Eating attitudes and reasons for exercise among physically active college female students

Ann Weber

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ABSTRACT

EATING ATTITUDES AND REASONS FOR EXERCISE AMONG PHYSICALLY ACTIVE COLLEGE FEMALE STUDENTS

Ann Weber, MS
Department of Family, Consumer, and Nutrition Sciences
Northern Illinois University, 2014
Josephine Umoren, Director

Disordered eating attitudes and exercise behaviors are important factors when studying the continuum of eating disorders. An individual’s attitude toward eating may influence other behaviors and thoughts toward health and exercise. A convenience sample study was used to examine the relationship between eating attitudes, reasons for exercise, and age among 190 physically active female college students ages 18 to 57. Participants completed the Disordered Eating Attitude Scale (DEAS) and Reasons for Exercise Inventory (REI). Level of exercise was self-reported by the participants and categorized as low, moderate, or high according to the Physical Activity Guidelines for Americans. Pearson’s Correlation determined that DEAS scores were significantly related to exercising to control weight ($p=.000$) and improve appearance ($p=.000$). There was no association between level of exercise and DEAS score or between age and DEAS score. This suggests that the college females in the study hold high regard to body image and exercise for non-health related reasons.
EATING ATTITUDES AND REASONS FOR EXERCISE
AMONG PHYSICALLY ACTIVE COLLEGE
FEMALE STUDENTS

BY

ANN WEBER
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A THESIS SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
MASTER OF SCIENCE

DEPARTMENT OF FAMILY, CONSUMER, AND NUTRITION SCIENCES

Thesis Director:

Josephine Umoren
ACKNOWLEDGEMENTS

The author wishes to express her appreciation to her Thesis advisor, Dr. Umoren, for her consistent guidance and knowledge throughout the process of this paper.
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The role of exercise in health maintenance and disease prevention has been increasingly recognized over the past few decades in the United States due to the increased rates of obesity. Exercise, along with a balanced diet and active lifestyle, may prevent obesity as well as comorbid health problems, such as type 2 diabetes, hypertension, dyslipidemia, gallbladder disease, and sleep apnea. Exercise also contributes to psychological well-being and has been found to decrease levels of depression and anxiety and improve feelings of self-sufficiency and self-esteem. Moreover, significant improvements in many eating disorder risk factors including self-esteem, anxiety, depression, mood and body image have been seen as a result of regular exercise. Despite these benefits, there is growing concern over the emphasis placed on exercise and the negative consequences that may result.

For females, thinness is associated with health, control, success, power, beauty, and attractiveness. Negative weight-related self-evaluation plays an important role in the development and maintenance of eating disorders. Research suggests that women who participate in exercise habitually may be at increased risk for developing disordered eating patterns, which could potentially lead to a clinically diagnosed eating disorder. Disordered eating includes a spectrum of abnormal eating patterns used to maintain a lower than normal body weight, including clinical eating disorders (ED) anorexia nervosa (AN), bulimia
nervosa (BN) and binge-eating disorder (BED). In between these disorders lie a variety of distorted behaviors ranging from limiting food groups to moderately restricting energy intake to occasionally bingeing and purging. To be diagnosed with a clinical eating disorder, an individual must meet all of the criteria described in the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM-V). However, in many cases, individuals demonstrate some but not all of the criteria for these disorders. These people still present significant eating pathology and body weight concerns.

Women of college age, in general, are a high-risk population for the development of eating disorders, compared to other populations. Those who compete in sports recreationally or at non-competitive levels, as well as those who participate in exercise independently, have been included in research as control subjects, but little attention has been given to these population groups despite their athletic tendencies. Similar to athletes, females who habitually exercise are vulnerable to these problems when restriction of food is combined with intense or frequent physical activity. Holm-Denoma, et al. reported that female independent exercisers have similar traits to varsity college athletes. Therefore, it is important to recognize that the non-elite athlete, college female population may be at increased risk for developing subclinical and clinical eating disorders.

In the exercise and sport environments, women can abuse exercise to expend extra calories and/or hide their abnormal eating and dieting behaviors making it difficult to identify exercise as a compensatory behavior. Furthermore, it is equally challenging to determine which behavior was the precipitating factor catapulting an individual into an eating disorder; that is, whether or not the exercise induced disordered eating or the disordered eating induced an increase in exercise behavior.
Previous research has primarily focused on female athletes in specific sports corresponding with a wide range of disordered eating behaviors.\textsuperscript{4} In addition, exercise can become a psychological problem on its own, independent from an eating disorder. The term “athlete” has been used to describe a variety of physically active females including elite college athletes and intramural sport athletes. Few studies, however, have focused on recreational athletes, or those who exercise on their own in the absence of a competitive sport.

The college environment is thought to increase pressures for fitness, thinness, and attractiveness.\textsuperscript{10} It has been suggested that up to 54\% of college women report weight dissatisfaction, 82\% participate in daily dieting behavior, 20\% engage in disordered eating, and 61\% have some form of an eating disorder.\textsuperscript{10-13} Levitt\textsuperscript{14} proposes that some college females may even abuse campus facilities and activities. This strongly supports the need for research regarding the association between exercise and disordered eating among female college students.

Research Objectives

Several factors contribute to both an individual’s eating attitudes and exercise behaviors. Currently, prevalence of disordered eating among physically active females is unknown. Therefore, there is a need to further explore this population. The purpose of this study was to explore the relationship between disordered eating, reasons for exercise, and age among female college students engaged in habitual exercise, by examining the following questions:

1. Is there a relationship between age and disordered eating?
2. Is there a relationship between exercise attitudes and eating attitudes?

3. Is there a relationship between level of exercise and disordered eating?

Study operational definitions:

Age – the number of years one has been alive.

College Student – in the present study, a female who is enrolled in higher-education at a college or university in a Midwestern state.

Disordered Eating - spectrum of abnormal and harmful eating patterns that are used in a misguided attempt to lose weight or maintain a lower than normal body weight

Physically active - the US Department of Health & Human Services’ 2008 Physical Activity Guidelines for Americans & the position stand of the American College of Sports Medicine, define physically active as 150 minutes (2 hours, 30 minutes) of moderate-intensity aerobic exercise/week. This is equivalent to at least 30 minutes, 5 days per week. For the purposes of this research study, “physical activity” will be used interchangeably with “exercise.”

Body Mass Index (BMI) - measures appropriate weight for height. Formula: weight in kg/height in m². Below 18.5 is classified as underweight. Between 18.5 and 24.9 is normal weight. Between 24 and 29.9 is overweight. Thirty and above is obese.

Ethnicity – the cultural group one identifies with.

Hypotheses

1. There is no relationship between level of exercise and disordered eating behavior, such that time spent exercising is not associated with increased risk of disordered eating.
2. There is a positive relationship between appearance and exercise, with worse disordered eating attitudes among individuals who exercise for weight control and attractiveness.

3. There is an inverse relationship between age and disordered eating attitudes, such that as age increases, disordered eating attitudes decrease.
CHAPTER 2
METHODODOLOGY

Sample Selection

A non-experimental, convenience sample method was used to obtain the participants for this cross-sectional study. Campus recreation directors at colleges and universities throughout Illinois were contacted through email to determine their interest in the study (Appendix 1). They were asked to respond to whether or not their institution would be willing to participate.

Consent to conduct the study was obtained from Northern Illinois University’s Institutional Research Board (IRB) on February 26, 2014 (Appendix B). Upon receiving IRB consent, colleges and universities, who previously indicated interest to participate in the study, were notified. When colleges or universities agreed to participate, the campus recreation director was again contacted by email to discuss the logistics of the study, including the start and end dates of the online survey. The campus recreation directors received the link to the survey, which they then emailed to eligible participants at their college or university (Appendix C). One week before the survey closed, campus recreation directors sent potential participants a reminder to complete the survey if they had not done so already (Appendix D).

Participants were required to consent to participating in the study prior to survey completion. The first page of the survey contained the consent form (Appendix E). Potential
participants were informed that participation was voluntary and choosing “yes” indicated consent to participate in the study and could withdraw from the survey at any time without penalty. They were also informed of an incentive upon completing the survey. If they wished, participants could send their contact name and email address to the investigator, in a separate email, for entry into a raffle to win a $50 Target gift card.

Survey Instrument Design

The survey instrument was adapted from two pre-existing scales that have been determined as being valid and reliable. Part 1 of the instrument was used to identify disordered eating attitudes of participants using the Disordered Eating Attitudes Scale\(^{15}\) (Appendix F). One question from the original scale was modified to provide an additional option for the given question. Permission to use the adapted version of the Disordered Eating Attitude Scale (DEAS) in this study was obtained through email (Appendix G). It is important to examine eating attitudes and the resulting influence these thoughts have on eating behaviors, for eating behaviors play a major role in determining quality of diet and health. Alvarenga\(^{15}\) contended that there is a strong lack of a well-discerned definition of the term “eating attitudes.” Therefore, the DEAS was used as it encompasses beliefs, thoughts, feelings, behaviors, and relationship with food as the basis of eating attitudes. The DEAS has 5 subscales. Questions were randomly ordered to avoid grouping of the subscales. The 5 subscales included: relationship with food; concerns about food and weight gain; restrictive and compensatory practices; feeling toward eating; and idea of normal eating. Section 1 of the DEAS had 12 dichotomous questions and required participants to answer ‘yes’ or ‘no’ when
asked whether or not they are concerned about food or weight gain. Section 2 contained 13 questions using a Likert scale to rank responses from 1 to 5; one representing rarely/never and 5 representing always. Use of the DEAS instrument has been determined to be valid and reliable with a Cronbach alpha of 0.75.15

Part 2 of the instrument assessed why participants exercise using the Reasons for Exercise Inventory16 (Appendix H). Verbal permission to use this instrument was obtained from the author on December 3, 2013. This instrument collected information regarding why female college students exercise using 7 dimensions: weight control, fitness, mood, attractiveness, health, enjoyment and body tone. Means of each dimension in previous research16 revealed subscale validity with the following Cronbach’s alphas: weight control (0.81), fitness (0.71), mood (0.79), health (0.73), attractiveness (0.78), enjoyment (0.67), and tone (0.74). The Reasons for Exercise Inventory (REI) uses a Likert scale to rank how important variables are when choosing to exercise. The Likert scale ranged from 1 to 7; 1 representing not at all important and 7 representing extremely important. The present study used this instrument to assess the importance of different motives for exercise among participants.

Part 3 of the survey instrument was designed to assess participants’ current amount of exercise in hours per week and demographic information including age, ethnicity, year in school (freshman, sophomore, junior, senior, graduate), college program of study, height in feet and inches and weight in pounds (Appendix I).
Pilot Study

A pilot study was conducted prior to data collection to determine if the questions from the DEAS and REI were clear and understandable for the target population. Female students were recruited from a local Community College. All pilot study participants were informed that their answers were only being used to determine how well female students understood the questionnaire and would not be included in the study.

With permission from the author, an additional answer option of “compensate with physical activity” was added to question 12 as participants in the pilot study found it difficult to choose the answers given for this particular question. The new answer option was given a score of “3” points as per the DEAS author. The original question and how it was modified follows.

Question: When you eat more than usual, what is your behavior afterwards?

Old responses:

a. Restart eating as usual
b. Assume you have lost control and keep eating even more.
c. Decide to go on a diet to compensate.
d. Use some kind of compensation, such as physical activity, vomiting, laxatives and diuretics.

New responses:

a. Restart eating as usual
b. Assume you have lost control and keep eating even more.
c. Decide to go on a diet to compensate.
d. Compensate with physical activity.

e. Use some kind of compensation, such as vomiting, laxatives and diuretics.

