriff). Participants were asked to select an SIL (numbered 1–9) that best represented (a) "how you appear in normal daily clothing (eg, what you wear to school)," (b) "how you would prefer to appear in your normal daily clothing," (c) "how you appear in a midriff uniform," d) "how you would prefer to appear in a midriff uniform," (e) "how you appear in a full-length uniform," and (f) "how you would prefer to appear in a full-length uniform." Scores were recoded based on the BMI value associated with each score.[17] Self-reported BMI was used to compare each person's actual body size with the associated SIL for the 6 questions.

Procedures

After we acquired approval from the University of South Carolina Institutional Review Board, participants completed the personal information survey, cheerleading background, Eating Attitudes Test-26, and sex-specific BMI base silhouette questionnaire.[15,16] All surveys were distributed via e-mail through SurveyMonkey.com (Palo Alto, CA). At 10 and 20 days after the initial notification e-mail was sent, a follow-up reminder e-mail was sent to nonrespondents. The survey was open for a total of 30 days.

Data Analysis

We used SPSS (version XVII; SPSS Inc, Chicago, IL) for all analyses. The sample size was determined using an α of .05 and a moderate effect size using the Cohen method.[21] Our a priori sample size estimate indicated that we needed 125 participants. Both univariate and multivariate (logistic regression) analyses were conducted to compare eating disorder risk (at risk or not at risk) as the dichotomous dependent variable. The independent variables were position, educational status, and BMI; BMI was included in the multivariate model because analysis of variance revealed differences in physical measurements across position (Table 1). Height and weight were not included in the multivariate model because of their covariance with BMI. Overall risk and risk by position and educational status were calculated by dividing the number of cheerleaders at risk by the number of cheerleaders in each group. Relative risks with 95% confidence intervals (CIs) were calculated with base position and freshman serving as the reference groups.[22] Backward stepwise logistic regression was used to compare eating disorder risk by position while controlling for educational status and BMI and is reported as odds ratios with 95% CIs.

Body image dissatisfaction was examined with the Likert SIL anchor data and a 3 (position: base, flyer, back spot) × 3 (clothing type: SIL daily clothing, SIL midriff uniform, SIL full uniform) × 2 (perceived body image, desired body image) analysis of variance with repeated measures on the last 2 factors. Tukey post hoc analyses were used to examine pairwise comparisons across cheerleading positions. The Mauchly test of sphericity was performed to determine whether a correction factor should be applied. An a priori α level was set at .05. We provide the BMI-

Table 1. Cheerleaders' Physical Measurements by Position

| | Sample, Mean ± SD | | | | | |
	Total	Bases (n = 54)	Flyers (n = 61)	Back Spots (n = 21)	F Value	P Value
Height, cm[a]						
Self-reported	160.2 ± 8.1	161.2 ± 6.9	155.8 ± 6.8	170.4 ± 3.3	41.5	<.001
Weight,[a] kg						
Self-reported	57.2 ± 8.3	62.3 ± 5.9	50.4 ± 4.8	63.5 ± 7.0	80.5	<.001
Ideal	53.7 ± 6.6	57.6 ± 5.1	48.5 ± 4.2	58.6 ± 4.6	61.6	<.001
Highest	60.0 ± 9.2	65.4 ± 6.8	52.9 ± 6.0	66.6 ± 8.3	59.1	<.001
Lowest	52.7 ± 7.1	57.1 ± 5.2	47.3 ± 4.6	52.7 ± 7.1	69.3	<.001
Self-reported ideal	3.4 ± 4.3	4.7 ± 3.9	1.9 ± 2.1	4.9 ± 7.5	8.5	<.001
Body mass index,[b] kg/m^2						
Self-reported	22.3 ± 2.8	24.1 ± 2.8	20.8 ± 1.8	21.9 ± 2.4	28.8	<.001

[a] Flyers < bases and back spots.
[b] Bases > flyers and back spots.

based SIL means established by Bulik et al[17] for comparative purposes, but we did not use these in statistical analyses examining body image variation across groups because the uneven intervals between BMI values associated with incremental Likert anchors would inherently inflate the type I error rate.

