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RESEARCH

Differences in Body Composition Affect Weight Control Practices and Body Image Satisfaction in College Students

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The purpose of the present study was to assess weight control practices, body image, exercise habits and body composition among college students. 81 female and 20 male participants (age: 21 ± 1 yrs, Body Mass Index (BMI): 23 ± 3 kg/m², body fat percentage (BF%): 22 ± 5%) were recruited. Participants were asked to complete the following questionnaires: 69-item Multidimensional Body-Self Relations Questionnaires (MBSRQ-69), Weight Control Practices (WCP), Exercise Dependence Scale (EDS) and Sedentary Behavior (SBQ). Participants were divided into four groups based on gender classifications of BF%. Appearance Evaluation, Fitness Evaluation and Orientation, Overweight Preoccupation, Self-Classification of Weight, and Body Area Satisfaction subscales of MBSRQ were significantly different ($p < 0.05$) among groups. In addition, there was a significant difference ($p = 0.004$) in WCP, but not in EDS or SBQ ($p > 0.05$). Participants with higher BF% engaged in more WCP. College students with higher body fat were less satisfied with their body image and therefore engaged in more weight control practices.

Keywords: weight perception; physical activity; students; self-image; overweight; body fat; weight preoccupation; fitness orientation; weight management

Introduction

College is a critical time in one's health, where lifestyle habits are created that persist far beyond graduation (Zuercher & Kranz 2012), making studies pertaining to college-aged populations so important. College is a time when individuals experience many changes that come with leaving home for, what is for most individuals, the first time. There is a shift from home cooking to cafeteria dining and meals on-the-go, from organized sports and athletic teams to scheduled campus recreation visits, and from a bedtime of 10 PM to all-nighters while studying for the next big exam (Yahia et al. 2011). This critical transition period between high school and college is marked by high levels of stress leading to unhealthy coping behaviors, and often students experience changes in body composition, decline in physical activity, adoption of unhealthy eating habits and sleep patterns, and an increase in alcohol consumption (Price et al. 2016).

Weight management is something university students struggle with, as is time management (Greene & Maggs 2017). However, rather than focusing on improving sleep, nutrition, and exercise, which would lead to a healthier lifestyle altogether, students want the quickest fix (Malinauskas et al. 2006; Yahia et al. 2011). Students may experiment with food restrictions, supplement use and fad diets in fear of weight gain (Malinauskas et al. 2006) which may put them at increased risk for developing health related problems (i.e. hypertension, diabetes, metabolic syndrome, etc) both in the short and long term (Zuercher & Kranz 2012). Dieting is a popular phenomenon among college-aged females as a method to obtain and maintain their desired appearance (Yahia et al. 2011). However, it has been shown that males were equally as likely as females to use food manipulation and adopt unhealthy habits for weight control (Bhurtun & Jeewon 2013). At times this pressure tends to go too far and lead to unhealthy practices starting at a very young age (Yahia et al. 2011). The emergence of dieting among girls is most prevalent at 13 and 14 years

of age and continues into adulthood (Huon & Lim 2000). In fact, females as young as 12 years old tried to lose weight, with 44% restricting food intake and 78% using exercise (Abraham & O'Dea 2000). Although dieting remains popular, there have been many findings supporting the fact that dieting and engaging in unhealthy weight control practices to manage one's weight is often ineffective (Malinauskas et al. 2006).

Differences in body composition can positively or negatively affect one's perception of healthy and attractive weight. Previously, lower perceived healthy weight and attractive weight was observed more so in overweight and obese compared to normal weight individuals (Malinauskas et al. 2006). Many unhealthy dieting and exercise behaviors stem from the way in which individuals perceive themselves. Previous studies (Harring et al. 2010; Latimer et al. 2013; Gonsalves et al. 2014), show that the way an individual perceives oneself is a strong indicator of the type of healthy or unhealthy weight control behaviors one may partake in. Using tools such as the Multidimensional Body-Self Relations Questionnaire (MBSRQ) and the Exercise Dependence Scale (EDS), one study (Hausenblas & Fallon 2002) determined that BMI was the strongest predictor of body satisfaction and social physique anxiety for female participants. However, in males, the strongest predictor of body satisfaction and social physique anxiety was exercise behavior. Therefore, using a multidimensional approach to assessing perception of body image and composition would allow to explore gender difference further.

Body image and composition dissatisfaction may lead to lower self-esteem, health concerns and engagement in unhealthy weight control practices (Lupi et al. 2015; Williams et al. 2007). Therefore, this study took a multidimensional approach to the analysis of weight perception, body composition, and weight control practices in college-age students. The purpose of this study was to obtain a preliminary understanding of the types of weight control practices, reasons for choosing a certain practice, weight perceptions, sedentary behavior and body composition among college males and females.