The online survey was delivered using Survey Monkey. The tool was set up in such a way that participants were required to answer each question before moving forward to the next page and question. This was done to ensure that each question was answered and that participants did not change their responses based on other questions. All information remained confidential and their identities were not relinquished in the survey.

Data Collection

The questionnaire was administered from March 18th, 2014 – April 15th, 2014. Data collection period occurred during specified 2-week time periods, which were determined by the campus recreation directors. Campus recreation directors received an emailed on their pre-arranged starting date with directions on how to proceed with distribution of the survey. The opening page displayed the consent form which participants were required to read prior to beginning the questionnaire. Participants received follow-up emails from campus recreation directors one-week after the initial email, reminding them to complete the survey if they had not done so already. The survey was closed to participants on April 15, 2014.

After the survey was closed, the investigator conducted the raffle drawing for distribution of the gift card incentive. Participants who entered the drawing were randomized using Internet database. The winning participant was contacted via email and agreed to receive the gift card through mail.
Data Treatment and Analysis

Survey responses were exported from Survey Monkey into Microsoft Excel for treatment. Participants’ responses for both the DEAS and REI were translated to a number score associated with their selected answer choice to allow for statistical analysis. Body Mass Index (BMI) was determined using the following equation: (weight in pounds x 703)/ (height in inches).2

The Office of Disease Prevention and Health Promotion within the US Department of Health and Human Services17 designed the Physical Activity Guidelines for Americans (PAG) using scientific data. According to these guidelines, individuals with "low" activity level are considered to be physically active if they exercise a minimum of 2.5 hours per week. Moderate activity level is described as 2.5-5 hours of physical activity per week, and high activity is described as "very active" at >5 hours per week. Using these criteria, participants’ self-reported hours of physical activity per week were categorized into 3 groups: low, moderate, and high. The categorical destinations based on these guidelines were as follows: 2.5 hours or less = low; 3-5 hours per week = moderate; 5.5 hours or more = high.

After treatment, data was analyzed using the Statistical Package for Social Sciences (SPSS) version 21.18 Pearson correlation was conducted to examine the relationships between level of exercise and disordered eating; eating attitudes and reasons for exercise; and age and disordered eating. Linear regression was then used to predict the incidence of disordered eating based on the level of exercise. Further analysis with a Chi-square test was performed to
determine if there were any differences between the study participants based on their college major.

Descriptive statistics including means, standard deviations, and ranges were calculated for DEAS scores, REI scores, age and BMI.
CHAPTER 3
RESULTS

Twenty-five universities in the state of Illinois were invited to participate in the study (Appendix J). Institutions were selected to receive the invitation if the campus had a student recreation center and contact information of the campus recreation director readily available. After initial contact, 1 institution declined, 14 did not respond and 10 agreed to participate. Upon IRB approval, 7 of the 10 institutions confirmed participation. Participants who completed the survey were enrolled at the following institutions in March 2014: Northern Illinois University, University of Illinois at Chicago, University of Illinois at Champaign/Urbana, University of Illinois at Springfield, Southern Illinois University at Edwardsville, Dominican University, and North Park University. Target number of participants was 270, based on the following equation: Target Sample Size = (Z-score)² X StdDev X (1-StdDev) / (margin of error)². A total of 205 participants from these institutions completed the survey. Fifteen of the surveys had missing data, which resulted in a total of 190 surveys with usable data.

Demographic data is found in Table 1. Results show a majority of the sample was Caucasian (73.16%), followed by African American (11.58%), Hispanic (8.95%), Asian-American (5.26%), and American Indian (1.05%). Participants ranged in age from 18 to 57, with the mean age being 22.14 ± 4.65 years. Over 96% of the participants were between the
ages of 18 and 29 years. Females from each academic level in college (freshman, sophomore, junior, senior and graduate) were represented in the sample.

**Table 1**

**Participant Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>Percent of Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>139</td>
<td>73.16%</td>
</tr>
<tr>
<td>African-American</td>
<td>22</td>
<td>11.58%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>17</td>
<td>8.95%</td>
</tr>
<tr>
<td>Asian-American</td>
<td>10</td>
<td>5.26%</td>
</tr>
<tr>
<td>Indian-American</td>
<td>2</td>
<td>1.05%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-23</td>
<td>148</td>
<td>77.90%</td>
</tr>
<tr>
<td>24-29</td>
<td>35</td>
<td>18.42%</td>
</tr>
<tr>
<td>&gt;30</td>
<td>7</td>
<td>3.68%</td>
</tr>
<tr>
<td><strong>Year in school</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>25</td>
<td>13.16%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>25</td>
<td>13.16%</td>
</tr>
<tr>
<td>Junior</td>
<td>46</td>
<td>24.21%</td>
</tr>
<tr>
<td>Senior</td>
<td>47</td>
<td>24.47%</td>
</tr>
<tr>
<td>Graduate</td>
<td>47</td>
<td>24.47%</td>
</tr>
<tr>
<td><strong>Sum of participants</strong></td>
<td>190</td>
<td>100%</td>
</tr>
</tbody>
</table>

Participants in this study included 84 (44.21%) Health & Human Science majors, 39 (20.52%) Liberal Arts & Sciences majors, 24 (12.63%) Business majors, and 22 (11.57%) Education majors. Table 2 shows the distribution of age and BMI by college major. Mean height of the participants was 65±2.76 inches while weight averaged 145±30.57 pounds. BMI ranged from a low of 18.29 to a high of 41.96, with the mean of all 190 participants being 24.08±4.
Participants’ physical activity was categorized as previously discussed. Of the 190 participants, 105 (55.26%) were classified in the high physical activity level group, 67 (35.26%) in the moderate physical activity group, and 18 (9.47%) in the low physical activity group. Physical activity reported from participants included yoga, weight/strength training, running, biking, swimming, kickboxing, cross-training, walking, Zumba/dance, pilates, hiking, P90X, elliptical, stair climbing; recreational sports including basketball, soccer, volleyball, tennis, and softball.

Disordered eating attitudes were assessed using the DEAS. The higher score on the DEAS the worse disordered eating attitude. The maximum total score possible on the DEAS is 190.0 points while the minimum score is 37.0 points. Scores among participants ranged from a low of 37.0 to a high of 135.0, with a mean score of 77.95±17.86.

Question 12 on the DEAS, a component of the Restrictive and Compensatory Practices subscale, was modified to include an additional answer choice. Results from the
pilot study indicated that the college female population views physical activity differently from other compensatory behaviors, therefore this change was made. Participants’ responses are shown in Table 3.

### Table 3

**Participants Responses to DEAS Question #12**

<table>
<thead>
<tr>
<th>Question: When you eat more than usual, what is your behavior afterwards?</th>
<th>Answer</th>
<th>Number of Responses (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restart eating as usual</td>
<td>68 (34.02%)</td>
<td></td>
</tr>
<tr>
<td>Assume you have lost control and keep eating even more</td>
<td>14 (7.02%)</td>
<td></td>
</tr>
<tr>
<td>Decide to go on a diet to compensate</td>
<td>11 (5.67%)</td>
<td></td>
</tr>
<tr>
<td>Compensate with physical activity*</td>
<td>102 (52.58%)</td>
<td></td>
</tr>
<tr>
<td>Use some kind of compensation, such as vomiting, laxatives and diuretics</td>
<td>1 (0.52%)</td>
<td></td>
</tr>
</tbody>
</table>

*indicates additional answer choice modification after pilot study

The Pearson correlation was used to determine associations between disordered eating attitudes and reasons why participants exercise. Significant positive correlations were found between DEAS scores and the following reasons for why they exercise: weight control ($p=.000$), fitness ($p=.003$), attractiveness ($p=.000$), enjoyment ($p=.009$) and tone ($p=.000$).

There was no significant relationship between DEAS scores and exercising for mood ($p=.057$) or health ($p=0.73$). These relationships can be seen in Table 4.
Table 4

Correlation between DEAS and Reasons for exercise

<table>
<thead>
<tr>
<th></th>
<th>DEAS</th>
<th>Weight</th>
<th>Fitness</th>
<th>Mood</th>
<th>Health</th>
<th>Attractiveness</th>
<th>Enjoyment</th>
<th>Tone</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEAS</td>
<td>1.00</td>
<td>.262**</td>
<td>.215**</td>
<td>.138</td>
<td>.130</td>
<td>.374**</td>
<td>.190**</td>
<td>.430**</td>
</tr>
<tr>
<td>Weight</td>
<td>.262**</td>
<td>1.00</td>
<td>.231**</td>
<td>.311**</td>
<td>.194**</td>
<td>.470**</td>
<td>.284**</td>
<td>.479**</td>
</tr>
<tr>
<td>Fitness</td>
<td>.215**</td>
<td>.231**</td>
<td>1.00</td>
<td>.476**</td>
<td>.622*</td>
<td>.344**</td>
<td>.267**</td>
<td>.433**</td>
</tr>
<tr>
<td>Mood</td>
<td>.138</td>
<td>.311**</td>
<td>.476**</td>
<td>1.00</td>
<td>.544**</td>
<td>.340**</td>
<td>.424**</td>
<td>.304**</td>
</tr>
<tr>
<td>Health</td>
<td>.130</td>
<td>.194**</td>
<td>.622**</td>
<td>.554*</td>
<td>1.00</td>
<td>.242**</td>
<td>.282**</td>
<td>.248**</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>.374**</td>
<td>.470**</td>
<td>.344**</td>
<td>.340**</td>
<td>.242**</td>
<td>1.00</td>
<td>.391**</td>
<td>.698**</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>.190**</td>
<td>.284**</td>
<td>.267**</td>
<td>.424**</td>
<td>.282**</td>
<td>.698**</td>
<td>1.00</td>
<td>.358**</td>
</tr>
<tr>
<td>Tone</td>
<td>.430**</td>
<td>.479**</td>
<td>.433**</td>
<td>.304**</td>
<td>.248**</td>
<td>.698**</td>
<td>.358**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

** indicates correlation is significant at the $p = 0.01$ level (2-tailed).

The linear regression model (Table 5) was performed to predict the incidence of disordered eating based on the level of exercise. The $p$-values corresponding to low and high level of exercise are $p= 0.317$ and $p=0.57$, respectively, meaning there is no association between the level of exercise and disordered eating. The $p$-value for BMI, however, was $p=0.04$. This additional finding from the linear regression model showed that among the participants in this study, BMI significantly influences disordered eating.
### Linear Regression Model