RESULTS

Physical measurements (height, weight, BMI, etc) for all cheerleaders and by cheerleading position are reported in Table 1. Differences were evident across position (bases, flyers, back spots) for all weight variables, with Tukey post hoc analyses indicating that flyers were smaller than both back spots and bases for all variables. Height differences were noted among groups; flyers were the shortest, followed by bases, who had higher BMIs than both flyers and back spots ($P < .01$).

Comparison of Eating Disorder Risk and Pathogenic Weight Control Behaviors

The overall likelihood of being at risk for eating disorders was 33.1% (95% CI = 25.2%, 41.0%) for all cheerleaders. Flyers were at greatest risk for eating disorders (36.1%, 95% CI = 24.0%, 48.1%), and back spots were at lowest risk (28.6%, 95% CI = 9.25%, 47.9%; Table 2). College seniors had the highest risk (48.0%, 95% CI = 28.4%, 67.6%), and juniors had the lowest risk (19.1%, 95% CI = 2.3%, 35.84%); however, the cell frequency for juniors was

less than 5, making it an unreliable estimate. Comparison across groups revealed no significant relative risks on univariate analysis of categorical variables (Table 2). Yet when controlling for BMI using backward stepwise logistic regression, flyers had greater odds (odds ratio = 4.4, 95% CI = 1.5, 13.2, $P = .008$) of being at risk than bases, but no difference was seen between the base and back-spot positions (odds ratio = 1.9, 95% CI = 0.5, 6.6, $P = .333$). Body mass index remained significant (odds ratio = 1.5, 1.2, 1.8, $P < .001$), indicating a 0.368 increase in the log odds of being at risk for each unit increase in BMI. Academic status was eliminated from the model. Forty-five participants (33.1%) were classified as at risk for eating disorders based on behaviors (n = 40), EAT-26 subscales alone (n = 0), or both behaviors and EAT-26 subscales (n = 5). With regard to pathogenic weight control behaviors overall, 11.8% (n = 16) reported binge eating at least 2–3 times a month; 9.6% (n = 13) vomited to control weight or shape at least once a month; 19.9% (n = 27) used laxatives, diet pills, or diuretics to control weight at least once a month; 1.5% (n = 2) exercised for more than 60 minutes at least once a day to control weight or shape; and 2.2% (n = 3) reported losing 20 pounds or more in the past 6 months (Table 3).

Body Image

Repeated-measures analysis of variance indicated a clothing type-by-cheerleading position interaction ($F_{2,133} = 13.8$, $P < .001$, $\eta^2 = 0.17$). Tukey post hoc tests revealed

Table 2. Frequencies and Proportions of Cheerleaders At Risk and Not At Risk for Eating Disorders by Position and Educational Status

| | | Frequencies | | Proportion | | |
	n	At Risk	Not at Risk	at Risk, %[a]	Relative Risk	95% Confidence Interval
Position						
Base	54	17	37	31.5	Referent	NA
Flyer	61	22	39	36.1	1.15	0.68, 1.92
Back spot	21	6	15	28.6	0.91	0.42, 1.98
Educational status						
Freshman	48	16	32	33.3	Referent	NA
Sophomore	42	13	29	31.0	0.93	0.51, 1.70
Junior	21	4[b]	17	19.1	0.57	0.22. 1.51
Senior	25	12	13	48.0	1.44	0.81, 2.55

Abbreviation: NA indicates not applicable.
[a] Overall proportion at risk = 33.10%.
[b] Cell frequencies of less than 5 may be unreliable.

