Exercise dependence, disordered eating behaviors, and general nutrition knowledge in female group fitness instructors employed at college and university recreation centers

Sarita Aguirre

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ABSTRACT

EXERCISE DEPENDENCE, DISORDERED EATING BEHAVIORS, AND GENERAL NUTRITION KNOWLEDGE IN FEMALE GROUP FITNESS INSTRUCTORS EMPLOYED AT COLLEGE AND UNIVERSITY RECREATION CENTERS

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Northern Illinois University, 2014
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Disordered eating behaviors (DEBs) may play a role in the development of eating disorders (EDs) in the general population. However, this has not been studied among female group fitness instructors. Several factors, such as exercise dependence and nutrition knowledge, may factor into the occurrence of DEBs. This cross-sectional study examined relationships between DEBs, exercise dependence, and nutrition knowledge. An internet-based survey was distributed to female group fitness instructors at Midwest colleges and universities in the Big Ten Conference. Fifty-six participants (mean age 25.48 ± 7.72 years) were included in the study. Pearson’s correlations, linear regression, and MANOVA were conducted. The results indicated the majority (77.2%) of participants were at increased risk for exercise dependence and 50.9% of participants exhibited a clinical manifestation of DEBs based on the Disordered Eating Questionnaire (DEQ; mean score of 33.94 ± 20.964). Statistically significant relationships between exercise dependence and DEBs (p < .001) and between DEBs and nutrition knowledge (p = .041) were found. These results suggest that nutrition knowledge and exercise dependence may influence DEBs in female group fitness instructors.
EXERCISE DEPENDENCE, DISORDERED EATING BEHAVIORS, AND GENERAL NUTRITION KNOWLEDGE IN FEMALE GROUP FITNESS INSTRUCTORS EMPLOYED AT COLLEGE AND UNIVERSITY RECREATION CENTERS

BY

SARITA AGUIRRE
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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, Ph.D.
ACKNOWLEDGMENTS

I would like to thank all members of my thesis committee who were kind enough to take the time to assist me with my research and guide me through this process. Your feedback and dedication are truly appreciated. Thank you to my advisor, Dr. Josephine Umorden for your patience, your support, and for helping me see this task through to the end. Thank you to the colleges and universities that participated in this study – without your help, this would not have been possible.
DEDICATION

To my family, thank you for keeping me sane through all these years in school. I hope I have made you proud, and I love you all.
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Eating disorders (EDs) have become a major issue in society as people are bombarded with images of fitness and thinness in the media (1). This force-fed idealization of the “perfect” body has caused many college-age women to go to drastic lengths to fit into this mold; the results can be tragic. Not all people are equally affected by Western culture’s obsession with the thin ideal, but those who are influenced by it may feel pressure to adopt behaviors that will bring them closer to attaining this ideal. Unfortunately, excessive exercise, dieting, EDs, and/or disordered eating behaviors (DEBs) are mechanisms commonly employed by those who succumb to the pressure to literally fit in. Some women might experience greater risk for EDs or DEB based on genetic, personal, or environmental factors, and some women might experience less risk based on these same factors – it depends on the individual. Common factors associated with an increased risk of EDs include dieting, exercising, and participation in athletics. The drive to obtain the ideal body can motivate women in different ways, and normal, healthy behaviors, like exercise, can become obsessive and extreme.

What can be said about people who exercise as part of their occupation? Fitness instructors, for example, are paid to lead exercise classes. This requires an extensive amount of dedication to, and time spent on, physical activity. This high frequency of physical activity may increase the likelihood of the fitness instructor becoming exercise dependent, which might lead
to adverse physical and psychological health effects. Furthermore, their bodies are often put on display, and it is assumed their appearances will be judged by those who encounter them at fitness centers. Constant display of the body can create a preoccupation with body image, body ideals, and weight; being highly concerned with these issues increases risk for EDs (2) or DEBs.