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>26.98</td>
<td>15.110</td>
<td>1.786</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>.295</td>
<td>.313</td>
<td>.080</td>
</tr>
<tr>
<td></td>
<td>Freshman</td>
<td>-1.02</td>
<td>4.191</td>
<td>-.020</td>
</tr>
<tr>
<td></td>
<td>Sophomore</td>
<td>2.82</td>
<td>4.165</td>
<td>.056</td>
</tr>
<tr>
<td></td>
<td>Junior</td>
<td>-.904</td>
<td>3.396</td>
<td>-.023</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>-2.04</td>
<td>3.774</td>
<td>-.051</td>
</tr>
<tr>
<td></td>
<td>African-American</td>
<td>-2.02</td>
<td>4.011</td>
<td>-.038</td>
</tr>
<tr>
<td></td>
<td>American-Indian</td>
<td>-14.29</td>
<td>11.649</td>
<td>-.086</td>
</tr>
<tr>
<td></td>
<td>Asian-American</td>
<td>-.84</td>
<td>5.392</td>
<td>-.011</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>-3.12</td>
<td>4.435</td>
<td>-.051</td>
</tr>
<tr>
<td></td>
<td>BMI</td>
<td>0.65</td>
<td>.323</td>
<td>.154</td>
</tr>
<tr>
<td></td>
<td>W.Sum</td>
<td>.89</td>
<td>.643</td>
<td>.126</td>
</tr>
<tr>
<td></td>
<td>F.Sum</td>
<td>-.058</td>
<td>.414</td>
<td>-.013</td>
</tr>
<tr>
<td></td>
<td>M.Sum</td>
<td>-.268</td>
<td>.310</td>
<td>-.079</td>
</tr>
<tr>
<td></td>
<td>H.Sum</td>
<td>.198</td>
<td>.421</td>
<td>.045</td>
</tr>
<tr>
<td></td>
<td>A.Sum</td>
<td>.432</td>
<td>.359</td>
<td>.121</td>
</tr>
<tr>
<td></td>
<td>E.Sum</td>
<td>.091</td>
<td>.340</td>
<td>.022</td>
</tr>
<tr>
<td></td>
<td>T.Sum</td>
<td>1.067</td>
<td>.443</td>
<td>.268</td>
</tr>
<tr>
<td></td>
<td>low</td>
<td>-4.444</td>
<td>4.431</td>
<td>-.076</td>
</tr>
<tr>
<td></td>
<td>high</td>
<td>1.500</td>
<td>2.637</td>
<td>.044</td>
</tr>
</tbody>
</table>
Reasons for exercise from highest to lowest level of importance, as shown in Table 6, were as follows: health, fitness, mood, weight, attractiveness, body tone, and enjoyment. The Pearson Correlation analysis was performed to determine any additional relationships among participants’ reasons for exercise. Results revealed significant positive relationships between several variables of the REI. Exercising for weight control was significantly related to exercising for fitness, mood, health, attractiveness, enjoyment and tone.

**Table 6**

REI Subscale Means

<table>
<thead>
<tr>
<th>REI Subscale</th>
<th>Mean Score (Std Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>5.02(0.05)</td>
</tr>
<tr>
<td>Fitness</td>
<td>5.88(0.19)</td>
</tr>
<tr>
<td>Mood</td>
<td>5.29(0.72)</td>
</tr>
<tr>
<td>Health</td>
<td>6.13(0.36)</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>5.02(0.44)</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>4.03(0.91)</td>
</tr>
<tr>
<td>Body Tone</td>
<td>4.96(0.53)</td>
</tr>
</tbody>
</table>

In the study participants majoring in Health & Human Sciences made up 44.20% of the population. The DEAS mean score among these participants was lower than the mean score of all other majors (77.19±16.27 and 79.65±17.58, respectively). Based on these results further analysis was conducted. A Chi Square test was conducted to determine if there was a
difference in the level of exercise between Health & Human Science students and all other majors. The results did not show any significant differences in exercise levels between these two groups (Table 7).

Table 7

Differences in exercise levels between Health and Human Science majors and other participants

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>1.810a</td>
<td>2</td>
<td>.405</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>1.816</td>
<td>2</td>
<td>.403</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>190</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.96.

Pearson Correlation results showed that there was no significant relationship between age and disordered eating attitudes (Table 7).

Table 8

Relationship between age and DEAS score

<table>
<thead>
<tr>
<th>Correlations</th>
<th>DEAS</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEAS Pearson Correlation</td>
<td>1</td>
<td>.012</td>
</tr>
<tr>
<td>DEAS Sig. (2-tailed)</td>
<td>.865</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>Age Pearson Correlation</td>
<td>.012</td>
<td>1</td>
</tr>
<tr>
<td>Age Sig. (2-tailed)</td>
<td>.865</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>190</td>
<td>190</td>
</tr>
</tbody>
</table>

$p < 0.05$
CHAPTER 5
DISCUSSION

Eating disorders, including anorexia nervosa, bulimia nervosa, and binge eating disorder, are prevalent among the young adult female population. The purpose of this study was to examine the relationship between disordered eating attitudes, reasons for exercise, and age. The population group in this study was comprised of physically active female students, ages 18 and older, currently enrolled in a college or university in a Midwestern state.

The majority of participants in this study were Caucasian (73.16%). While ethnicity was seldom accounted for in the literature, this distribution of ethnic groups is similar to Zmijewski and Petrie. Mean age of the participants (22.14 years ± 4.65) is representative of the average college female student, while mean BMI of 24.08± 4.04 is approximately 2-3 standard deviations higher than other studies. This showed that on average, participants were at a normal weight according to BMI classifications, where <18.5 is underweight, 18.5-24.9 is normal, 25-29.9 is overweight, and >30 is obese.

A significant number of the participants reported that their major field of study was in Health and Human Sciences. This included, but was not limited to, majors such as Audiology, Speech-Language Pathology, Physical Therapy, Rehabilitation Services, Family and Child Studies, Nutrition and Dietetics, Nursing, Biomedical Sciences, and Textiles and Merchandising. A Chi-square test was conducted to determine if these students differed from
non-health majors. Results showed that there were no significant differences between level of physical activity in Health and Human Sciences majors compared to other majors in the study. Mean DEAS score among Health and Human Sciences majors was 77.19±16.27.

Comparatively, the mean DEAS score among the rest of the participants in other majors was 79.65±17.58. Research on the incidence of disordered eating among different college majors is scarce, and among the existing studies results vary. One study\textsuperscript{20} showed that the prevalence of disordered eating symptoms was significantly higher among dance and drama majors compared to English and Physical Education majors. Similar to athletes who are involved in appearance-related sports, such as ballet and gymnastics, it is not surprising that dance and drama majors are at increased risk for developing disordered eating due to the appearance-focused activities they engage in and desire to attain a slim figure in order perform successfully. Conversely, others found that eating attitude disorders were more prevalent among women studying education, psychology, or nursing.\textsuperscript{21-22} In a sample of female undergraduate Portuguese students, no significant differences in eating disorder behavior was found between nutrition and dietetics majors, other health majors, and non-health majors.\textsuperscript{23} In the current study, while the difference was not significant, the slightly higher DEAS mean for non-health majors suggests that female students in non-health majors in this population may tend to have more negative attitudes towards eating and may be more susceptible to engaging in disordered eating behaviors compared to health majors. Due to the differences in results in previous research, however, this cannot be generalized to all non-health majors. It can be hypothesized that female students studying health-related subjects have more exposure and education on healthy lifestyle habits, which may serve as a protective factor and reduce their risk for developing eating disorders.
Data from the American College Health Association’s National College Health Assessment of 2012\textsuperscript{24} identified that among women trying to maintain their weight, 59\% did not meet the minimum Physical Activity Guidelines. For women wanting to lose weight, 43\% met the guidelines. Racette et al.\textsuperscript{25} found that 30\% of college students did not participate in physical activity and only half engaged in some kind of activity on a regular basis. Silliman et al.\textsuperscript{26} showed in a cross-sectional study of 302 students that 46\% were sedentary and 39\% met the minimum Physical Activity Guidelines. In the literature that has studied physically active college students, one study\textsuperscript{3} reported that 244 (27.2\%) of their male and female college student population (n=878) participated in 5 hours or more of activity, whereas another study\textsuperscript{1} indicated that 29.4\% of their population exercised 3 to 4 times per week and 7.9\% exercised seven or more times each week. The number of highly active female college students in the present study is in agreement with the literature that has previously studied physically active college students. The current study sought out students who met minimal standards for the Physical Activity Guidelines of Americans. That is, participants were required to engage in a minimum of 2.5 hours of physical activity per week. Of the 190 participants in this study, 105 (55.26\%) engaged in more than 5.5 hours of physical activity per week. This finding is not surprising due to the data collection procedures and recruitment of physically active female students via campus recreation centers. Possible explanation for these results includes the large percentage of Health & Human Science majors. It has been suggested that these students conform to health recommendations as preventive measures and serve as role models for others.\textsuperscript{23}

While physical activity is important for health maintenance, some studies have shown that it can be associated with eating disorders.\textsuperscript{7,27-33} In this study participants were asked why
they exercise through 7 dimensions. The most important motivations for exercise selected by participants were health and fitness, followed by mood, weight and attractiveness, body tone, and enjoyment. Past findings are mixed. In a population of female athletes, the most frequently reported reason for exercising was to improve health and fitness. On-the-other-hand, studies of physically active female and male undergraduate students found that the most often reported reasons for exercising were to improve appearance, improve tone and to manage weight. The present study’s findings support earlier research which stated that different reasons for exercise may be differentially associated with eating and weight-related thoughts.

Weight and appearance-related exercise may be predominantly external motivations, whereas exercising for health and fitness are internal, or natural motivations. Negative affect, the feeling that is experienced after one fails to complete a task or goal, may play a role in motivating individuals to exercise in ways that are not to their benefit. On the contrary, it may be an adaptive coping mechanism that substitutes health-promoting activity for potentially unhealthy behaviors, such as binge eating, restricting, or using drugs and alcohol. Women are more likely than men to exercise in response to negative affect and typically this type of exercise is associated with eating disorder behaviors. In a cross-sectional study with undergraduate males and females, DeYoung and Anderson found that those who exercised for negative affect had significantly higher scores on eating-related psychopathology scales, showing higher incidences of restraint, concerns over eating, and concerns about body shape and weight. Exercising in response to negative affect may function in a similar manner to purging, supplying individuals with temporary relief from the adverse
feelings related to their body image and weight. Encouraging individuals to adopt flexible exercise routines may be beneficial for establishing healthy exercise behaviors.

An important finding of this study is the number of subjects who reported use of physical activity as a means of compensation after over eating. Question 12 read, “When you eat more than usual, what is your behavior afterwards?” The answer options on the original DEAS scale combined physical activity with other forms of compensation, including vomiting, laxatives, and diuretics. Answer choices for this study were modified and separated physical activity as its own method of compensation. Of the 190 participants, 102 (52.58%) selected the option, “compensate with physical activity” which likely influenced total score results on the DEAS. Distribution of results for this item shows that among these participants, physical activity was used to control weight. Other studies showed similar results.\textsuperscript{31,34-35} Physical activity is often used as a method of purging among both subclinical and clinical populations of individuals with eating disorders.\textsuperscript{30,37} Exercise motivated by negative affect may serve as a marker for other disordered eating behaviors because it is less stigmatized than other eating disorder behaviors such as purging and use of laxatives or diuretics.\textsuperscript{31} Female college students potentially do not recognize the connection between the intent of their exercise and eating behaviors. Exercise may be used to offset an unhealthy meal in the absence of other eating disorder behaviors, in which case there may be limited reason for concern. At the same time, it is possible that exercise behavior alone is as harmful as other eating disorder behaviors. The group of females in this study may not see their exercise as an eating disorder behavior.

Disordered eating behavior has been associated with increased risk for developing eating disorders.\textsuperscript{15} In the study at hand, disordered eating was measured using the DEAS. The
mean DEAS score for all participants was 77.95±17.86. The scores ranged from 10.0 to 16.0 points higher than the mean score reported in the 3 research studies that previously used this instrument. One explanation for this is the difference in culture in which the studies took place. All 3 of the studies were conducted in Brazil, whereas the present study took place in the United States. It is important to acknowledge that the culture in western countries such as the United States emphasizes a thin body shape as ideal more so than other countries. Santana reported the prevalence of body image dissatisfaction was lower in Brazilian adolescents compared to adolescents in the United States. Prevalence of abnormal eating attitudes among a Brazilian university population of men and women, mean age 20.2±2.75 years, was 8.3%. Comparatively, in the United States, 25% of college-women engage in disordered eating behaviors. Forbes found that when women were asked to choose a figure representing the body shape they desired most, those from Brazil chose the largest body size as ideal whereas women from the United States chose the smallest body size as ideal. In addition, Brazilian females had a lower incidence of disordered eating than females from the United States and fewer social pressures to be thin.