Table 3. Comparison of Prevalence Rates (Proportions, %) of Pathogenic Behaviors Among Cheerleaders and Other Female Athletes

	Current Study	Torres-McGehee et al, 2011[20]	Torres-McGehee et al, 2009[7]	Greenleaf et al, 2009[2]	Carter and Rudd, 2005[12]	Johnson et al, 1999[3]	Black and Burckes-Miller, 1988[23]
Sample size	136	138	101	204	2001: 353 2002: 355	562	382
Athletes	Cheerleaders	Equestrian	Auxiliary Units	Mixed	Mixed	Mixed	Mixed
Pathogenic behavior							
Binge eating	11.8	24.6	14.9	15.2	7.1–6.2	16.2	NA
Vomiting	9.6	11.6	9.9	2.9	1.7–2.8	6.4	7.3
Laxatives	19.9[a]	15.2[a]	18.9[a]	0.98	4.6–2.3	1.78	4.5
Diet pills, dieting	NA	NA	NA	15.7	NA	1.42	15.3
Diuretics	NA	NA	NA	1.5	NA	0.53	4.2
Exercise	1.5	NA	NA	25.5	NA	NA	53.1
Thoughts of suicide[b]	NA	3.6	0.0	NA	NA	NA	NA
Lost 20 lb or more	2.2	NA	NA	NA	NA	NA	NA

Abbreviation: NA indicates no reported measures for these variables.

[a] Included laxatives, diet pills, and diuretics in 1 question.

[b] The previous version of the Eating Attitudes Test-26 included the question "Have you ever thought of or attempted suicide"? The question is not included in the current version, which we used in our study.

differences between flyers and bases ($P < .001$), with the greatest discrepancy between perceived and ideal body images for each clothing type. The body image perception-by-clothing type interaction was significant ($F_{2,133} = 22.5$, $P < .001$, $\eta^2 = 0.14$): cheerleaders desired to be smaller than their perceived body image for each of the clothing types, with the largest difference for midriff uniform (2.6 ± 0.8 versus 3.7 ± 0.9) compared with daily clothing (2.8 ± 0.8 versus 3.5 ± 0.9) and full uniform (2.7 ± 0.8 versus 3.5 ± 0.9; Table 4).

DISCUSSION

This study is unique because we estimated the prevalence of eating disorder risk behaviors and examined risk within individual cheerleading positions (base, flyer, back spot) in the largest known sample of collegiate cheerleaders. The prevalence estimate for eating disorder risk for all cheerleaders was 33%, which is consistent with other studies examining athletes in aesthetic sports[1,2,5,6,23] and performance squads.[7,10,11,25] More specifically, Black et al[1] estimated their highest eating disorder prevalence to be among cheerleaders (33%); however, only 9 cheerleaders were included. Eating disorder risk in other aesthetic-sport

groups (aerobics, auxiliary performers, cross-country, diving, figure skating, gymnastics, modern dance) ranged from 24% to 50%,[1,2,6] with gymnastics highest at 50% and cheerleading most similar to auxiliary performers (ie, dancers, color guard, and majorettes) at 29.7%.[7] In contrast, a recent study[26] examining dieting attitudes using the EAT-26 in female college students (n = 299) revealed a lower percentage (12.9%) of these students at risk for disturbed eating tendencies or behaviors.

After we controlled for BMI and academic status, logistic regression showed that flyers were at higher risk than bases and back spots, indicating that the cheerleaders in this sample were not at equal risk for eating disorders across positions. Flyers were also smaller (weighed less) than back spots and bases, suggesting possible selection bias. Flyers may be either selected or self-selected into these positions based on size and may, therefore, be more at risk for eating disorders, independent of position. Although no differences were evident for the total at-risk sample by academic status, freshmen and seniors had the highest prevalence for eating disorder risk (Table 2). In the multivariate model, flyers and those with higher BMIs were more likely to be at risk for eating disorders; however, the overall incidence was greater than 10%, so the odds ratios may be inflated.[27] Subsequent

Table 4. Descriptive Statistics for Cheerleaders' Self-Reported Body Mass Index and Body Mass Index and Likert Silhouette Anchor Means for Clothing Type Body Image Variables