As a general term, fitness is not typically associated with unhealthy behaviors, and certainly not with EDs or DEBs. Fitness is generally viewed as a means by which people can improve their health and well-being. Some people may assume that fitness instructors must have very high self-esteem, lack body image issues, and feel very confident in themselves, because they are able to motivate and perform in front of others. People might not always consider the enormous pressures fitness instructors can feel to meet or exceed the expectations of their participants. Not every instructor will dwell on these pressures; in fact, some do not let the influences of their participants affect them (3). However, it is not difficult to imagine the physical and psychological toll that being a fitness instructor can have on an individual.

The prevalence of EDs in the general population is well-studied, but unfortunately, EDs and DEBs among fitness instructors are vastly under-researched. The environment in which they work may put fitness instructors at increased risk for EDs or DEBs. However, there is little research to confirm this assumption. In fact, some studies have produced conflicting results. A study by Scharf et al (1) found that a sample of aerobics instructors had scores on the Eating Disorder Inventory similar to those found in Anorexia Nervosa patients. Conversely, a study by Martin and Hausenblas (4) found that aerobics instructors scored much lower on body dissatisfaction and drive for thinness than both a control group and a sample of eating disorder patients.
Gaining a better understanding of the exercise dependence, DEBs, and general nutrition knowledge among fitness instructors is necessary for several very important reasons. Perhaps of most importance is that people who are struggling with cultural influences to be thin and are at risk for unhealthy behaviors often join fitness centers to increase their physical activity levels. Thus, it is imperative that fitness instructors, who essentially serve as role models, are healthy themselves, as they must be able to communicate healthy attitudes and reasonable body ideals to their participants (5). As Evans and Kennedy (6) stated, “Instructors, in their leadership role, have the power to shape the psychosocial atmosphere of their classes by their attitudes and behaviors” (pg 92). Some fitness instructors may have previously suffered from or currently struggle with an ED, and if so they may be more likely to send conflicting messages about training and physical activity goals (5). Fitness instructors have a professional responsibility not to transfer their own possible ED attitudes to, or promote such behaviors in, others (5).

Thompson and Sargent (7) found that this perceived pressure to serve as a role model may lead the instructor to partake in extreme eating and/or exercise behaviors in order to avoid failing as a role model. It is apparent that these issues necessitate continued research for the sake of both fitness instructors and their participants.

Female fitness instructors employed at colleges and universities are of particular interest. It is known that college-age females face struggles with and are vulnerable to the pressures of body image, social comparison, and objectification (8). This time in a female’s life is particularly salient for the development of their self-perceptions, self-concept, and awareness of how others perceive them (8). A study of female exercisers from a Vancouver fitness club by Vogel (90)
found that fitness class participants may feel anxiety when they encounter a fitness instructor and worry about their ability to keep up in class. A fitness instructor’s appearance and actions can sometimes impact the body image perceptions of some of their participants (9). Additionally, phrases used by the instructors to motivate might be perceived by different participants in ways that were not intended, so they must be careful about what they communicate about body image and the goals of exercise (9). This may be especially important if the instructor currently has or has had an ED, as their motivations for exercise may be different. Participants in Vogel’s (9) study often expressed their high levels of trust and admiration for their fitness instructors. Further, participants might ask their fitness instructors for nutrition advice. Not all fitness instructors are equipped with a nutrition education, and they may give incorrect information to their participants. Many factors are at play in the potential development of EDs or DEBs. There is value in examining exercise dependence, DEBs, and general nutrition knowledge in female fitness instructors at colleges and universities, as there may be large implications for the participants of their classes.

Statement of Research Question

To what extent are female group fitness instructors employed at college and university recreation centers at risk for EDs based on their levels of exercise dependence, engagement in disordered eating behaviors, and general nutrition knowledge?
Operational Definitions

Disordered eating behavior (DEB): DEB includes bingeing, purging (self-induced vomiting), restrictive eating, or use of diuretics or laxatives to control weight, as measured by the Disordered Eating Questionnaire (DEQ).