Level of Exercise and Disordered Eating Attitudes

Level of exercise (hours per week) may be an influential factor in the development of disordered eating, and was therefore examined in this study. Results showed that there was not a significant relationship between level of exercise and disordered eating attitudes. Hypothesis 1 indicated no association would be found. While many studies have reported that exercise behaviors correlate with eating pathology, others argue that it is the
purpose behind the exercise, and not the amount, that influences eating attitudes and behaviors.\textsuperscript{1,3,31,34,35,44} This finding suggests that participants who exercise more than the recommended 2.5 hours per week do not exhibit worse eating attitudes when compared to those with lower weekly hours of exercise. Therefore, the compulsive quality of exercise, rather than quantity of exercise, may be a better characterization of exercise that is related to eating disorders. On-the-other-hand, this also indicates that eating disorder behaviors may be present in individuals with low to moderate exercise levels.

Zmijewski\textsuperscript{1} suggests that exercise can be related to positive psychological health in college-age females, but only when exercise is not part of an eating disorder. This notion supports the theory of planned behavior. The theory of planned behavior considers intention, or a person’s level of motivation as a determinant of behavior. One’s attitude and perceived control predicts intention, which in turn predicts behavior.\textsuperscript{45} If an individual possesses a negative attitude towards food, body image, and weight, their behavioral intentions behind eating and exercise are likely to be negative as well. Participants who score higher on the DEAS may therefore be more likely to encompass negative intentions, increasing their risk for disordered eating and exercise behaviors. A study of female undergraduates\textsuperscript{45} found that the strongest predictor of dieting intention was attitude. The present study shows similar results in regards to both exercise and eating behaviors. Those who exercise for health and fitness may be at greater risk for developing compulsion to exercise. Some habitual exercisers may develop an increased awareness of body size and shape as well as distorted eating patterns. Thus, it can be physically active women walk a narrow line between optimal performance and harmful health behavior.
Disordered Eating Attitudes and Reasons for Exercise

Significant relationships were found between participants’ disordered eating attitudes and reasons for exercise. All dimensions of the REI, excluding mood and health, were positively correlated with the total score of the DEAS. The relationship between these two instruments has not been studied before. As the total score on the DEAS increased, importance of exercising for weight, fitness, attractiveness, enjoyment and tone increased. This showed that subjects were more likely to be motivated to exercise in order to improve appearance, rather than for health benefits. Moreover, females with a worse disordered eating attitude find exercising for weight, fitness, attractiveness, and tone more important than exercising for mood and health. Despite the high motivation to exercise for weight and attractiveness, subjects also reported exercising for enjoyment as moderately important, which implies that even though enjoyment may not be as important to them as other factors, exercise is still an activity they take pleasure in. It is unknown whether they enjoy exercising because of improved mood and psychological benefits, or because the exercise behavior itself temporarily satisfies their weight-related concerns. Individuals who exercise for weight or appearance and feel obligated to exercise for those reasons, however, may be at a higher risk for developing an eating disorder than an individual who exercises frequently, but not for weight-related reasons.³⁰

Body dissatisfaction can be detrimental to physical and mental health, and furthermore, is the strongest predictor of disordered eating and eating disorders.⁴⁶ (Smith-Jackson). Promoting size acceptance as well as self-acceptance may be an effective way to encourage healthy lifestyle behaviors independent of body weight. The Health at Every Size
paradigm (HAES) focuses on promoting acceptance of body shape and size, an understanding of the ineffectiveness of dieting for weight loss, and eating in response to internal body cues.\(^47\) (Robison from Smith-Jackson) This dissonance-based approach to health fosters physical activity for social and pleasurable movement for not only physical activity, but also for improved quality of life, not weight loss and calorie burning.\(^46\) Strong evidence supports HAES as a successful paradigm that endorses positive health behaviors. A cross-sectional study\(^48\) conducted by registered dietitians at Brigham Young University in Utah (Brown), gathered data on college students’ opinions of the HAES paradigm. Students completed a pre-test prior to receiving a lecture about HAES and post-test after the lecture. Statistically significant changes (p<.001) included 83% of students reporting improved overall understanding of HAES, 77% reporting improved attitude, and 47% reporting a decrease (a positive change) in seeing calorie restriction and exercise as ways to combat the obesity epidemic.\(^48\) This shows that HAES may serve as an effective approach for college students to decrease distorted thoughts and beliefs around food and exercise, and instead embrace self-acceptance in order to live a healthy lifestyle, free of negative weight-related body shame.

Age and Disordered Eating Attitudes

A majority (77.9\%) of the sample was less than 24 years of age. Research studies that previously used the DEAS had similar age distribution with most participants between the ages of 18 and 24.\(^15, 38-39\) These studies, however, did not appear to be based on age. Correlations between age and DEAS scores have not previously been analyzed; this is the first
known study of its kind. It was hypothesized that a higher incidence of disordered eating would be present among younger female students. DEAS scores among the current study participants were not significantly correlated with age, causing hypothesis 3 to be rejected. This supports the notion that disordered eating behaviors can present at any stage of the lifecycle and is not limited to subjects of a particular age group. The research, however, shows that 95% of those who have eating disorders are between the ages of 12 and 25 years.\(^{49}\)

**Limitations**

The current study poses several limitations. A non-experimental, convenience sample was used due to the nature of the subject matter and inability to recruit all college-aged female students across the country. Additionally, the sample purposely included only females who habitually exercise. The results of this study are therefore unable to be generalized to all females ages 18 to 29 years. The participants in the sample all currently reside in a Midwestern state; therefore individuals from different areas of the country may have responses different than those presented in the study.

While 25 colleges and universities throughout the state were invited to participate, only 7 institutions agreed to participate. Campus recreation directors were used as the point of contact to recruit female students for participation. Number of students contacted by the campus recreation directors is unknown, thus results may be skewed. Disordered eating is a sensitive subject, and may elicit negative thoughts or feelings for those affected. Individuals with eating and/or body image disturbances may have preferred not to participate or respond truthfully for personal reasons, which also may skew the results. In addition, the sample size
is homogenous and largely Caucasian (73.16%), so answers of the participants may not reflect those of the entire population of interest.

Amount (hours per week) of physical activity, height and weight was self-reported by participants, making this data vulnerable to bias. Even so, the results are consistent with past research and the information was collected anonymously, which may have encouraged more honest reporting.

Two questions were mistakenly left out of the questionnaire; 1 from the DEAS (“Would you rather not eat?”) and 1 from the REI (To lose weight). Inclusion of these items would have provided additional information on attitudes toward eating and a clearer indication if the participants were weight-loss focused exercisers. Both questions would have contributed to a more comprehensive conclusion, and likely impacted results, to which extent is unknown.

Conclusion

The purpose of this study was to determine the relationship between disordered eating attitudes and reasons for exercise among physically active college female students. Physically active college female students may be at an increased risk for eating disorders. In this study, more negative disordered eating attitudes were found among females who exercise to maintain weight and improve appearance. However, level of exercise, age and college major of study did not appear to influence disordered eating attitudes among participants. These findings are consistent with other research that examined the role of exercise behavior for
eating pathology. It is important to recognize that even though young adult females may appear healthy, many exercise for appearance reasons, which may lead to excessive exercise and increase their risk of developing disordered eating attitudes and behaviors.

The results of this study suggest the need for more research. While this study was unable to draw significant results between health majors and non-health majors, further investigation in this area would provide new data on the prospective implication that higher education in a health field of study may serve as a protective factor in the development in eating disorders. More research is needed to examine the psychological, behavioral, and social aspects of eating and exercise behaviors. Studying the various elements of negative-affect exercise would help to identify more individuals with harmful exercise intentions and behaviors, as well as prevent or halt the progression of existing disordered eating thoughts and behaviors. Despite the high number of participants reporting exercising for weight and appearance, many also cited exercising for weight and enjoyment. Uncovering why individuals enjoy exercise would be beneficial in determining the factors that cause one to enjoy it for positive health-related behaviors (mood, cardiovascular benefits, etc.) versus negative health-related behaviors (purging, body image concerns, etc.).

It would be advantageous to replicate this study using a non-homogenous sample size, including physically active women greater than 25 years old, males and sedentary individuals. More objective measures to assess both eating and exercise pathology and behaviors are needed, yet there is still not a clear answer as to what are the best instruments for assessing these variables. This study was one of few that included the DEAS scale. Future research would benefit from using this instrument in order to increase validity and reliability. In addition, using the DEAS, in accordance with other measures, may provide a clearer picture
of an individual’s risk for developing an eating disorder. The lack of data available to determine at which score one is considered to have a high disordered eating attitude, further limits the interpretation of the findings; therefore it would be advantageous for the future researchers to develop a more comprehensive scoring measure for the DEAS. The additional finding that BMI significantly influenced the disordered eating attitude, lends for further exploration. Previous studies have found similar results, however, the evidence remains inconclusive.

In summary, the results of this study build upon previous research and may clarify motivations for exercising and eating among female college students who habitually exercise. The evidence demonstrates a positive relationship between disordered eating attitudes and exercising for appearance and weight related reasons in this population. Exercise intention, not frequency, is a distinguishing factor in identifying how exercise contributes to eating pathology. Instituting programs or paradigms such as HAES on college campuses will be effective to help empower women by increasing self-acceptance and reducing body shame, which ultimately may help reduce the incidence of disordered eating among this population.
References


APPENDIX A

LETTER TO CAMPUS RECREATION DIRECTORS
December 12, 2013

Dear Campus Recreation Director,

My name is Annie Weber. I am a graduate student in the Nutrition & Dietetics program at Northern Illinois University. For my Master’s thesis I am conducting a survey regarding health behaviors and attitudes of physically active college females. I am contacting you to ask for assistance in recruiting female students who would be able to complete my survey via Internet. Would you be willing to provide access to female students who use recreation facilities at your college or university? I can send you the flyers about the study for posting and recruitment purposes, as well as the link to my online survey to distribute to female students who use your recreational facilities.

With approval for use of human subjects from the Northern Illinois University Institutional Review Board (IRB), the survey will be launched with an estimated time frame for completion in March, 2014.

Should you have any questions regarding this request or the survey, please feel free to contact me at aweber2@niu.edu or my thesis advisor Dr. Josephine Umoren at 815-753-6351 or email jxu1@niu.edu

Thank you,

Annie Weber
Nutrition & Dietetics M.S. Candidate
Northern Illinois University
APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL
Dear Ann Weber,

Your application for institutional review of research involving human subjects was reviewed by Institutional Review Board #2 on 26-Feb-2014 and it was determined that it meets the criteria for exemption, as defined by the U. S. Department of Health and Human Services Regulations for the Protection of Human Subjects, 45 CFR 46.101(b). Although this research is exempt, you have responsibilities for the ethical conduct of the research and must comply with the following:

Amendments: You are responsible for reporting any amendments or changes to your research protocol that may affect the determination of exemption and/or the specific category. This may result in your research no longer being eligible for the exemption that has been granted.

Record Keeping: You are responsible for maintaining a copy of all research related records in a secure location, in the event future verification is necessary. At a minimum these documents include: the research protocol, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to participants, all correspondence to or from the IRB, and any other pertinent documents.

Please include the protocol number (HS14-0064) on any documents or correspondence sent to the IRB about this study.