Variable	Silhouette	Image Perception	Anchor Mean ± SD by Position			
			All (n = 136)	Base (n = 54)	Flyer (n = 61)	Back Spot (n = 21)
Self-reported body mass index, kg/m²			22.3 ± 2.8	24.1 ± 2.8	20.8 ± 1.8	21.9 ± 2.4
Body mass index, kg/m²	Daily clothing	Perceived	22.2 ± 2.0	23.2 ± 1.9	21.5 ± 1.9	22.1 ± 1.8
		Desired	20.7 ± 1.4	21.2 ± 1.4	20.2 ± 1.2	20.6 ± 1.3
	Midriff uniform	Perceived	22.7 ± 2.6	23.4 ± 2.3	22.1 ± 2.8	22.8 ± 2.5
		Desired	20.3 ± 1.3	20.7 ± 1.3	19.9 ± 1.2	20.2 ± 1.1
	Full uniform	Perceived	22.1 ± 1.9	23.0 ± 1.7	21.4 ± 2.0	22.0 ± 1.8
		Desired	20.6 ± 1.4	21.1 ± 1.5	20.1 ± 1.2	20.4 ± 1.2
Likert scale[a]	Daily clothing	Perceived	3.5 ± 0.9	3.9 ± 0.7	3.2 ± 0.9	3.5 ± 0.9
		Desired	2.8 ± 0.8	3.1 ± 0.7	2.5 ± 0.7	2.8 ± 0.7
	Midriff uniform	Perceived	3.7 ± 0.9	4.0 ± 0.9	3.4 ± 1.1	3.7 ± 1.2
		Desired	2.6 ± 0.8	2.8 ± 0.8	2.3 ± 0.7	2.5 ± 0.7
	Full uniform	Perceived	3.5 ± 0.9	3.9 ± 0.7	3.1 ± 0.9	3.4 ± 0.9
		Desired	2.7 ± 0.8	3.0 ± 0.8	2.5 ± 0.7	2.7 ± 0.7

[a] Likert scale: 1 = *18.3 kg/m²*, 2 = *19.3 kg/m²*, 3 = *20.9 kg/m²*, 4 = *23.1 kg/m²*.

authors should track eating disorder risk across years in college to better understand contributing mechanisms and pinpoint context-sensitive intervention targets.

Pathogenic Behaviors

The pathogenic behaviors of the NCAA cheerleaders in our study included misuse of laxatives, diuretics, or other medications and were consistent with recent findings on auxiliary performers (ie, dancers, color guard, majorettes)[7] and equestrian athletes.[20] However, the prevalence in this sample was significantly higher than in other studies of NCAA varsity sport athletes (Table 3), particularly for the use of diet pills, laxatives, or diuretics to lose or control weight. This is especially concerning because cheerleading is not considered an NCAA varsity sport, and so cheerleaders are not protected by NCAA rules regarding the use of dietary supplements and weight loss agents. Varsity Brands, Inc is the parent company of the largest national cheer organization and has partnered with the NCAA to establish risk management guidelines for cheer squads. However, eating disorder risk in these collegiate women may require additional vigilance until the NCAA or other governing bodies implement balanced policies to address this issue.

Body Image

The trend for body image dissatisfaction in cheerleaders is similar to that for the general female college student population: in general, females possess less body image satisfaction.[28] However, body image in cheerleading may have ties to both social and culturally driven pressures to achieve a certain body shape and contextual demands for thinness to maximize performance.[29] Accordingly, we examined the role of body image dissatisfaction from the perspective of clothing type (daily clothing, midriff uniform, full uniform). Although no differences in body image dissatisfaction were observed across cheerleading position or academic status, our findings were consistent with recent studies[7,20] on collegiate auxiliary dancers and equestrians that used SILs to examine body image dissatisfaction across clothing type. In all samples, desired SILs were significantly smaller than perceived SILs, implying that, like equestrians and auxiliary performers, cheerleaders were dissatisfied with their bodies. Not surprisingly, when clothing type was considered, cheerleaders had the greatest degree of body image dissatisfaction with the midriff uniform (Table 3), confirming Reel and Gill's[10] earlier findings that revealing team uniforms contribute to weight pressures among cheerleaders. The role of revealing uniforms in body image dissatisfaction is important because uniforms have become increasingly revealing during the past 15 years, likely as a function of media coverage. This added pressure may cultivate cheerleaders' mindsets for unhealthy body comparisons, competitive thinness, and pressures to look "good" (thin), especially in those who appear on national television (and hear that "TV adds 10 pounds").[30] Subsequent investigators should examine the role of national television appearances more carefully to understand the possible effects of media-related pressures.