Exercise dependence: Coen and Ogles (10) defined exercise dependence as physical activity that is extreme in frequency and duration, relatively resistant to change, and often accompanied by an irresistible impulse to exercise even when injury, fatigue, or other personal demands persist. Exercise dependence was measured using the Exercise Dependence Scale (EDS-21).

General nutrition knowledge (GNK): This term refers to fitness instructors possessing a basic understanding of the functions of nutrients (e.g. carbohydrates, protein, fats) in the body and how they affect health. Nutrition knowledge was measured using the General Nutrition Knowledge Questionnaire (13).

Hypotheses

Hypothesis 1: Female group fitness instructors will have high exercise dependence based on their responses on the EDS-21 (11).

Hypothesis 2: Female group fitness instructors will have high levels of disordered eating behavior on the DEQ (12).

Hypothesis 3: A relationship will exist between exercise dependence and disordered eating behavior among female group fitness instructors at colleges and universities.
Hypothesis 4: Participants with higher scores on the general nutrition knowledge questionnaire will have lower exercise dependence, and engage in disordered eating behaviors less often than those with lower scores on the general nutrition knowledge questionnaire.
CHAPTER 2

METHODOLOGY

Design and Setting

The current study used a descriptive cross-sectional survey design with non-probability convenience sampling. The objective of the study was to examine exercise dependence, disordered eating behaviors, and nutrition knowledge of female group fitness instructors employed at college and university recreation centers. A secondary objective was to examine whether level of exercise dependence increases risk for disordered eating behaviors. The goal sample size was 380 participants, determined using the following calculation Pukhovich calculation.

Participants

The population of interest from which participants were recruited was female group fitness instructors employed at college and university recreation centers. Participants were recruited using convenience sampling. A recruitment package (Appendix D) was sent electronically to directors of recreation at Big Ten colleges and universities explaining the study. In addition to the study information, the recruitment package contained a recruitment flyer (included in Appendix D) for the directors of recreation to send to potential participants to alert
them of the study. To be eligible to participate, subjects had to be female, at least 18 years of age, and teach group fitness classes. There were no requirements regarding years of teaching, types of classes taught, or number of classes taught. The population was recruited from female group fitness instructors employed at universities in the Big Ten Conference. This conference was chosen as it is comprised of large schools that offer multiple group fitness classes.

The length of the study was 4 weeks, giving participants ample time to complete the questionnaire. Those who agreed to participate in the study were asked to complete an informed consent form (Appendix E) that was provided at the start of the survey. Information regarding whom to contact if they had questions or concerns pertaining to their rights as research subjects was given. They were informed that the information they provided in the questionnaire would be kept confidential and used for research purposes only.

Participants completed the online questionnaire to address factors related to the development of disordered eating behaviors among female group fitness instructors. They were given the link to access the online questionnaire where they would first have to read and sign the informed consent form. The questionnaire took approximately 15-20 minutes to complete. Participants were required to respond to each item before proceeding to the next page of the questionnaire. Once a participant completed the questionnaire, they submitted it and it was collected for review and analysis. After submission of the questionnaire, participants had the option to enter into a drawing for a $50 Target gift card by providing their contact information to the researcher at gfistudy@gmail.com. All information was kept confidential and was not linked to any questionnaire responses.
Permission to conduct the study using human subjects was obtained from the Northern Illinois University Institutional Review Board (IRB) before the study began. Recruitment began once IRB approval was granted.

Survey

To assess relationships among exercise dependence, disordered eating behaviors, and general nutrition knowledge a questionnaire was adapted from three existing, previously validated instruments and a fourth part was developed to measure demographic information. The instruments included the Exercise Dependence Scale (EDS-21; 11; Appendix F), the Disordered Eating Questionnaire (DEQ; 12; Appendix F) and a general nutrition knowledge questionnaire (13; Appendix F). Permission to use the instruments was obtained from the authors (Appendix G). The survey took between 15-20 minutes to complete. The online questionnaire was delivered through surveymonkey.com.