Methods

Participants

College-age male (n = 20) and female (n = 81) students participated in this study during the months of April to August 2017. Participants were recruited via word of mouth and social media from a small, primarily white (81%), ~60% female, private liberal arts university in North Carolina. Prior to participation, procedures were explained, and informed consent was obtained from all participants. A demographics questionnaire was used to determine class standing, involvement in extracurricular campus activities (i.e. fraternity or sorority, sport team, academic club, etc.), and living off or on campus. Additionally, participants completed current health and medical history questionnaires. The local Institutional Review Board for Human Subject Research reviewed and approved study procedures.

Protocol

Participants reported to the lab on the day of the testing. Participants' physical characteristics, body image, weight control practices, dietary influences, exercise dependence and sedentary behavior were assessed during one hour laboratory session.

Physical characteristics of participants including weight and height were measured using standard procedures. Height was measured to the nearest 0.5 cm, and weight was measured to the nearest 0.1 kg using a scale and stadiometer (SECA, Chino, CA). Waist and hip circumference were measured at the smallest waist and largest hip circumference by the trained researcher following the same procedures, and the average of two trials were recorded. A non-invasive test procedure was used to measure body composition with a Biodynamics BIA 450 Bioimpedance Analyzer (Biodynamics Corporation, Shoreline, WA). Participants were asked to report to the laboratory after at least an eight hour overnight fast in a well-hydrated state. Participant mass distribution including lean body mass, fat mass, body fat percentage (BF%), body mass index (BMI), and basal metabolic rate (BMR) were recorded.

Resting blood pressure was measured using an Omron 7 Series wrist blood pressure monitor (Omron Healthcare Inc., Lake Forest, IL) following standardized procedure provided by the manufacturer. Participant blood pressure was measured on the right side after remaining sedentary for at least 5 minutes.

A 69-item Multidimensional Body-Self Relations Questionnaire (MBSRQ-69) addressed an individual's attitudinal dispositions toward the self (Cash 2000). Participants rated the provided statements on a Likert scale (1 – definitely disagree; 5 – definitely agree) in relation to their body image, physical appearance, fitness levels, and health/illness. Statements were categorized into the following subscales: Appearance Evaluation, Fitness Evaluation, Health Evaluation, Appearance Orientation, Fitness Orientation, Health Orientation, Overweight Preoccupation, Body Areas Satisfaction Scale, Self-classified Weight. Participants were then given a score for each subscale based on the formulae provided in the MBSRQ-69 manual.

A 25-item Weight Control Practices Questionnaire (WCPQ) was used to assess weight control practice activities over the last 30 days. Participants were asked to answer "yes" or "no" in regard to each practice performed. For example, questions included "weigh yourself?", "cut out sweets and junk food from your diet?", etc.

The Dietary Influences Survey assessed the reasons as to why a participant followed a certain diet by providing potential influences, such as weight management, friends, ethical reasons, social media, or cost. Participants were asked to select the most influential reasons contributing to their dietary practices. The top four most influential reasons were determined as the most common dietary influences of entire sample.

The Exercise Dependence Scale (EDS) was used to assess exercise dependence or the maladaptive pattern of exercise, leading to clinically significant impairment or distress (Hausenblas et al. 2002). Participants were asked to rate 21 statements on a Likert scale (1 – never; 6 – always). An example statement is "I exercise to avoid feeling irritable", or "I exercise longer than I intend". Based on 7 criteria, tolerance, withdrawal, intention effect, lack of control, time, reduction in other activities, and continuance, this scale operationalized exercise dependence based on the Diagnostic and Statistical Manual of Mental Disorder-IV (DSM) criteria for substance dependence (Hausenblas et al. 2002). A higher score indicates more exercise dependence symptoms. Individuals who would be classified as exercise dependent would have to reach dependent range for 3 or more of the DSM criteria.

The Sedentary Behavior Questionnaire (SBQ) was used to assess the amount of time an individual spent sitting while doing nine different activities (watching television, playing computer or video games, listening to music, talking on the phone, doing office work, reading a book or magazine, playing a musical instrument, doing artwork or crafts, driving in a car, bus or train).(Rosenberg et al. 2010) Participants were asked to provide the average time spent on a typical weekday and weekend day, separately. For example, participants were prompted with the question "On a typical WEEKDAY, how much time do you spend (from when you wake up until you go to bed) doing the following?" Response options were none, 15 min. or less, 30 min., 1 hr., 2 hrs., 3 hrs., 4 hrs., 5 hrs., or 6 hrs. or more. Total hours spent in each activity were recorded.