If you have questions or need additional information, please contact the Office of Research Compliance and Integrity at 815-753-8588.
APPENDIX C

SURVEY INSTRUCTIONS FOR CAMPUS RECREATION DIRECTORS
Annie Weber  
Graduate Student  
Department of Family, Consumer, & Nutrition Sciences  
Northern Illinois University  
DeKalb, Illinois 60115

Dear Campus Recreation Director:

Thank you for agreeing to participate in my thesis project regarding eating and exercise behaviors of physically active college female students. Your help in distributing this information to all females using your recreation facilities is appreciated and very important to this research. Please forward this email to your female students and encourage their participation in the research. Participation in this survey is voluntary and if they decide to participate the survey will take only about 15 and 20 minutes to complete online.

Thank you,

Annie Weber

Dear student,

In an effort to research eating and exercise behaviors of physically active college females, we would like you to take a few minutes of your time to respond to this survey. Participation is voluntary. The self-administered on-line survey will take between 15 and 20 minutes. To access the survey please click here. If the survey does not open automatically, please copy and paste the following link into your internet browser’s address bar:

Link

Please complete your survey before specified date per institution.

Upon completion of the survey, you will have the option to enter a drawing for a $50 Target gift card. For those interested in participating, send contact information, including name, phone number, and mailing address to pacfstudy@gmail.com.

Your assistance and participation is important to us and we hope you will participate. If you have any questions at this time, please contact Annie Weber at (505) 362-4952 or aweber2@niu.edu or my advisor Dr. Josephine Umoren at (815) 753-6351 or jxu1@niu.edu.

Thank you,

Annie Weber
APPENDIX D

FOLLOW-UP EMAIL TO PARTICIPANTS
Annie Weber  
Graduate Student  
Department of Family, Consumer, & Nutrition Sciences  
Northern Illinois University  
DeKalb, Illinois 60115  

Campus Recreation Director,  

Please forward this message to your students. We appreciate your help with our research. Thank you!  

Sincerely,  

Annie Weber  

Message for female students:  

If you have already completed the survey regarding eating and exercise behaviors, thank you for your participation. If you have not completed it yet, please do so by specified date. Please follow the link provided and follow the instructions. Data is still being collected and analyzed. Once the results of the study have been produced, we will provide you with a summary of our study, results, and conclusions.  

If you have any further questions, please contact us at your convenience.  

Thank you again,  

Annie Weber
APPENDIX E

INFORMED CONSENT FORM
Dear Participant,

My name is Annie Weber; I am a nutrition and dietetics graduate student at Northern Illinois University. I am conducting a thesis project as part of the requirements for my M.S. and I need your assistance. You are invited to participate in my graduate thesis project regarding physically active females and eating and exercise behaviors. This questionnaire will take approximately 15-20 minutes to complete. You may withdraw from the survey at any point without penalty. Your participation is voluntary. Should you decide to participate you will have the option to enter a drawing for a $50 Target gift card after you have completed the survey. To enter into the drawing you may email me at pacfstudy@gmail.com with the subject line “gift card” added. Please be sure to include your contact information in order to receive the gift card.

If you have any questions, please contact Annie Weber at aweber2@niu.edu. You may also contact thesis director Josephine Umoren at jxu1@niu.edu or the Office of Research Compliance at: (815) 753-8588.

I have read and understand the above information. I certify that I am 18 years or older and am currently enrolled at a public university in the state of Illinois. By clicking the Yes button to enter the survey, I am volunteering to take the survey.

Yes, I wish to take part in the survey. _____
No, I do not wish to participate in the survey. _____

Thank you,

Annie Weber
Graduate Student
Northern Illinois University
APPENDIX F

DISORDERED EATING ATTITUDE SCALE
Disordered Eating Attitude Scale – DEAS (and score system)
- Higher scores means worse eating attitude; score in each question varies from 1 to 5;
- For question 1, its necessary to score each alternative to have question 1 score;
- Minimum score is 37 and maximum is 190;
- Correspondent score for each alternative is in read bellow.

**PART I**
1) Mark with an X how healthy and necessary you consider consumption of each kind of food below:

**a) Sugar**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 1 point
- *Not* eating this food is healthy and necessary 5 point

**French Fries**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 1 point
- *Not* eating this food is healthy and necessary 5 point

**Oil**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 1 point
- *Not* eating this food is healthy and necessary 5 point

**b) Breads**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Rice**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Beans**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Pasta**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Red meat**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Whole milk**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point

**Cheese**
- Eating this food *often* is healthy and necessary 1 point
- Eating this food *occasionally* is healthy and necessary 3 point
- *Not* eating this food is healthy and necessary 5 point
Disordered Eating Attitude Scale (cont.)

c) Vegetables  
Eating this food *often* is healthy and necessary 1 point  
Eating this food *occasionally* is healthy and necessary 3 point  
Not eating this food is healthy and necessary 5 point  

Fruits  
Eating this food *often* is healthy and necessary 1 point  
Eating this food *occasionally* is healthy and necessary 3 point  
Not eating this food is healthy and necessary 5 point  

White meat  
Eating this food *often* is healthy and necessary 1 point  
Eating this food *occasionally* is healthy and necessary 3 point  
Not eating this food is healthy and necessary 5 point  

2) Do you feel pleasure when you eat?  
Yes. 1 point  No. 5 point  

3) Does eating ever feel unnatural to you?  
Yes. 5 point  No. 1 point  

4) Have you ever spent one or more days without eating or having only liquids because you believed you could lose weight?  
Yes. 5 point  No. 1 point  

5) Do you count the calories of everything you eat?  
Yes. 5 point  No. 1 point  

6) Do you enjoy the feeling of an empty stomach?  
Yes. 5 point  No. 1 point  

7) Do you “skip” meals to avoid putting on weight?  
Yes. 5 point  No. 1 point  

8) Does eating make you feel “dirty”?  
Yes. 5 point  No. 1 point  

9) Do you have good memories related to food?  
Yes. 1 point  No. 5 point  

10) Would you like to not need to eat?  
Yes. 5 point  No. 1 point  

11) Do you believe that it is normal to eat sometimes just because you are sad, upset or bored?  
Yes. 1 point  No.  

12) When you eat more than usual, what is your behavior afterwards?  
Restart eating as usual. 1 point  
Assume you have lost control and keep eating even more. 3 point  
Decide to go on a diet to compensate. 3 point  
Use some kind of compensation, such as physical activity, vomiting, laxatives and diuretics. 5 point  

**PART II**  
All question (13 to 25) score in the same way:  
Always = 5 points
Disordered Eating Attitude Scale (cont.)

Usually = 4 points
Often = 3 points
Sometimes = 2 points
Rarely/never = 1 point

13) I feel guilty when I eat something that I thought I should not eat for some reason.
Always Usually Often Sometimes Rarely/Never

14) I quit eating a kind of food if I find out it has more calories than I thought.
Always Usually Often Sometimes Rarely/Never

15) I worry all the time about what I am going to eat, how much to eat, how to prepare food and whether I should eat or not.
Always Usually Often Sometimes Rarely/Never

16) I worry about how much a certain kind of food or meal will make me gain weight.
Always Usually Often Sometimes Rarely/Never

17) I am angry when I feel hungry.
Always Usually Often Sometimes Rarely/Never

18) It is hard to choose what to eat, because I always think I should eat less or choose the option with fewer calories.
Always Usually Often Sometimes Rarely/Never

19) When I desire a specific kind of food, I know I won’t stop eating until I have finished with it.
Always Usually Often Sometimes Rarely/Never

20) I would like to have my appetite and eating behavior under total control.
Always Usually Often Sometimes Rarely/Never

21) I try eating less in front of others in order to overeat when I am alone.
Always Usually Often Sometimes Rarely/Never

22) I am afraid to start eating and not be able to stop.
Always Usually Often Sometimes Rarely/Never

23) I dream of a pill that would replace food.
Always Usually Often Sometimes Rarely/Never

24) I get nervous and/or lose my self-control at parties and buffets, due to a great amount of foods available.
Always Usually Often Sometimes Rarely/Never

25) My relationship with food messes up my life as a whole.
Always Usually Often Sometimes Rarely/Never

SUBSCALES:
Subscale 1 (Relationship with food) includes questions 8,10,13,17,18,19,20,21,22,23,24 and 25;
Subscale 2 (Concerns about food and weight gain) includes questions 5,14,15 and 16;
Subscale 3 (Restrictive and compensatory practices) includes questions: 4,6,7 and 12;
Subscale 4 (Feeling toward eating) includes questions: 2,3 and 9;
Subscale 5 (Idea of normal eating) includes questions: 1a,b,c and 11.
APPENDIX G

PERMISSION TO USE DEAS SCALE
My name is Annie Weber, I am a graduate student and dietetic intern at Northern Illinois University. For my Master's thesis I will conducting a survey about health attitudes and behaviors among physically active college females. I am writing to obtain permission to use selected items and sub scales from the Disordered Eating Attitude Scale (DEAS) as one of my instrument measures. The survey will be conducted in this upcoming semester, Spring of 2014. I would be happy to share the results with you upon completion.

Thank you,

Annie Weber
Dietetic Intern & M.S. Candidate
Northern Illinois University

Dear Ann

I’m glad to hear about your interesting in the DEAS.

The development and validation of DEAS (done in Portuguese in Brazil) was published in the Perceptual and Motor Skills journal - and the English version of it is in the appendix. The validation of the English version was performed in USA and published in Appetite journal. I'm attaching both for you. You can have the scale in the appendix and I’m attaching also the score system.

We also validated a Spanish version in Panama and published it (it is attached also if you can read Spanish). A Japanese version was also published.

I’m also sending the results of application of this scale in a sample of Brazilian college students, and evaluation regarding eating disorders symptoms.

The scale was developed and validated with young female participants, the validation study with adolescents is submitted and with male are in press.

Let me know if you have more questions.

Best regards
Marle Alvarenga, PhD
Dietitian / Eating Disorders Specialist
Nutrition Department - Public Health School - University of Sao Paulo
APPENDIX H

REASONS FOR EXERCISE INVENTORY
Reasons For Exercise Inventory

People exercise for a variety of reasons. When people are asked why they exercise, their answers are sometimes based on the reasons they believe they should have for exercising. What we want to know are the reasons people actually have for exercising. Please respond to the items below as honestly as possible. To what extent is each of the following an important reason that you have for exercising? Use the scale below, ranging from 1 to 7, in giving your answers.

1  2  3  4  5  6  7
not at all  moderately  extremely
important  important  important

Weight control
1. To be slim
2. To lose weight
3. To maintain my current weight

Fitness
4. To improve my muscle tone
5. To improve my strength
6. To improve my endurance, stamina
7. To improve my flexibility, coordination

Mood
8. To cope with sadness, depression
9. To cope with stress, anxiety
10. To increase my energy level
11. To improve my mood

Health
12. To improve my cardiovascular fitness
13. To improve my overall health
14. To increase my resistance to illness and disease
15. To maintain my physical well-being

Attractiveness
16. To improve my appearance
17. To be attractive to members of the opposite sex
18. To be sexually desirable
Reasons for Exercise Inventory (cont.)