The questionnaire contained four parts. Part 1 measured participants’ exercise dependence using the EDS-21. The EDS-21 is the only tool that operationalizes exercise dependence based on the 7 DSM-IV criteria consistent with substance dependence: tolerance (items 3, 10, 17), withdrawal (items 1, 8, 15), intention effects (7, 14, 21), lack of control (items 4, 11, 18), time (items 6, 13, 20), reduction in other activities (items 5, 12, 19), and continuance (items 2, 9, 16). The EDS-21 differentiates between those at risk for dependence, nondependent-symptomatic subjects, and those who are nondependent-asymptomatic (11). Further, it specifies whether subjects are physiologically dependent on exercise (i.e. whether they show evidence of tolerance or withdrawal in the absence of exercise). This 21-item scale is beneficial because it
can be administered to individuals or groups and takes only 5 minutes to complete. The authors suggest the scale be scored according to a computer-based procedure allowing for immediate and accurate scoring.

Computer scoring of the EDS-21 was performed based on the Statistic Package for the Social Sciences (SPSS) using a syntax file developed by the authors (11). The syntax enables computation of total and subscale mean scores with higher scores indicating more exercise dependent symptoms. Categorization as exercise dependent, nondependent-symptomatic (at increased risk for exercise dependence), or nondependent asymptomatic (not at risk) was performed using a flowchart consisting of rules to determine which category a particular individual fits into. Individuals classified in the dependent range on 3 or more of the DSM criteria were classified as exercise dependent, indicating a score of 5 or 6 for that item. Individuals scoring in the 3 to 4 range were classified as symptomatic, and may be at risk for exercise dependence. Individuals scoring in the 1 to 2 range were classified as asymptomatic and are not at risk for exercise dependence. Validation and reliability studies on the EDS-21 found the instrument had a Cronbach’s alpha ranging from 0.78-0.95, adequate internal consistency, and excellent test-retest reliability (14; 15).

Part 2 of the questionnaire was designed to measure disordered eating behaviors using the DEQ. The DEQ is a 29-item questionnaire with 3 sections, A, B, and C. Section A consisted of 18 items evaluating the frequency with which the subject engaged in disordered eating behaviors (e.g. eating in secret, limiting the amount of calories consumed, etc.). The scale measures average frequency of behaviors over the previous 3 months, and possible answers are never, once or twice, 3-4 times, 5-6 times, every day, or more than once a day. Four items in Section A evaluated the frequency of purging behaviors such as laxative use or self-induced vomiting.
Section B contains 6 items regarding worries and intrusive thoughts about food, calories, weight, and physical fitness. Subjects must determine how well each item describes their own experiences in the previous 3 months on a scale from 0 (not at all) to 6 (totally). Scores from sections A and B were summed to determine whether the participant exhibited a clinical manifestation of DEBs (indicated by a score of 30 or higher). Section C contains questions regarding demographic and other personal information such as self-reported age, weight, height, and questions about menstruation for female subjects. The items in Section C were not used in this study as an alternate demographic section that included questions pertaining to age, weight, height, and additional items was included in part 4 of the study questionnaire. Omission of section C of the DEQ did not affect the reliability or validity of the instrument. Validation studies indicate the DEQ has acceptable concurrent and criterion-related validity. It has been found to have a sensitivity and specificity comparable to that of the EAT-40 and better than that of the EDI-2 despite the fact that it has fewer items, and the Cronbach’s alpha was 0.90 in reliability studies (12). This tool was used because, in comparison to other instruments measuring disordered eating behavior, it provides items that are more detailed and includes a wider range of possible answers.