Statistical Analysis

Statistical analyses were performed using SPSS Version 24 software (IBM Corporation, Armonk, NY). A one-way ANOVA was used to analyze body composition, MBSRQ-69, SBQ, EDS, WCPQ, and Dietary Influences. Significance was accepted at $p < 0.05$, and data presented as Mean ± *SD*. There was no significant difference between genders, therefore males and females were grouped together. To determine group differences participants were divided into four groups based on their BF%. The following groups included: well above average (Male <12%; Female <19%), above average (Male 12.1–16%; Female 19.1–22%), average (Male 16.1–20%; Female 22.1–25%), and below average (Male >20.1%; Female >25.1%) according to fitness categories for body composition for men and women 20–29 years of age (Pescatello 2014).

Results

Most of the participants were upperclassmen, lived off campus, had a job, consumed alcohol but did not smoke (**Table 1**). A significant difference among the groups was observed in BF% ($p < 0.001$), lean body mass percent ($p < 0.001$), and waist circumference ($p = 0.01$) (**Table 2**). Groups with higher BF% had a higher waist circumference. According to categories defined by the World Health Organization, 79.2% of total participants were within healthy range for BMI (18.5–24.9) (ACHA-NCHA 2017).

There was a significant difference observed in the subscales of MBSRQ-69 including Appearance ($p = 0.02$) and Fitness Evaluation ($p = 0.005$), Fitness Orientation ($p = 0.002$), Overweight Preoccupation ($p = 0.04$), Body Areas Satisfaction Scale ($p = 0.001$), and Self-Classified Weight ($p = 0.001$) among the groups (**Table 3**). Groups with higher BF% were less happy with their physical appearance, body size, and appearance of several areas of their body and did not value physical fitness. However, the group with the highest BF% exhibited less weight gain anxiety, weight vigilance, dieting, and eating restraints.

Higher BF% groups consistently had the highest percentage of participants engaging in the given weight control practice. Individuals with higher BF% indicated the most engagement in weight control practices such as "weighing self", "increasing exercise intensity", and "increasing fruits and vegetables" (**Figure 1**). Additionally, the most influential reasons for choosing a specific diet were "health reasons", "weight management", "appearance", and "like the taste better". The majority of participants did not engage in any specific type of diet.

There was no significant difference ($p > 0.05$) observed in exercise dependence among the groups (**Table 4**). Although the group with lower BF% tended to spend more time exercising, it did not reach statistical significance ($p = 0.08$). The most prevalent sedentary behavior for both weekends and weekdays for all groups were office work and watching television (**Figure 2**).

Table 1: Demographic Survey Results.

Measurement	% of Total Participants
Year	
Freshman	2
Sophomore	15
Junior	43
Senior	40
Greek Organization	
Yes	90
No	10
Job	
Yes	56
No	35
No Response	9
Residential Arrangement	
Live On Campus	40
Live Off Campus	58
No Response	2
Race	
White	96
Black or African American	2
Hispanic or Latino	1
Asian	1
Smoker	
Yes	8
No	87
No Response	5
Consumer of Alcohol	
Yes	86
No	9
No Response	5

Discussion

The purpose of this study was to assess the types of weight control and dieting practices, reasons for choosing a certain practice, self-attitudinal aspects of body image, exercise habits and body composition among college age students. This multidimensional assessment of the students showed a negative relationship between body composition and body image, while the students with highest BF% were engaging in the greatest number of weight control practices.

Body composition was significantly different among the groups. As would be expected, those with the highest BF% had the lowest lean body mass, highest waist circumference, and lowest total handgrip strength. Although, handgrip strength is not a complete representation of total body strength, there was an inverse relationship between strength and body fat percent. However it should be noted that a group of students with BF% classification "below average" were healthier than the general college student population (ACHA-NCHA 2017). According to the Spring 2017 National College Health Assessment, only 61.5% of college students fall within the BMI classification for healthy weight range (18.5–24.9) on a national level, compared to 79.2% of the students in the present study. Perhaps this could be due to the university being a private institution that attracts students from higher socio-economic status and education level, as well as a campus with lower

Table 2: Anthropometric Measurements Based on Body Fat % Classification.