With the popularity and competitiveness of collegiate cheerleading continually increasing, the prevalence of eating disorder risk and body image dissatisfaction within the sport has the potential to increase as well. Our findings show that collegiate cheerleaders are at risk for eating disorders and exhibit body image dissatisfaction in patterns similar to those of other collegiate nonvarsity sport performers.[7] Understanding how cheerleaders perceive their bodies can have practical implications for their weight loss behaviors and mental status. Our study confirms the need to examine the high percentage of pathogenic behaviors to control or lose weight, independent of eating disorder status, especially in understudied aesthetic populations. In addition, the external pressures on body image dissatisfaction indicate an increased risk for developing eating disordered thoughts and behaviors. An external factor contributing to this increase in body image dissatisfaction was uniform type (eg, midriff or full uniform); however, previous researchers[10,31] have implicated cheerleading coaches as influential in weight loss pressures. Identifying perceived body images from social agents associated with the home (eg, parents and peers) and athletic environment (eg, coaches) should be considered for future research.

Limitations

Although this study revealed several body image characteristics and underlying mechanisms of eating disorders in cheerleaders, the following limitations should be recognized. First, only female cheerleaders were investigated; with the growth of mixed-sex squads, future researchers need to examine eating disorders and body images in male cheerleaders. Our 40% response rate for an Internet-based survey is good, but it is low for estimating prevalence rates in a population and may result in a biased estimate. Second, the EAT-26 was used to screen for eating attitudes and behaviors. This is a widely used and psychometrically sound instrument, yet it is not an accurate diagnostic instrument by itself. Because we screened for and did not diagnose eating disorder characteristics and behaviors, we cannot definitely conclude that the collegiate cheerleaders classified as at risk actually had eating disorders. Obsessive dieters without morbid concerns and generally disturbed individuals who respond positively on surveys without having significant eating concerns could have also inflated the EAT-26 scores in the absence of a diagnosable eating disorder.[32,33] Given the scoring of the EAT-26, it is also possible to have similar EAT-26 total score mean values for those athletes classified as at risk and not at risk (eg, not at risk with a total EAT-26 score less than 20 but reported as at risk due to answers on the behavioral questions). Finally, silhouettes were used to determine BI dissatisfaction. Although this is only a small snapshot of the construct, some of the longer and more common instruments that include body-related perceptions are fee based or time consuming (eg, Eating Disorder Inventory-3 and Eating Disorder Evaluation). In addition, these longer instruments can be impractical, especially in nonclinical settings. Thus, these findings should be interpreted with caution.

CONCLUSIONS

Initiating more preventive actions will help decrease the risk to young female cheerleaders. Currently, cheerleaders are bound only by the college or university rules regarding drug testing, but monitoring them (like other varsity student-athletes) for the use of weight loss supplements

permitted by the NCAA may help to decrease the risk of unhealthy weight loss behaviors. The NCAA does acknowledge the importance of early recognition of the female athlete triad[34] and supports integrating screening for indicators. However, as in auxiliary performers,[7] the NCAA does not require a preparticipation physical examination for collegiate cheerleaders. Interestingly, in 2006, NCAA and Varsity Brands, Inc,[35] collaborated to undertake a risk management initiative that includes cheerleading in the NCAA's Catastrophic Injury Insurance Program, which requires cheerleading squads to be supervised by a safety-certified coach or advisor, but they do not require any additional medical personnel (eg, athletic trainer, team physician, dietitian, counselor). Providing collegiate cheerleading squads with medical personnel may help in the early identification of signs and symptoms of eating disorders (including body image dissatisfaction), so that prompt, appropriate referrals can be initiated.