Part 3 of the study questionnaire assessed participants’ general nutrition knowledge using the General Nutrition Knowledge Questionnaire (13). This 20-item questionnaire measures basic knowledge of food and nutrition. Topics include food components (e.g. fats, carbohydrates, proteins, vitamins, minerals, and fiber), rehydration, and loss of body weight. Participants chose one of three proposed answers and the percent of correct answers was recorded and used for analysis. The food and nutrition questionnaire was previously pilot tested for validity and reliability in three groups of subjects: doctors, nurses, and senior high school students (13).
Internal reliability for all participants was 0.77 and pre-test evaluations demonstrated acceptable validity and reliability of the questionnaire. This tool was useful for this study because it assesses basic nutrition knowledge and, although some group fitness instructors do not have an educational background in nutrition, it is possible that their participants will ask them for nutrition advice. This instrument helped determine if the female group fitness instructors have some accurate nutrition knowledge regardless of their educational background.

The fourth part of the study questionnaire (Appendix F) was designed to collect demographic information. This section asked for participants’ age, weight, height, gender, race, years of teaching, frequency of teaching (i.e. number of classes per week), time spent on personal exercise regimen, type(s) of classes taught (i.e. cardio, strength, flexibility), educational background (major and degree level), and any fitness certifications they have (e.g. American College of Sports Medicine, American Council on Exercise, American Fitness Professionals & Associates).

Pilot Study

A pilot study was conducted to determine the design and wording of the online survey. An email (Appendix D) was sent to female group fitness participants at a Midwestern university that would not be included in the study’s data collection explaining the purpose of the pilot study, the deadline for completing survey, and the link to the survey. A reminder email was sent to the pilot participants to remind them to complete the pilot survey by the deadline. Inclusion criteria for the pilot study participants were that they were female, at least 18 years of age, and
taught group fitness classes at a college or university. Pilot study data was collected using the online survey tool SurveyMonkey.

A total of 11 participants completed the pilot study survey. The pilot survey included the EDS-21, DEQ, GNK, and demographic items. The survey also included an open-ended question asking the participants for feedback on the design of the survey. Some participants stated they felt some of the questions were repetitive. However, some questions were deliberately worded in a similar manner in order to force the participants to read the items closely, and the questions did address different issues. Some participants stated they felt the survey was too long; others reported they thought the length was appropriate. Some typos were identified, as well as some flaws in the settings, such as being allowed to advance to the next page without answering the current page’s question, even though the survey should have been set to require the participants to answer before proceeding. These errors were corrected.

Data Collection

Permission to conduct the study using human subjects was obtained from the Northern Illinois University Institutional Review Board (IRB) before the study began. Upon IRB approval, the recruitment packages were emailed to the directors of campus recreation or the person identified by the director of campus recreation as the point of contact for the study. The length of the study was 4 weeks, giving participants ample time to complete the questionnaire. A reminder email was sent in order to increase the response rate before the survey deadline. Those who agreed to participate in the study completed and signed an informed consent form (Appendix E). They were provided with information regarding whom to contact if they had questions or
concerns pertaining to their rights as research subjects. They were informed that the information they provided in the questionnaire would be kept confidential and used for research purposes only, and that they could withdraw at any time without penalty.

Participants completed the online questionnaire to address factors related to the development of disordered eating behaviors among female group fitness instructors. They were given the link to access the online questionnaire where they would first have to read and sign the informed consent form. The questionnaire took approximately 15-20 minutes to complete. Participants were required to respond to each item before proceeding to the next page of the questionnaire. Once a participant completed the survey, it was submitted for analysis. After submission of the questionnaire, participants had the option to enter into a drawing for a $50 Target gift card by providing their contact information to the researcher at gfistudy@gmail.com. All information was kept confidential and was not linked to any questionnaire responses. The winner was selected by entering the participants’ names into an excel spreadsheet in the order in which their emails expressing interest in the drawing were received. An online randomization tool was used to choose a number. The number was found on the excel spreadsheet and the corresponding participant’s name was identified as the winner of the drawing. The winner was then contacted through email and the gift card was mailed to them. A total of 56 female group fitness instructors participated in the study and 51 completed the survey, resulting in 91.07% response rate.
Data Analysis