Measurement	Well Above Average (n = 17)	Above Average (n = 24)	Average (n = 28)	Below Average (n = 32)	*p*-value
Weight (kg)	58.5 ± 9.7	65.3 ± 11.7	64.6 ± 11.0	67.9 ± 12.7	0.07
BF (%)	15.9 ± 3.2[a]	18.5 ± 3.4[b]	22.8 ± 2.1[c]	27.9 ± 3.3[d]	<0.001
LBM (%)	84.1 ± 3.2[a]	81.5 ± 3.4[b]	77.2 ± 2.1[c]	72.1 ± 3.3[d]	<0.001
BMI (kg/m^2)	21.2 ± 2.0[a]	22.9 ± 2.7	22.9 ± 2.3	24.3 ± 3.3	0.003
BMR (kcals/day)	1540.9 ± 315.9	1665.5 ± 360.7	1555.8 ± 295.0	1522.3 ± 287.9	0.37
Height (cm)	165.3 ± 6.8	168.0 ± 10.7	167.1 ± 7.4	166.5 ± 7.2	0.76
SBP (mmHg)	117.9 ± 15.5	121.0 ± 15.4	116.4 ± 9.8	118.1 ± 9.7	0.64
DBP (mmHg)	73.4 ± 14.2	77.4 ± 11.5	74.0 ± 8.5	74.4 ± 9.5	0.61
WC (cm)	66.7 ± 5.9[a]	71.8 ± 7.1	72.1 ± 8.9	74.8 ± 8.3	0.01
W:H Ratio	0.72 ± 0.0	0.75 ± 0.0	0.74 ± 0.1	0.75 ± 0.0	0.31

BF = Body Fat; LBM = Lean Body Mass; BMI = Body Mass Index; BMR = Basal Metabolic Rate; SBP = Systolic Blood Pressure; DBP = Diastolic Blood Pressure; WC = Waist Circumference; W:H Ratio = Waist to Hip Ratio; Data is presented as Mean ± SD. Well above average (Male <12%; Female <19%), above average (Male 12.1–16%; Female 19.1–22%), average (Male 16.1–20%; Female 22.1–25%), and below average (Male >20.1%; Female >25.1%).

[a] $p < 0.05$ for the comparison of Well Above Average to all other groups.

[b] $p < 0.05$ for the comparison of Above Average to all other groups.

[c] $p < 0.05$ for the comparison of Average to all other groups.

[d] $p < 0.05$ for the comparison of Below Average to all other groups.

[e] $p < 0.05$ for the comparison of Above Average to Below Average.

Table 3: Multidimensional Body-Self Relations Questionnaire Subscale Scores by Body Fat % Classification.

Measurement	Well Above Average (n = 17)	Above Average (n = 24)	Average (n = 28)	Below Average (n = 32)	*p*-value
Appearance Evaluation	3.7 ± 0.6	3.7 ± 0.6	3.4 ± 0.7	3.2 ± 0.6[a]	0.02
Fitness Evaluation	4.1 ± 0.5	3.9 ± 0.5	3.8 ± 0.5	3.5 ± 0.8[a]	0.005
Health Evaluation	3.8 ± 0.7	4.0 ± 0.5	3.7 ± 0.6	3.8 ± 0.6	0.28
Appearance Orientation	3.1 ± 0.5	3.5 ± 0.6	3.4 ± 0.6	3.5 ± 0.5	0.09
Fitness Orientation	4.1 ± 0.4[b]	3.9 ± 0.5[c]	3.6 ± 0.5	3.6 ± 0.7	0.002
Health Orientation	3.6 ± 0.7	3.5 ± 0.6	3.4 ± 0.6	3.3 ± 0.6	0.20
Overweight Preoccupation	2.3 ± 0.6	2.2 ± 0.9	2.2 ± 0.8	2.7 ± 0.8[d]	0.04
Body Areas Satisfaction Scale	3.8 ± 0.7	3.6 ± 0.6	3.5 ± 0.5[e]	3.2 ± 0.5[f]	0.001
Self-classified Weight	2.9 ± 0.3[b]	2.9 ± 0.4[c]	3.2 ± 0.4	3.3 ± 0.4	0.001

Well above average (Male <12%; Female <19%), above average (Male 12.1–16%; Female 19.1–22%), average (Male 16.1–20%; Female 22.1–25%), and below average (Male >20.1%; Female >25.1%).

[a] $p < 0.05$ for the comparison of Below Average to Above and Well Above Average.

[b] $p < 0.05$ for the comparison of Well Above Average to Average and Below Average.

[c] $p < 0.05$ for the comparison of Above Average to Average and Below Average.

[d] $p < 0.05$ for the comparison of Below Average to Average and Above Average.

[e] $p < 0.05$ for the comparison of Average to Well Above Average.

[f] $p < 0.05$ for the comparison of Below Average to all other groups.