*All are presented in a random order in the questionnaire

**Enjoyment**
19. To meet new people  
20. To socialize with friends  
21. To have fun

**Tone**
22. To redistribute my weight  
23. To improve my overall body shape  
24. To alter a specific area of my body
APPENDIX I

DEMOGRAPHIC SURVEY INSTRUMENT
Please indicate what physical activities you regularly engage in (running, swimming, biking, kickboxing, etc.)
________________________________________________________________________
________________________________________________________________________
How much total time do you spend participating in these physical activities? (**hours and minutes per week**)  
________________________________________________________________________
What is your current age: ______ years
What year in school describes you best?:  
   a. Freshman  
   b. Sophomore  
   c. Junior  
   d. Senior  
   e. Graduate
What is your major field of study? _________________
Which ethnicity describes you best?  
   a. African-American  
   b. American Indian  
   c. Asian-American  
   d. Caucasian  
   e. Hispanic  
   f. Other (please specify)__________________
How tall are you?  
Height: ______feet ______inches OR _____ m
What is your current weight?  
Weight: _____ pounds OR _____kg
APPENDIX J

INSTITUTIONS INVITED TO PARTICIPATE
Colleges and Universities Invited to Participate

1. Augustana College
2. Benedictine University
3. Bradley University
4. Chicago State University
5. DePaul University
6. Dominican University
7. Eastern Illinois University
8. Governors State University
9. Illinois Institute of Technology
10. Illinois Wesleyan University
11. Illinois State University
12. Lake Forest College
13. Loyola University Chicago
14. Northeastern Illinois University
15. Northern Illinois University
16. Northwestern University
17. North Park University
18. Southern Illinois University-Carbondale
19. Southern Illinois University-Edwardsville
20. University of Chicago
21. University of Illinois-Chicago
Colleges and Universities Invited to Participate (cont.)

22. University of Illinois Champaign-Urbana

23. University of Illinois-Springfield

24. Western Illinois University

25. Wheaton College
REVIEW OF LITERATURE

In the United States, the role of exercise in health maintenance and disease prevention has been increasingly recognized over the past few decades, particularly as the rates of obesity continue to rise. For the female population it is often an activity associated with improving appearance rather than for health or pleasure. Several psychological factors such as self-objectification, drive for thinness, body dissatisfaction, and coping influence exercise and eating behaviors among women.

Physical Activity in Females

Exercise, along with a balanced diet and active lifestyle, may prevent obesity as well as comorbid health problems, such as type 2 diabetes, hypertension, dyslipidemia, gallbladder disease, and sleep apnea. Exercise also contributes to psychological well-being and has been found to decrease levels of depression and anxiety and improve feelings of self-sufficiency and self-esteem. Significant improvements in many disordered eating risk factors including self-esteem, anxiety, depression, mood and body image have been seen as a result of regular exercise. Despite these benefits, there are growing concerns for the emphasis placed on exercise and the negative effects that may develop from or contribute to exercise.

Physical activity (PA) is defined in terms of weekly hours spent on leisure time physical activities. The American College of Sports Medicine (ACSM) recommends 30 minutes of moderate-intensity exercise per day, 5-7 days each week, in order to be physically
active. According to the ACSM, this amount, type, and intensity are associated with enhanced health and quality of life.

Intensity of exercise, as defined by the World Health Organization\(^4\), refers to the rate at which the activity is being performed or the magnitude of the effort required to perform the activity. In other words, it can be described as how hard one works to accomplish the activity. Moderate-intensity requires a moderate amount of effort and noticeably increases the heart rate, such as brisk walking, dancing, and active play with children.\(^4\) Vigorous-intensity exercise requires a large amount of effort and subsequently causes rapid breathing and a substantial increase in heart rate. Examples of vigorous-intensity exercise are running, fast swimming, participation in competitive sports, and aerobics.\(^4\)

Multiple definitions for PA are utilized in research studies, but the inconsistencies are difficult to ignore. In terms of exercise frequency, Augestad and Flanders\(^5\) defined low PA as less than 5 hours per week and high PA as 5 hours or more per week. In comparison, Kjelsas and Augestad\(^6\) (2004) defined moderate levels of exercise as less than 7 hours per week and high levels of exercise as greater than 7 hours per week. In several other research studies, authors gathered self-reported data from participants and inferred their own levels of PA based on the average number of hours of weekly exercise reported by participants.\(^5\)-\(^7\) This leads to conflicting data and a possible failure to identify potential problems, including exercise dependence and exercise as a compensatory behavior in eating disorders.

With no clear definition of PA, one cannot determine from duration and frequency of activity alone when exercise may become unhealthy. Adkins and Keel\(^8\), describe exercise as excessive when its duration, frequency, or intensity exceeds what is required for physical
health and increases the risk of physical injury. Furthermore, duration, frequency, or intensity level varies from person to person. What may be considered excessive for some individuals may not apply to others.

Theory of Planned Behavior

The theory of planned behavior (TPB) has been widely studied since 1988 as a conceptual framework of human action that considers intention, or a person’s level of motivation as the immediate determinant of behavior. Human behavior is guided by three considerations according to the theory: beliefs about the likely consequences or attributes of the behavior (behavioral beliefs), beliefs about the expectations of other people (normative beliefs), and beliefs about the presence of factors that may enhance or hinder performance of the behavior (control beliefs). Intention is determined by attitude, subjective norm, and perceived behavioral control. Ajzen proposed that attitude is the function of behavioral beliefs, or the “product of the perceived consequences of performing a behavior and the evaluation of the outcomes.” Perceived behavioral control is an important predictor of health behaviors and is generally measured by evaluating factors that make it easier or more difficult to perform a behavior. It is expected to lead to a behavior, if it is goal oriented, such as weight loss or dieting. Attitude, social norm, and perceived control all contribute to behavioral intention, which ultimately predicts behavior.

TPB has been used to study exercise and diet behaviors among various populations. In a study of 117 overweight women ages 18-64, perceived behavioral control was the only
significant predictor of exercise intention, whereas attitude, subjective norm, and perceived behavioral control, all were significant predictors of diet intention. These results contrasted previous research conducted. Due to the inability of attitude to predict exercise intention in this sample, the authors suggest that either a positive or negative evaluation of exercise among overweight women has less of an impact on their intention to perform exercise.

Similarly, in a sample of 256 undergraduate women with a mean age of 21 years, the TPB model was used to predict dieting intention. The strongest predictor of dieting intention was attitude, followed by perceived control and subjective norms. Specifically, 69% of the variance in intention was explained by direct attitude and 49% of the women had a positive attitude toward dieting. Most respondents believed that dieting was likely to help in losing weight (76%), looking better (73%), becoming healthier (66%), increasing self-esteem (53%), and being more in control of their body (51%). These results support further research into the attitudes young adult women have towards eating and how those attitudes, in turn, effect eating and exercise behaviors.

Eating Attitudes & Behaviors

Eating attitudes related to disordered eating behavior are not limited to those with clinically diagnosed eating disorders. Many individuals experience distorted eating thoughts, feelings, and behaviors towards food; however, they do not recognize that these attitudes are “abnormal.” The positive effect food has on one’s body is well established, while the
negative effects of attitudes is largely neglected. Eating attitudes have a profound impact on food choices and consequently influence one’s health.

The American College of Sports Medicine\(^3\) describes disordered eating as a “spectrum of abnormal and harmful eating patterns that are used in a misguided attempt to lose weight or maintain a lower than normal body weight.” In the past few decades this range of disordered eating has widened to a continuum, including the extremes of clinically diagnosed eating disorders. In between these extremes lies a variety of disordered eating behaviors ranging from severely limiting food or food groups to moderately restricting energy intake to occasional binging and purging.\(^{14}\) It can include behaviors that reflect, but do not encompass all of the symptoms of clinically diagnosed eating disorders. Examples of disordered eating include but are not limited to: restricting food intake, skipping meals, fasting or chronic dieting, binge eating, self-induced vomiting, and unbalanced eating such as avoiding certain food groups like fat or carbohydrates, taking diet pills, laxative or diuretic abuse, and steroid use. Physical hunger and satiety are often ignored. Disordered eating can potentially lead to a reduced ability to cope with stress and an increased incidence of suicidal thoughts.

A 2010 study by Alvarenga, Scagliusi, and Philippi\(^{15}\) evaluated the eating attitudes and risk behavior for eating disorders among 2,489 female undergraduate students in Brazil. Female students completed the Disordered Eating Attitude Scale (DEAS) to evaluate attitudes and the Eating Attitude Test (EAT-26) to evaluate eating disorder risk behavior. From the total sample, 26.1% presented with disordered eating risk behavior. Additionally, female students who scored higher on the EAT-26 presented with more problematic DEAS scores.

The results indicate that female undergraduate students who present with risk for developing
eating disorders, also present with worse beliefs, feelings, behaviors, and relationships with food compared to those who are not at risk for developing eating disorders.

Comparatively, a 2010 study\textsuperscript{16} comprised of 682 adolescent athletes from a variety of sports and 423 adolescent controls assessed eating disorders using the body dissatisfaction and drive for thinness scales of the Eating Disorders Inventory (EDI-2). A higher percentage of controls than athletes (70.9\% vs. 44.7\%) reported dieting to improve appearance. These statistics correlated with a higher prevalence of disordered eating symptoms among controls compared with athletes.\textsuperscript{16}

Gargari\textsuperscript{17} and others sought to determine disordered eating attitudes, self-esteem, and social physique anxiety in Iranian females who participate in fitness programs. Two hundred seventy-two females between the ages of 14-51 years old, completed the EAT-26, Rosenberg’s self-esteem scale (RSES), and social physique anxiety scale (SPAS). 28.4\% of the Iranian females had disordered eating attitudes and were at risk of eating disorders as defined by a score of twenty or more on the EAT-26 scale. In particular, this study showed that females who had higher EAT-26 scores had higher weight and BMI as well as lower self-esteem and higher social physique anxiety than those with normal eating attitudes (EAT-26 <20).

Reasons for Exercise & Eating Behaviors

Health beliefs strongly impact the way individuals exercise and eat. Commonly identified reasons for exercising and eating include fitness and health management,
appearance and weight management, stress and mood management, and socializing. Among these broad categories, more specific factors such as self-objectification, body dissatisfaction, coping, appearance, and personality factors are often predictors for physical activity and eating behaviors in young women.

**Self-objectification**

Self-objectification, according to Morry & Staska\textsuperscript{18}, is the internalization of an observer’s perspective upon their own body, causing them to “think about and value their own bodies from a third-person perspective focusing on body attributes, rather than from a first-person perspective, which focuses on non-observable attributes like feelings.” Therefore, a woman’s relationship with her body parallels an observer’s relationship to an object and in essence, their bodies become objects even to themselves.\textsuperscript{19}

Greenleaf\textsuperscript{20} compared self-objectification among a sample of physically active female university students ages 18-30 and a sample of physically active women ages 39 to 64. Results showed that self-objectification predicted levels of physical activity for both age groups. In this particular population, women who internalized an outsider’s view of their bodies were less likely to be physically active. Wolfe\textsuperscript{21} however, found that self-objectifying thoughts were triggered during exercise, therefore, suggesting that appearance is a primary motive for exercise among women. Greenleaf\textsuperscript{20} further notes that the exercise environment highly affects self-objectification. In environments where attention is drawn to the body, such as fitness rooms with mirrors or exercisers wearing tight clothing, women’s awareness of their
own physique increases, leading to increased self-objectification. Thus, while exercise may positively impact self-esteem and body image, self-objectification can also lead to a negative influence of exercise.

Noll and Fredrickson\textsuperscript{22} identified self-objectification and body shame as key predictors of eating disorder symptomatology. They found a significant interaction of self-objectification through an experimental condition (swimsuit or sweater) in predicting body shame. Women who tried on swimsuits were more likely to self-objectify than those who tried on sweaters. Body shame was in turn related to greater restrained eating in the swimsuit group after the clothes were tried on.