In summary, coaches, universities and colleges, and national governing bodies of these squads need to focus on programs for preventing body image dissatisfaction and disordered eating and promoting self-esteem. Targeting the governing bodies for cheerleading (eg, American Association of Cheerleading Coaches & Administrators) when advocating to include education about preventing and recognizing eating disorders in cheerleading and spirit squad members could help to decrease the risk. Implementing policies to address the possible use of banned substances or weight loss agents by the NCAA would protect cheerleaders by holding them to the same standards as athletes competing in other varsity sports and may help limit unhealthy behaviors (eg, taking banned dietary supplements) to control weight or lose weight. Until the NCAA recognizes cheerleading as a varsity sport, cheerleading coaches and the current governing bodies of these squads need to focus on programs for preventing body image dissatisfaction and disordered eating and promoting self-esteem. They should also require medical personnel to oversee screening for eating disorders.

ACKNOWLEDGMENTS

REFERENCES

1. Black DR, Larkin LJ, Coster DC, Leverenz LJ, Abood DA. Physiologic screening test for eating disorders/disordered eating among female collegiate athletes. *J Athl Train*. 2003;38(4):268–297.
2. Greenleaf C, Petrie TA, Carter J, Reel JJ. Female collegiate athletes: prevalence of eating disorders and disordered eating behaviors. *J Am Coll Health*. 2009;57(5):489–495.
3. Johnson C, Powers PS, Dick R. Athletes and eating disorders: the National Collegiate Athletic Association study. *Int J Eat Disord*. 1999;26(2):179–188.
4. Smolak L, Murnen SK, Ruble AE. Female athletes and eating problems: a meta-analysis. *Int J Eat Disord*. 2000;27(4):371–380.
5. Byrne S, McLean N. Elite athletes: effects of the pressure to be thin. *J Sci Med Sport*. 2002;5(2):80–94.
6. Sundgot-Borgen J, Torstveit MK. Prevalence of eating disorders in elite athletes is higher than in the general population. *Clin J Sport Med*. 2004;14(1):25–32.
7. Torres-McGehee TM, Green JM, Leeper JD, Leaver-Dunn D, Richardson M, Bishop PA. Body image, anthropometric measures, and eating-disorder prevalance in auxiliary unit members. *J Athl Train*. 2009;44(4):418–426.
8. Gottlieb A. Cheerleaders are athletes too. *Pediatr Nurs*. 1994;20(6):630–633.
9. Lundholm JK, Littrell JM. Desire for thinness among high school cheerleaders: relationship to disordered eating and weight control behaviors. *Adolescence*. 1986;21(83):573–579.
10. Reel JJ, Gill DL. Psychosocial factors related to eating disorders among high school and college female cheerleaders. *Sport Psychol*. 1996;10:195–206.
11. Thompson SH, Digsby S. A preliminary survey of dieting, body dissatisfaction, and eating problems among high school cheerleaders. *J Sch Health*. 2004;74(3):85–90.
12. Carter JE, Rudd NA. Disordered eating assessment for college student-athletes. *Women Sport Phys Act J*. 2005;14(1):62–71.
13. Nattiv A, Loucks AB, Manore MM, Sanborn CF, Sundgot-Borgen J, Warren MP; ACSM. American College of Sports Medicine position stand: the female athlete triad. *Med Sci Sports Exerc*. 2007;39(10):1867–1882.
14. Kuczmarski MF, Kuczmarski RJ. Najjar M. Effects of age on validity of self-reported height, weight, and body mass index: findings from the Third National Health and Nutrition Examination Survey, 1988–1994. *J Am Diet Assoc*. 2001;101(10):28–34.
15. Garner DM, Olmstead MP, Bohr Y, Garfinkel PE. The Eating Attitudes Test: psychometric features and clinical correlates. *Psychol Med*. 1982;12(4):871–878.
16. Stunkard AJ, Srensen T, Schulsinger F. Use of the Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis*. 1983;60:115–120.
17. Bulik CM, Wade TD, Heath AC, Martin NG, Stunkard AJ, Eaves LJ. Relating body mass index to figural stimuli population-based normative data for Caucasians. *Int J Obes Relat Metab Disord*. 2001;25(10):1517–1524.
18. Peterson M, Ellenberg D, Crossan S. Body-image perceptions: reliability of a BMI-based Silhouette Matching Test. *Am J Health Behav*. 2003;27(4):355–363.
19. Peterson M, Orsega-Smith E, Tholstrup L. Validity of the body mass index silhouette matching test. *Am J Health Behav*. 2004;28(5):437–443.
20. Torres-McGehee TM, Monsma EV, Gay JL, Minton DM, Mady-Foster AN. Prevalence of eating disorder risk and body image distortion among National Collegiate Athletic Association Division I varsity equestrian athletes. *J Athl Train*. 2011;46(4):431–437.
21. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988:145–178.
22. Knowles SB, Marshall SW, Guskiewicz KM. Issues in estimating risks and rates in sports injury research. *J Athl Train*. 2006;41(2):207–215.
23. Sundgot-Borgen J. Prevalence of eating disorders in elite female athletes. *Int J Sport Nutr*. 1993;3(1):29–40.
24. Black DR, Burckes-Miller ME. Male and female college athletes: use of anorexia nervosa and bulimia nervosa weight loss methods. *Res Q Exerc Sport*. 1988;59(3):252–256.
25. Taub DE, Blinde EM. Eating disorders among adolescent female athletes: influence of athletic participation and sport team membership. *Adolescence*. 1992;27(108):833–848.
26. Sira N, Pawlak R. Prevalence of overweight and obesity, and dieting attitudes among Caucasian and African American college students in Eastern North Carolina: a cross-sectional survey. *Nutr Res Pract*. 2010;4(1):36–42.
27. McNutt LA, Wu C, Xue X, Hafner JP. Estimating the relative risk in cohort studies and clinical trials of common outcomes. *Am J Epidemiol*. 2003;157(10):940–943.
28. Frederick DA, Forbes GB, Grigorian KE, Jarcho JM. The UCLA Body Project 1: gender and ethnic differences in self-objectification