Data is presented as Mean ± SD.

ethnic diversity. Based on National Longitudinal Survey of Youth body weight changes through adulthood and is inversely related to childhood socioeconomic status with the disparity increasing with age (Baum & Ruhm 2009). Additionally, the Centers for Disease Control and Prevention (CDC) reports inverse associations between the prevalence of obesity and educational attainment that are statistically significant among both males and females, with differences greater in females (Baron et al. 2013). Furthermore, they report little

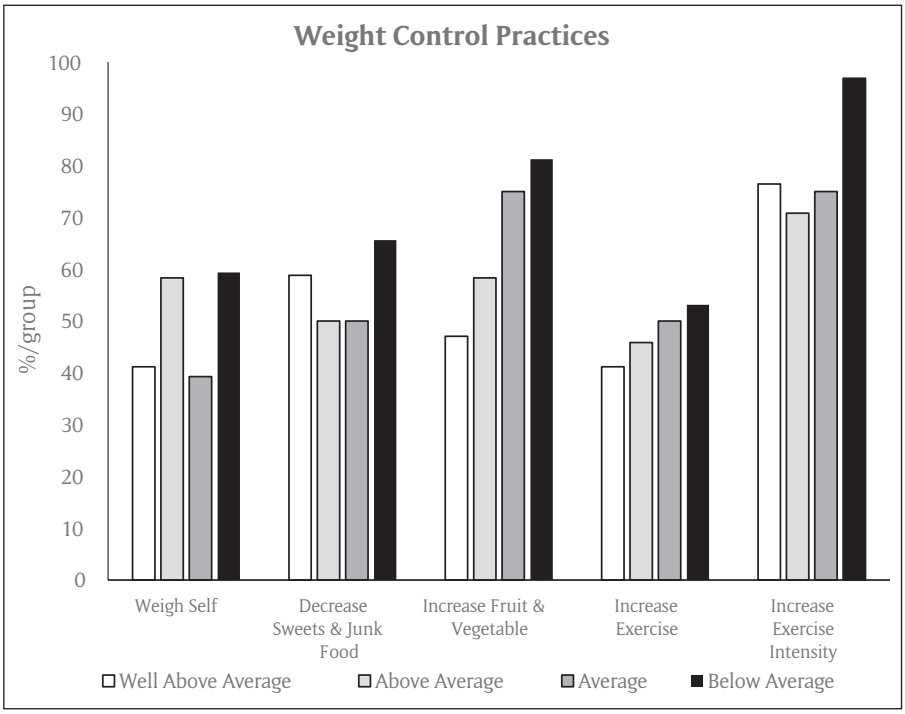

Figure 1: Comparison of Weight Control Practices by Body Fat % Classifications.

Table 4: Exercise Dependence Scale Subscale Scores by Body Fat % Classification.

Measurement	Well Above Average (n = 17)	Above Average (n = 24)	Average (n = 28)	Below Average (n = 32)	*p*-value
Withdrawal	11.1 ± 4.1	11.2 ± 4.3	9.4 ± 3.3	9.8 ± 3.7	0.26
Continuance	7.5 ± 4.4	6.2 ± 3.4	5.5 ± 2.7	5.7 ± 2.7	0.18
Tolerance	8.7 ± 2.8	9.7 ± 3.6	8.6 ± 3.2	10.2 ± 3.7	0.24
Lack of Control	7.8 ± 4.5	6.3 ± 2.8	6.1 ± 3.5	5.6 ± 3.0	0.20
Reduction of Other Activities	6.2 ± 2.7	5.4 ± 2.0	5.1 ± 2.7	5.1 ± 2.0	0.42
Time	9.2 ± 4.3	8.0 ± 3.3	6.9 ± 3.1	7.0 ± 2.5	0.08
Intention Effects	6.9 ± 3.8	6.9 ± 3.5	6.7 ± 3.5	6.5 ± 3.3	0.97

Data is presented as Mean ± SD. Well above average (Male <12%; Female <19%), above average (Male 12.1–16%; Female 19.1–22%), average (Male 16.1–20%; Female 22.1–25%), and below average (Male >20.1%; Female >25.1%).

difference in the prevalence of obesity by race/ethnicity in males, but not in females. In their study, the overall prevalence among non-Hispanic blacks was 10% higher than that among Mexican-Americans and 20% higher compared to non-Hispanic white women. Therefore, this sample of college students, in general, did not reflect the national epidemic of overweight and obesity.