In a 2005 study by Greenleaf\textsuperscript{20} where self-objectification was measured using the Body Surveillance subscale of the Objectified Body Consciousness Scale, younger women reported higher levels of self-objectification than older women. Similarly, McKinley\textsuperscript{23} found that college women reported greater body surveillance than middle-aged mothers. These age-related differences, according to McKinley\textsuperscript{23}, are potentially due to generational differences and self-esteem. Social norms and body ideals have drastically changed over time. In the 1950s and 1960s, a voluptuous figure like Marilyn Monroe was seen as ideal. In contrast, in the last two decades, extremely thin has become the ideal figure young females strive for. A second factor, self-esteem, is a possible influence on young women’s eating attitudes and behaviors. Younger women may gain self-worth from their appearance whereas older women may focus on their accomplishments.\textsuperscript{20}
Drive for Thinness & Body Dissatisfaction in Relation to Exercise Behaviors

It is more common in American society to find that women exercise to pursue a thinner body or increased sense of control and accomplishment, rather than for fitness or pleasure. This cultural standard for thinness as the ideal body type highly influences the way many women perceive their bodies. It is well documented that when women aspire towards attaining this thin ideal, they become dissatisfied with their body shape and preoccupied with negative characteristics.24

Several research studies have cited body dissatisfaction as a primary motivator for college age females’ involvement in physical activity.6,15,25-26 In Petrie, Greenleaf, Reel & Carter’s survey-based study26, 204 female athletes, mean age of 20 years completed questionnaires to evaluate disordered eating, perfectionism, reasons for exercise, and appearance orientation. Based on their responses to the Questionnaire for Eating Disorder Diagnoses (QEDD), 25.5% of the sample self-reported exercising to improve their appearance. Their responses indicated higher levels of body dissatisfaction compared to their counterparts.26

Lowery et al.25 examined the relationships among self-esteem, body image, and health behaviors of 267 female and 156 male first-year college students. Data was collected through the Objectified Body Consciousness Scale, the Weight and Appearance Visual Analogue Scales, the Rosenberg self-esteem scale, and a measure of physical fitness behaviors. Compared to men, women reported more body surveillance, greater discrepancy between their ideal and real body figures, and more dissatisfaction with their weight and physical
appearance (89.6% females vs. 67.34% males). Women who regularly exercised, however, did not have a more positive body image than women who did not exercise. Therefore, regular exercise in this sample did not correlate with higher self-esteem.

Kjelsas & Augestad recruited 905 women and 577 men, mean age 23, from 4 universities in Norway to complete questionnaires regarding demographic, hours of weekly exercise, type of sport, Karolinska Scales of Personality (KSP), and the Eating Disorder Inventory (EDI). Results from the EDI showed that the female participants with both moderate and high levels of exercise scored highest on body dissatisfaction and drive for thinness subscales in comparison to other EDI subscales.

Women, in general, who exercise for self-presentation reasons, according to Davis and McDonald & Thompson, are more dissatisfied with their bodies and consequently at increased risk for developing both unhealthy exercise and eating patterns. In addition, Kjelas and Augestad argue that preoccupation with body weight can develop and lead to a negative perception of body shape. Social physique anxiety (SPA), according to Hart et al., involves concern that others are negatively evaluating one’s body or physical appearance. This reflects one’s self-consciousness concerning one’s body. Therefore, body dissatisfaction is related to SPA. Krane et al. looked at a population of 198 female aerobic exercisers and 204 college athletes in order to determine exercise concerns. The aerobic exercisers were undergraduate and graduate students enrolled in not-for-credit aerobics classes at a university. Mean age of aerobic participants was 19.75. Self-reported data on average minutes of exercise per week ranged from 60 minutes to 1310 minutes. Mean age of the athletes was 19.55 years. Many of these women reported exercising outside of team practices for an average of 156.27 minutes
per week. The sample of females completed the EDI and Social Physique Anxiety Scale (SPAS). Between both populations, body dissatisfaction was the strongest predictor of SPA, however; it was not a predictor of time per week engaged in exercise.

Various researchers indicate that college females with high weekly physical activity seem to be more satisfied with their bodies. Rote et al.\textsuperscript{31} measured the relationship between body image and objectively measured physical activity in 120 undergraduate women ages 18-23 years. In this study, women who spent more time in moderate and vigorous activity were more likely to be more invested in their fitness regimen than those who were not. This in turn correlated with them being more invested in their health and well-being. In addition, these women, were not found to have significant body image concerns. Chu\textsuperscript{32} found in a study of 137 college men and 200 women that the females with higher activity levels had similar scores on the SPAS to those who had low activity levels. Augestad and Flanders\textsuperscript{33} evaluated the association between hours of physical activity and prevalence of eating disorder behaviors in 898 physically active Norwegian women ages 18-50 years. Women filled out the EDI, Survey of Eating Disorders (SED), and a questionnaire concerning self-reported physical activity and demographic data. Hours of weekly PA were not associated with increased risk of eating disorder behavior or clinically diagnosed eating disorders. Like Chu\textsuperscript{32}, Augestad and Flanders\textsuperscript{33} found that more hours of PA were associated with a decreased risk. Cook and Hausenblas\textsuperscript{34}, on-the-other-hand, reported in a study population of 330 female university students, that those with high self-reported exercise behavior had higher eating pathology scores on the Drive for Thinness subscale of EDI-2. Similarly, Lowery et al.\textsuperscript{25} reported that first-year college females struggled with body image whether or not they exercised regularly.
while Augestad et al.\textsuperscript{33} noted that females engaging in physical activity more than 6 hours per week were at higher risk for being classified with an eating disorder not-otherwise specified (EDNOS) than those who reported a lower amount of activity. Participating in exercise did not correlate with higher self-esteem in this sample. Additionally, Mond et al.\textsuperscript{7} studied 400 females aged 18-45 years on measures of eating disordered behavior, frequency of exercise, quality of life, weight and height, and sociodemographic information. Results found that scores on the Eating Disorder Examination (EDE-Q) were higher among females who felt guilty after missing exercise or who exercised to improve appearance and body tone.

Competitive female athletes are exposed to added pressure to conform to the thin ideal if performance will benefit from a low weight and low percentage of body fat. This pressure, in turn, leads to over-concern with body shape and increased body dissatisfaction.\textsuperscript{5} Prevalence of disordered eating among female athletes, in general, has been shown to range from 5.2-46.7\%\textsuperscript{17} however, consensus on whether or not athletes exhibit more disordered eating behavior and exercise commitment than average exercisers, remains unclear. Some data suggest that sports participation protects college women from eating disorders\textsuperscript{35} while others challenge that and claim female college athletes are at increased risk for disordered eating.

Holm-Denoma et al.\textsuperscript{36} reported that varsity athletes had higher scores on the EDI than did independent exercisers. Two hundred seventy-four female undergraduate students completed the eating disorders inventory (EDI) and the physical activity and sport anxiety scale (PASAS) and reported their exercise habits. The EDI is a 64-item self-report measure of eating behaviors and attitudes. The PASAS is a 16-item self-report questionnaire that assesses social fear and avoidance of exercise or athletic situations. Independent exercisers had
significantly higher scores on eating disorder behavior measures than club athletes and non-athletes. Females who had high sports anxiety scores were more likely to have a higher EDI score in the subscale of drive for thinness. The authors proposed that independent (non-athletes) exercisers have similar traits to varsity athletes, and thus, some may engage in exercise as frequently or intensely as women in competitive sports. In general, they concluded that women in competitive sports had higher rates of eating disorder symptoms than those who participate in non-competitive activity.

Petrie and Greenleaf\textsuperscript{26} examined the relationship between perfectionism, psychological well-being, and reasons for exercising among 204 female collegiate athletes using the Eating Disorder Diagnoses (QEDD), Multidimensional Perfectionism Scale (MPS), Life Orientation Test-Revises (LOT-R), Reasons for Exercise Inventory (REI), and Multidimensional Body-Self Relations Questionnaire (MBSRQ). Seventy-five percent (75\%) of the athletes were asymptomatic for disordered eating, and the remaining 25\% were symptomatic. The athletes who were found to engage in disordered eating behaviors were more likely to exercise to feel better about themselves and to manage their mood than athletes who were asymptomatic. These results suggest that similar findings could be found in physically active non-athlete females.

Hausenblas\textsuperscript{37} compared a sample of 36 elite female divers to an athletic control group and a nonathletic control group on attitudes, behaviors, and psychological processes of eating disorders and social physique anxiety (SPA). The divers were competing at the national level, (mean age 16.33). The athletic control group comprised of 39 elite athletes, mean age 17.35 years, competing in volleyball, lacrosse, or soccer. Nonathletic controls were high school
students, mean age 17.38 years, not participating in more than one hour of physical activity each week. Participants completed psychological subscales of the EDI-2 and the Social Physique Anxiety Scale (SPAS). The elite divers had significantly lower SPA scores compared to both control groups. This shows that the divers were more comfortable with their physical appearance and had little concern about their body image. Differences in correlates associated with eating disorders were not found. However, results revealed that dissatisfaction with body shape among the two control groups was a strong predictor of dieting, thinness, and SPA.

Krane et al.\textsuperscript{30} conducted a study comparing 204 female college athletes to 198 college female exercisers in regards to body dissatisfaction, drive for thinness, bulimia, perfectionism, and SPA on the EDI and SPAS. Athletes participated in cross-country, track, swimming, gymnastics, figure skating, basketball, golf, soccer, softball, volleyball, tennis, and lacrosse. While results showed that the athletes and exercisers did not differ in body dissatisfaction, drive for thinness, bulimia, and SPA, the exercisers had a lower perfectionism score compared to the athletes. The results also showed that both athletes and exercisers with low SPA had lower body dissatisfaction and drive for thinness scores, suggesting that physical activity may buffer individuals from this negative effect of physical activity.

In a three-part study by Klungland-Torstveit and Sundgot-Borgen,\textsuperscript{38} the prevalence of the female athlete triad was examined amongst 186 elite female athletes and 145 physically active controls, ages 13-39. Athletes trained an average of 13.9 hours per week and controls were active 5.3 hours per week. Only eight of the 186 athletes (4.3%) met all 3 components of the triad while 50 athletes (26.9%) met 2 components of the triad. In comparison, five out of
145 controls (3.4%) met all 3 components of the triad and 22 (15.2%) met at least 2 of the components. While a higher percentage of athletes met the criteria for both disordered eating and menstrual dysfunction, a higher percentage of controls had low bone mineral density. This was the first study of its kind to indicate that the female athlete triad may be present in non-athletes as well.

**Drive for Thinness & Body Dissatisfaction in Relation to Eating Behaviors**

Mussel et al.\(^{39}\) argue that the persistent idealization of the female body has caused women of all ages to experience increased feelings of body dissatisfaction and body shame, therefore leading many to resort to drastic measures in order to conform to these ideals. Similarly, Striegel-Moore\(^{24}\) stated that body dissatisfaction is a precursor to unhealthy eating behaviors and may predict the severity of eating problems. Worsening body image corresponded to increase disordered eating.