and body satisfaction among 2,206 undergraduates. *Sex Roles*. 2007;57(5–6):317–327.

29. Bonci CM, Bonci LJ, Granger LR, et al. National Athletic Trainers' Association position statement: preventing, detecting, and managing disordered eating in athletes. *J Athl Train*. 2008;43(1):80–108.

30. Thompson RA. The last word: cheerleader weight standards. *Eating Disord*. 2003;11(1):87–90.

31. Petrie TA, Greenleaf C, Reel J, Carter J. Personality and psychological factors as predictors of disordered eating among female collegiate athletes. *Eat Disord*. 2009;17(4):302–321.

32. Fairburn CG, Wilson GT. The eating disorder examination. In: Fairburn CG, Wilson GT, eds. *Binge Eating: Nature, Assessment and Treatment*. 12th ed. New York, NY: Guilford Press; 1993:317–360.

33. Wilfley DE, Schwartz MB, Spurrell EB, Fairburn CG. Using the Eating Disorder Examination to identify the specific psychopathology of binge eating disorder. *Int J Eat Disord*. 2000;27(3):259–269.

34. Sherman R, Thompson R, National Collegiate Athletic Association. *NCAA Coaches handbook: managing the female athlete triad*. http://www.ncaa.org/wps/wcm/connect/2db7d8004e0db26bac18fc1ad6fc8b25/female_athlete_triad.pdf?MOD=AJPERES&CACHEID=2db7d8004e0db26bac18fc1ad6fc8b25. Accessed December 14, 2010.

35. National Collegiate Athletic Association. *Cheerleading insurance coverage information*. http://www.ncaa.org/wps/portal/ncaahome?WCM_GLOBAL_CONTEXT=/ncaa/NCAA/About+The+NCAA/Budget+and+Finances/Insurance/CoverageSummary.doc. Accessed May 16, 2011.

Address correspondence to Toni M. Torres-McGehee, PhD, ATC, Physical Education and Athletic Training, University of South Carolina, 1300 Wheat Street, Blatt PE Center 218, Columbia, SC 29208. Address e-mail to torresmc@mailbox.sc.edu.