There are specific pressures associated with the culture at a small liberal arts university such as the one where this study took place, in addition to the already present societal pressures emphasizing weight as a measure of beauty, social acceptance and belongingness (Yahia et al. 2011). There is a very high involvement in Greek organizations, with more than 40% of students belonging to a fraternity or sorority. With a Greek organization affiliation comes a strong influence of same-sex peers, which has been shown to affect body dissatisfaction, drive for thinness, and weight-loss or weight-control practices in previous studies (Latimer et al. 2013). In this specific study, 90% of students were a member of a Greek organization which could have played a role in their body weight perception and engagement in one or more weight control practices.

Previous research has used MBSRQ to examine the relationship between body perception and depression or cigarette smoking (Clark et al. 2005; Hamilton 2008), however the present study examined the specific subscales of MBSRQ-69 to further break down different variables of weight perception and the implications it had on sedentary behavior and weight control practices. In a previous study (Harring et al. 2010), it was

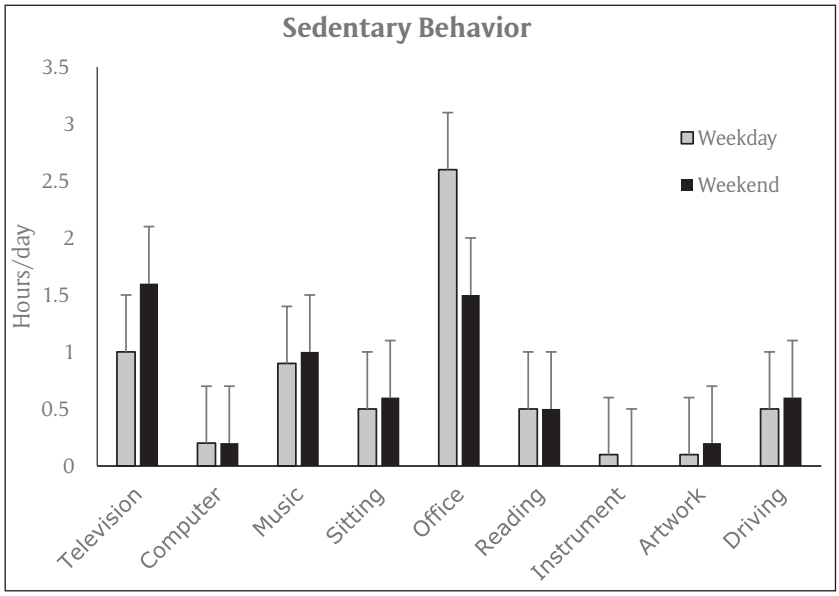

Figure 2: Comparison of Sedentary Behavior Practices between Weekday and Weekend.

determined that normal weight females with an inflated body weight perception were likely to engage in unhealthy weight management strategies. The study also found that overweight females who had an accurate weight perception, such as those with higher BF% in the present study, were almost three times more likely to use diet pills to lose weight than other females. Additionally, both males and females with poor weight perceptions reported more unhealthy weight control behaviors (Gonsalves et al. 2014). In the present study, students with lowest BF% were more satisfied with their physical appearance, whereas students with highest BF% were less satisfied with their body image and less content with areas of their body. In relation to previous knowledge from studies, this group of students with highest BF% and less contentment with areas of their body could be at risk for unhealthy weight control behaviors in the future.

Not only did the Appearance Evaluation and Body Areas Satisfaction subscale show significant differences in body satisfaction among groups, but differences were also observed in the Fitness Orientation scale among groups. Students with lowest BF% were more fitness oriented, and students with highest body fat were not as concerned with their fitness. The group with highest BF% also had the least fat anxiety, suggesting potential weight gain was not a great concern for them. Thus, students with higher BF% seem to ignore the importance of exercise and fitness, yet they were not satisfied with how they look. With negative self-perception and no strong desire to engage in physical activity, there is a great risk for engaging in dangerous weight control practices, rather than recognizing physical activity as a pivotal portion of weight control.

Oftentimes, physical activity tends to be reported as one of the most common weight control practices and yet one third do not participate in regular physical activity (Malinauskas et al. 2006). Although, sedentary behavior and type of sedentary behavior was not significantly different among groups, any amount of sedentary behavior takes away from time spent engaging in physical activity. Therefore, it can be assumed that those students with highest BF% should spend less time partaking in sedentary behavior to increase their fitness orientation and fitness evaluation. At this university, watching television and doing office work throughout the weekdays and weekend was the most common sedentary behavior across all groups. This is consistent with previous findings, including a study that reported that male students self-reported more hours per week spent watching television and/or videos, and more use of computer when compared to female students. However, female students decreased the days per week or moderate activities, exercise duration, and vigorous intensity activities during the last year as they grew older (Buckworth & Nigg 2004). Similarly, another study found that male students reported overall screen time and television watching, whereas female students reported higher homework time (Fountaine et al. 2011). The present study supports these previous study findings, as television use and office work, or homework time, were the most common sedentary behaviors. A conscious effort should be made by students with higher BF% to reduce the amount of time engaging in these two behaviors, as they directly relate to physical activity time and overall well-being. This shift in how an individual perceives fitness is an integral part of how much effort one puts forth in terms of physical activity.