Martinsen et al.\(^{15}\) conducted a study among 682 female adolescent athletes in a variety of sports and 423 female adolescent controls. The participants completed a questionnaire that contained questions regarding training patterns, menstrual status and history, dieting, use of pathogenic weight control methods, and drive for thinness and body dissatisfaction subscales from the EDI. Results showed that 15.8% of controls versus 11.1% of athletes were involved in weight control behaviors that meet criteria of disordered eating. While both athletes and controls reported dieting to improve appearance, controls had higher rates of body dissatisfaction and drive for thinness (7.6% vs. 2.3% and 31.6% vs. 16.5%). A high level of
Body dissatisfaction has been a key feature in development of maladaptive eating and dieting patterns. Worsening body image may lead to disordered eating, as was found in a sample of 450 college freshman women. Cooley and Toray reported similar results in a longitudinal study of 118 non-athlete college women where those entering college with higher levels of body dissatisfaction were likely to show worsening patterns of eating pathology across the college years based on their responses to Body Image Silhouettes, Restraint Scale, Bulimia scale of the EDI, Ineffectiveness scale of the EDI, Public Self-Consciousness Scale, and Profile of Mood States. Levitt investigated whether frequency of exercise activities was related to eating disorder behavior among 853 college students using the EAT-26 and self-reported athletic activities. The highest scores of eating disorder behavior were seen among recreational exercisers, or those that exercise on their own, compared to more organized sport activities such as intramurals, club sports, and collegiate athletes. Rudd and Lennon conducted a qualitative study among 99 college students, ages 19-24 in which the students wrote an essay in response to various questions regarding body image and self-presentation. Approximately 15% of the women respondents expressed dissatisfaction with their body, while 48% said they were satisfied. Despite this large proportion of women expressing satisfaction with their bodies, all individuals made comments about their perceived shape, size, and weight.

Body dissatisfaction among females of college age typically stems from complying with the body ideals of westernized societies. The internalization and pursuit of unrealistic body ideals like thinness can be attributed in part to media exposure to excessive thinness. These portrayals lead to dissatisfaction with one’s own body and further, body shame. Body
shame, according to Fredrickson et al.\textsuperscript{45} is the result of experiencing feelings of shame about one’s body shape or size. Moradi et al.\textsuperscript{19} argue that negative emotions result from measuring oneself against such a standard and failing to meet that standard. Comparing oneself to rigid standards brings about personality factors, specifically perfectionism.

**Perfectionism**

Self-oriented perfectionism has been shown to influence body dissatisfaction, drive for thinness, and eating and exercise behaviors. McLaren et al.\textsuperscript{46} investigated the role exercise and perfectionism had on diet restraint in 269 female university students using the Multidimensional Perfectionism Scale (MPS), Perfectionistic Self-Presentation Scale (PSPS), Restraint subscale of the Dutch Restraint Scale, and the Commitment to Exercise Scale (CES). Self-oriented perfectionism, socially prescribed perfectionism, and perfectionistic self-presentation significantly influenced dietary restraint. Secondly, commitment to exercise also predicted dietary restraint. The authors proposed that these results suggest that an individual’s attitude toward exercise is the critical component that most strongly affects eating behaviors.

Kjelsas and Augstad\textsuperscript{6} describe personality traits commonly seen in individuals exhibiting these behaviors to include neuroticism, introversion, conformity, perfectionism, high achievement, rigidity, obsessive-compulsive features, hostility, and guilt. Some individuals may have personality characteristics that predispose them more to developing eating disorders than those who do not have these personality traits. These authors, explored the associations between personality traits, exercise, and eating behaviors among 577 men and
905 women, as previously described. The best predictors distinguishing between women with eating disorder behavior from women with normal eating behavior were neuroticism and age.

According to Thome and Espelage\textsuperscript{47}, individuals with neurotic tendencies are more likely to become engaged in a cycle of exercise and diet preoccupation. Neuroticism is characterized by anxiety, moodiness, and worry and those who exhibit neuroticism are more likely to be depressed, angry, or experience feelings of guilt. Thome and Espelage\textsuperscript{47} explored coping styles of 235 female and 86 male undergraduate students. Students completed 10 questionnaires that assessed exercise behavior, coping strategies, eating attitudes, self-esteem, life satisfaction, depression, and anxiety. Exercise was found to be associated with positive and negative health attitudes among females. High EAT-26 scores were associated with negative exercise affect. Low EAT-26 scores were associated with positive exercise affect, suggesting that exercise is associated differently with mental health depending on the presence or absence of disordered eating pathology.

People who engage in disordered eating behaviors are known to engage in exercise to promote weight loss, either in an extreme weight control behavior through the drive for thinness in AN, or as a non-purging compensatory behavior in BN.\textsuperscript{48} Addictiveness, according to Thome and Espelage\textsuperscript{47} may be an important link in the association between exercise and disordered eating. Davis and Claridge\textsuperscript{27} found that college females with anorexia nervosa (AN) or bulimia nervosa (BN) had high addiction scores, and that addictiveness and obsessive-compulsiveness were related to weight preoccupation and excessive exercise.
Coping

Similar to eating behaviors, exercise may be used as a coping mechanism in order to manage stress, anger, or sadness, and to promote psychological health.\textsuperscript{49} Stress, according to Thome & Espelage\textsuperscript{49}, is a response to events or situations that require individuals to find and utilize other methods of adaptation, while coping is a process by which a person manages demands that are believed to be stressful, in addition to the emotions that result from stress.

To understand how exercise may contribute to coping, it is important to first discuss the three different coping strategies as defined by Thome and Espelage.\textsuperscript{49} Task-oriented coping consists of purposeful efforts aimed at solving a problem. Emotion-oriented coping encompasses self-oriented reactions that are aimed at alleviating stress, but might not always be successful in doing so. Avoidance-oriented coping is comprised of two distinct components including distraction and social diversion. Thome and Espelage\textsuperscript{49} identified “exercise-oriented coping” as a fourth method of coping assessment. Examples of items used to measure this style in response to stress were, “go to the gym to work out,” “do something active, such as running,” and “get some exercise.”

There are many differences between men and women when it comes to reasons for exercise. Koff and Sangani\textsuperscript{50} in a study of 128 female undergraduate students, found that students with subclinical eating disorders reported more emotion-coping and distraction strategies than did female undergraduate students without eating disorders. Those with subclinical eating disorders scored higher on the EAT-26 and Coping Inventory for Stressful Situations. In a study conducted by Thome and Espelage\textsuperscript{49} male college students revealed that
they “go to the gym to work out” when faced with a difficult situation more often than female college students. Furthermore, exercise was associated with a higher life satisfaction in males, along with a lower state of trait anxiety and positive affect. Female exercise behavior and exercise-oriented coping, however, were only moderately correlated with lower trait anxiety and positive affect. Zmijewski and Howard\(^1\) reported that college females are more likely to exercise for withdrawal symptoms, weight control, and health reasons. Specifically, 63% of women in the top quartile of Eating Attitudes Test (EAT) had higher tolerance to exercise, 58.6% reported exercise withdrawal symptoms, 68.8% reported they craved exercise, 84.6% were depressed and felt tense or restless when unable to exercise. Similarly, Kjelsas and Augestad\(^6\) showed that college women scored higher than college men on guilt, irritability, indirect aggression, muscle tension, and psychic anxiety when asked about not exercising. Strelan et al.\(^{51}\) found when investigating reasons for exercise among 105 college females, that the enjoyment of exercise was the least likely reason among college females to utilize fitness centers.

**Relationship between Physical Activity & Eating Behaviors**

Findings of clinical studies have been strongly supportive of the behavioral synergy between food restriction and exercise.\(^{1,14,34,36,43,49,52}\) It is difficult to identify which behavior negatively influences the other; that is, which came first, the distorted eating attitudes and behaviors or the exercise behaviors?
Mond et al.\textsuperscript{7} has shown that competitive and vigorous exercise often precedes the onset of ED psychopathology among those receiving treatment for an ED and that over-exercising may play an integral role in the pathogenesis and maintenance of eating disorders. Davis et al.\textsuperscript{52} and Cook et al.\textsuperscript{34} also support this observation, and claim that exercise precedes the initiation of disordered eating behaviors. In a study of 539 normal weight university students (18-28 years old, 75\% female), the authors attempted to find a conceptual model that hypothesized regular exercise without psychological compulsion. Participants filled out the short form health survey, drive for thinness subscale of the EDI, exercise dependence scale (EDS), and the leisure-time exercise questionnaire (LTEQ). The authors found that certain aspects of exercise behavior, such as feelings of guilt following postponement of exercise and exercising for weight and/or body shape reasons, contributed to a higher risk for developing disordered eating or clinically diagnosed eating disorders.

De Young and Anderson\textsuperscript{53} found in a study that 71\% of 177 undergraduate women endorsed exercise by negative emotional states. The results from the eating disorder examination questionnaire (EDE-Q) showed that these women scored high on restrained eating, eating concern, shape concern, and weight concern and also reported fasting on a significantly greater number of days over the previous 4 weeks. These results suggest that this type of exercise, that is, exercising to alleviate adverse negative emotions, may be associated with eating disorder behavior.

The exercise frequency factor obtained in a study by Ackard et al.\textsuperscript{54} proposes that there is a dimension of exercise not always related to eating pathology. 586 female students at a university between the ages of 17 and 55 completed the obligatory exercise questionnaire
(OEQ), EDI-2, as well as depression and self-esteem scales. Those who scored high on the OEQ exercised frequently and often participated in intense activity; however, they did not score high on eating disorder subscales. These authors concluded that individuals who exercise frequently, who are strongly and emotionally preoccupied with their exercise activity, and who have a strong commitment, however, have substantial psychopathology in eating disorder development. 

Several other studies, previously discussed, conversely reported that eating disorder behavior did not seem to be associated with high weekly hours of physical activity. Therefore, the compulsive quality of exercise, rather than quantity of exercise, may be a better characterization of exercise that is related to eating disorders. On-the-other-hand, this also indicates that eating disorder behaviors may be present in individuals with low to moderate exercise levels. It is clear that some emotional attachment to exercise exists in the links between excessive exercise or activity disorder with EDs.

Zmijewski and Howard examined 317 male and female undergraduate students and the relationship between exercise-dependence symptoms and disordered eating attitudes. Women scored significantly higher than men on the Exercise for Weight Control and Exercise for Health Reasons subscales of the Eating Disorder Questionnaire. Furthermore, the dieting subscale was most strongly associated with exercising for weight control. This suggests that many college women who exercise may have distorted eating patterns and/or formal or subclinical eating disorders. Similarly, Thome and Espelage reported that obligatory attitudes toward exercise were predictive of eating and weight restriction and exercise behaviors in a sample of 599 college females. Specifically, women who recounted exercising
for weight and appearance had higher eating disturbance scores on the EAT-26 and EDI-2 compared to those who did not exercise for weight or food related reasons.

On the other hand some research suggests exercising for health and fitness may be associated with less disordered eating particularly, when the individual exercises frequently but in absence of weight-or-food-related reasons.\(^8\) 162 female university students, mean age 19.7, completed the reasons for exercise inventory (REI); drive for thinness, bulimia, and body dissatisfaction subscales of the EDI-2; and the obligatory exercise questionnaire (OEQ). Appearance exercisers had significantly higher scores on the EDI subscales, OEQ, and BMI than nonappearance exercisers. There was no difference in motivations to exercise, number of days per week spent exercising, and duration of exercise. In addition, average exercise time was not significantly correlated with disordered eating for those exercising for appearance reasons, and those exercising for nonappearance reasons. These authors further state that their results suggest it is possible that exercise may be related to positive psychological health in college-age females, but only when exercise is not part of an eating disorder. Consequently, those who exercise for health and fitness may be at greater risk for developing compulsion to exercise. Some habitual exercisers may develop an increased awareness of body size and shape as well as distorted eating patterns. Thus, it can be hypothesized that physically active women walk a narrow line between optimal performance inclination and harmful health behavior.

Though the literature has seldom included the behaviors of physically active college females who exercise in the absence of organized sports, there is supporting evidence of existing behaviors and attitudes among female athletes and various control groups. The
research that is supportive of a relationship between eating and exercise behaviors is outdated, however, and with the increased interest in exercise and fitness there is a need for updated research on role of exercise among non-athlete college females. Research on the factors that influence non-athlete females’ participation in exercise and its possible association with eating behaviors, will help identify areas of education for improving prevention of disordered attitudes and behaviors on college campuses.
References