Furthermore, students with higher BF% reported engaging in the most weight control practices, while students with lower body fat percentage engaged in less weight control practices. The most common weight control practices observed across all groups in this study were "weigh yourself", "decrease sweets and junk

food", "increase fruits and vegetables", "increase exercise", and "increase exercise intensity". These findings are consistent with previous findings for most common weight control practices. Previous studies (Thakkar et al. 2013; Bhurtun & Jeewon 2013), have found that reducing fat intake, exercising, and increasing intake of fruits and vegetables while decreasing intake of sugar were the most commonly reported methods to control weight. In the present study, it may seem contradictory that high body fat directly related to more weight control practices. However, for students who are leaner and more satisfied with their health status and physical appearance, weight control practices do not take as much of a priority in their daily life. This may suggest that some of these practices such as eating healthier and exercising at higher intensity may be already integrated into their lifestyles and are not perceive as weight control practices. In fact, the results of EDS showed that students with lower BF% tended to spend more time exercising, which suggests that physical activity was integrated into their lifestyle more so than other groups.

Due to the small sample size, this study should be used to provide preliminary data and inform future research; a larger sample size is needed for replication. In addition, although there was no significant difference observed between genders in body image this lack of differences emphasizes the need to include males in future research studies. Furthermore, this study cannot be generalized to ethnically diverse universities, but could be applied to smaller, private institutions with similar demographic characteristics. Future studies with ethnically diverse populations, addressing multiple social and professional groups that represent college students should be performed.

In addition, longitudinal studies are needed to further establish the patterns of weight control and dieting practices. As this was only a cross-sectional study, longitudinal studies are needed to determine actual physical activity amounts and weight control practices that students are participating in. This is one of the main limitations with studies including self-reported surveys; specifically, there is most likely some error between the amount of reported weight control practices or hours of sedentary behavior, and actual amounts of each. Comparing survey results to a student's actual hours of physical activity and number of weight control practices one performs could give further insight into the relationship between BF% and weight control practices.

In summary, college students at this university could benefit from open discussions with health educators about healthy weight control practices. This type of education is extremely important for this population, as long-lasting habits and practices are created during college and persist far beyond graduation. As shown by the college students with lower BF% who were most satisfied with their physical appearance, being involved in activities to maintain fitness is a key component of positive weight perception. Therefore, students should be reminded of the benefits of increasing physical activity and decreasing sedentary behavior. Additionally, although college students with the higher BF% said that they are partaking in more weight control practices that did not necessarily translate to a healthier weight. Students should try to integrate necessary weight control practices into their life to create a natural shift to a healthier lifestyle.

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Competing Interests

The authors have no competing interests to declare.

Author Information

M.H.R. and S.N. formulated the research question and designed the study, secured funding for the project, carried out participant recruitment and data collection, and performed data analysis. M.H.R. and S.N. were responsible for drafting of the manuscript. T.A.M. provided oversight for data collection and helped with data analysis and manuscript preparation. Other undergraduate students assisted with data collection. All authors read and approved the final manuscript.

References

Abraham, S., & **O'Dea, J. A.** (2000). Body Mass Index, Menarche, and Perception of Dieting Among Peripubertal Adolescent Females. *International Journal of Eating Disorders*, 23–28.

ACHA-NCHA. (2017). Undergraduate Student Reference Group Executive Summary. *American College Health Association National College Health Assessment*, 20.

Baron, S. L., et al. (2013). CDC Health Disparities and Inequalities Report – US, 2013. *Morbidity and mortality weekly report. Surveillance summaries (Washington, D.C.: 2002), 62*(3), 35–40.

Baum, C. L., & **Ruhm, C. J.** (2009). Age, socioeconomic status and obesity growth. *Journal of Health Economics*, *28*(3), 635–648. DOI: https://doi.org/10.1016/j.jhealeco.2009.01.004

Bhurtun, D. D., & **Jeewon, R.** (2013). Body Weight Perception and Weight Control Practices among Teenagers. *ISRN Nutrition*. DOI: https://doi.org/10.5402/2013/395125

Buckworth, J., & **Nigg, C.** (2004). Physical activity, exercise, and sedentary behavior in college students. *Journal of American College Health*, *53*(1), 28–34. DOI: https://doi.org/10.3200/JACH.53.1.28-34

Cash, T. F. (2000). MBSRQ Users' Manual (Third Revision), 1–10.

Clark, M. M., et al. (2005). The relationship of body image dissatisfaction to cigarette smoking in college students. *Body Image*, *2*(3), 263–270. DOI: https://doi.org/10.1016/j.bodyim.2005.05.002

Fountaine, C. J., et al. 2011. Physical activity and screen time sedentary behaviors in college students. *International Journal of Exercise Science*, *4*(2), 102–112.

Gonsalves, D., Hawk, H., & **Goodenow, C.** (2014). Unhealthy weight control behaviors and related risk factors in massachusetts middle and high school students. *Maternal and Child Health Journal*, *18*(8), 1803–1813. DOI: https://doi.org/10.1007/s10995-013-1424-5

Greene, K. M., & **Maggs, J. L.** (2017). Academic time during college: Associations with mood, tiredness, and binge drinking across days and semesters. *Journal of Adolescence*, *56*, 24–33. DOI: https://doi.org/10.1016/j.adolescence.2016.12.001

Hamilton, S. (2008). The Relationship Between Perceived Body Image and Depression: How College Women See Themselves May Affect Depression. *Student Journal of Psychological Sciences*, *1*, 13–20.

Harring, H. A., Montgomery, K., & **Hardin, J.** (2010). Perceptions of Body Weight, Weight Management Strategies, and Depressive Symptoms Among US College Students. *Journal of American College Health*, *59*(1), 43–50. DOI: https://doi.org/10.1080/07448481.2010.483705

Hausenblas, H. A., et al. (2002). Exercise Dependence Scale-21 Manual, 1–9.

Hausenblas, H. A., & **Fallon, E. A.** (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders*, *32*(2), 179–185. DOI: https://doi.org/10.1002/eat.10071

Huon, G., & **Lim, J.** (2000). The emergence of dieting among female adolescents: age, body mass index, and seasonal effects. *The International journal of eating disorders*, *28*(2), 221–225. DOI: https://doi.org/10.1002/1098-108X(200009)28:2<221::AID-EAT12>3.0.CO;2-H

Latimer, L. A., Velazquez, C. E., & **Pasch, K. E.** (2013). Characteristics and behaviors of non-overweight college students who are trying to lose weight. *Journal of Primary Prevention*, *34*(4), 251–260. DOI: https://doi.org/10.1007/s10935-013-0309-0

Lupi, S., et al. (2015). Assessment of lifestyle and eating habits among undergraduate students in northern Italy. *Annali dell'Istituto Superiore di Sanità*, *51*(2), 154–161.

Malinauskas, B. M., et al. (2006). Dieting practices, weight perceptions, and body composition: A comparison of normal weight, overweight, and obese college females. *Nutrition Journal*, *5*, 11. DOI: https://doi.org/10.1186/1475-2891-5-11

Pescatello, L. (2014). *ACSM's Guidelines for Exercise Testing and Prescription*, 9th ed., Baltimore: Lippincott Williams & Wilkins.

Price, A., et al. (2016). Body Composition, Fitness Status, and Health Behaviors Upon Entering College: An Examination of Female College Students From Diverse Populations. *Clinical Medicine Insights: Women's Health*, *9*, 23. DOI: https://doi.org/10.4137/CMWH.S34697

Rosenberg, D. E., et al. (2010). Reliability and validity of the Sedentary Behavior Questionnaire (SBQ) for adults. *Journal of physical activity & health*, *7*(6), 697–705. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21088299. DOI: https://doi.org/10.1123/jpah.7.6.697

Thakkar, H., et al. (2013). Obesity and weight control measures: Findings from female college students of Agra. *Medical Journal of Dr. D.Y. Patil University*, *6*(1), 66–66. DOI: https://doi.org/10.4103/0975-2870.108648

Williams, L., Germov, J., & **Young, A.** (2007). Preventing Weight Gain: A Population Cohort Study of the Nature and Effectiveness of Mid-age Women's Weight Control Practices. *International Journal of Obesity (London)*, *31*(6), 978–986. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17264847. DOI: https://doi.org/10.1038/sj.ijo.0803550

Yahia, N., et al. (2011). Dieting practices and body image perception among: Lebanese university students. *Asia Pacific Journal of Clinical Nutrition*, *20*(1), 21–28.

Zuercher, J. L., & **Kranz, S.** (2012). College eating 101: Factors influencing students' food decisions. *International Journal of Child and Adolescent Health*, *5*(1), 3–6.

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