Data was downloaded from the surveymonkey.com website for statistical analysis. The data was compiled into an Excel spreadsheet and cleaned for analysis using the Statistical Package for the Social Sciences (SPSS). The demographic data was analyzed using descriptive statistics. To test the relationships between exercise dependence, disordered eating behaviors, nutrition knowledge, BMI, race, years of instructing, and number of classes taught per week, correlation coefficient was used. This test was chosen to measure how well different variables, nutrition knowledge, disordered eating behaviors, and exercise dependence, were related to each other. To test hypothesis 1, the syntax file was used to code the data for SPSS analysis, and the participants were then categorized as exercise dependent, nondependent-symptomatic, or nondependent-asymptomatic. Hypothesis 2 was tested by summing the scores for sections A and B on the DEQ to determine whether the participant exhibited a clinical manifestation of DEBs, which was indicated by a score of 30 or more on the DEQ. A point value ranging from 0 to 5 was given per item based on the responses for section A, and a point value ranging from 0 to 6 was given per item based on the responses in section B. Hypothesis 3 was tested using the linear regression model. This test was chosen because there was one dependent variable (exercise dependence) and multiple independent variables (ex. disordered eating behaviors, age, race, BMI). Linear regression allows estimation of relationships among variables and helps understand how one typical value of the dependent variable changes when any one of the independent variables are changed while the other independent variables are held constant. Other demographic variables, such as race and age, were used to identify differences between the demographic variables and either exercise dependence or disordered eating behaviors. The main
goal was to estimate the relationship between exercise dependence and disordered eating behaviors. To test hypothesis 4, Multivariate Analysis of Variance (MANOVA) was used because there were 2 dependent variables (exercise dependence and disordered eating behaviors) and multiple independent variables (ex. nutrition knowledge, age, race, BMI). MANOVA helped determine if changes in the independent variables would have significant effects on the dependent variables. Demographic variables, such as age and race, served as covariates. The main goal was to determine if participants with higher nutrition knowledge would have decreased engagement in disordered eating behaviors and lower levels of exercise dependence. Level of nutrition knowledge was determined by totaling the number of correct answers on the general nutrition knowledge questionnaire.
CHAPTER 3

RESULTS

Characteristics of the Participants

Table 1 shows the characteristics of the participants. The participants for this study consisted of female group fitness instructors employed at college and university recreation centers in the Big 10 Conference. A total of 56 fitness instructors participated in the survey; however, only 51 (91.07%) of them completed the survey as instructed. The data were analyzed using the Statistic Package for the Social Sciences (SPSS).

The average age of the participants was 25 ± 7.72 years old, with an age range between 19 and 52 years old. Most (64.48%) of the participants were between the ages of 19-24 (N=36). The majority of the participants identified themselves as White, 2 identified as Asian/Pacific Islander, 1 identified as Hispanic or Latino, and 2 identified as “other”. The average BMI was 22.8 ± 2.357 (categorized as normal weight), with a range of BMIs from 19 (normal weight) to 28 (overweight). Seventy percent of the participants had been instructing fitness classes for 1-5 years, with the next highest percentage (21%) instructing for less than 1 year, and 7% were instructors for 6 or more years. 44.64% of participants instructed 3-4 classes per week, about 27.27% taught 1-2 classes per week, and only 3.5% taught as many as 9-10 classes per week. Outside of their time spent instructing, many participants engaged in personal exercise during their free time. Three-to-four hours per week spent on exercise outside of instructing was the most common amount of time reported (33%), followed by 1-2 hours per week (26%), 5-6 hours
per week (about 23%), more than 10 hours per week (about 9%), 7-8 hours per week (5%), and zero hours per week (about 2 percent). This indicates that nearly 97% of the participants engaged in exercise outside of time spent instructing. Forty-eight of the participants had earned some type of fitness certification, while some had earned more than one. Forty-six of the participants had earned or were currently working toward a bachelor’s degree and/or advanced degree.

Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Participants (N=56)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-24</td>
<td>36</td>
<td>64.28</td>
</tr>
<tr>
<td>25-30</td>
<td>13</td>
<td>23.21</td>
</tr>
<tr>
<td>31-36</td>
<td>2</td>
<td>3.77</td>
</tr>
<tr>
<td>37 and older</td>
<td>5</td>
<td>8.92</td>
</tr>
<tr>
<td><strong>Mean age</strong></td>
<td></td>
<td>25.48 ± 7.72</td>
</tr>
<tr>
<td><strong>Body Mass Index (BMI)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 18.5 (Underweight)</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>18.5 – 24.9 (Normal)</td>
<td>42</td>
<td>75.0</td>
</tr>
<tr>
<td>25.0 – 29.9 (Overweight)</td>
<td>14</td>
<td>25.0</td>
</tr>
<tr>
<td>30.0 and Above (Obese)</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Mean BMI</strong></td>
<td></td>
<td>22.8 ± 2.357</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>100.0</td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 1 continued on next page
### Table 1 continued

<table>
<thead>
<tr>
<th>Years of Instructing Group Fitness Classes</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 Year</td>
<td>12</td>
<td>21.43</td>
</tr>
<tr>
<td>1-5 Years</td>
<td>40</td>
<td>71.43</td>
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<tr>
<td>6-10 Years</td>
<td>2</td>
<td>3.57</td>
</tr>
<tr>
<td>More than 10 Years</td>
<td>2</td>
<td>3.57</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Number of Classes Taught Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 Classes</td>
</tr>
<tr>
<td>3-4 Classes</td>
</tr>
<tr>
<td>5-6 Classes</td>
</tr>
<tr>
<td>7-8 Classes</td>
</tr>
<tr>
<td>9-10 Classes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Hours Spent Exercising on Personal Time Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Hours</td>
</tr>
<tr>
<td>1-2 Hours</td>
</tr>
<tr>
<td>3-4 Hours</td>
</tr>
<tr>
<td>5-6 Hours</td>
</tr>
<tr>
<td>7-8 Hours</td>
</tr>
<tr>
<td>More than 10 Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
</tr>
<tr>
<td>Black or African-American</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
</tr>
<tr>
<td>Native American or American Indian</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College Education/Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
</tr>
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</table>

Table 1 continued on next page
Table 1 continued

<table>
<thead>
<tr>
<th>Fitness Certifications</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>American College of Sports Medicine (ACSM)</td>
<td>4</td>
<td>7.14</td>
</tr>
<tr>
<td>American Council on Exercise (ACE)</td>
<td>10</td>
<td>17.86</td>
</tr>
<tr>
<td>American Fitness Professionals and Associates (AFPA)</td>
<td>3</td>
<td>5.36</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
<td>55.34</td>
</tr>
</tbody>
</table>

Figure 1: Histogram of the participants’ ages. The majority of participants were under age 30, with mean age of $25.48 \pm 7.72$ years old.
Figure 2: BMI distribution of the participants. BMI ranged from 19 – 28, with a mean BMI of 22.84 ± 2.357.

Data Treatment and Analysis

Statistical analysis was performed using correlations, linear regression, and MANOVA to determine whether relationships exist between the variables of interest, namely, exercise dependence, disordered eating behavior (DEB), and general nutrition knowledge (GNK). Table 2 provides definitions of the variables, as well as the instruments used to collect the data for the study.
Table 2
Definition of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDStot</td>
<td>Exercise Dependence Scale total score, exercise dependent, nondependent-symptomatic, nondependent asymptomatic</td>
</tr>
<tr>
<td>DEB</td>
<td>Disordered Eating Behaviors, each participant given a score based on their answers on the Disordered Eating Questionnaire (DEQ), scores determine if participant exhibits clinical manifestation of DEBs or not</td>
</tr>
<tr>
<td>GNK</td>
<td>General Nutrition Knowledge, correct answers were summed from General Nutrition Knowledge Questionnaire (GNKQ) for each participant</td>
</tr>
<tr>
<td>Age</td>
<td>Continuous variable</td>
</tr>
<tr>
<td>BMI</td>
<td>Continuous variable</td>
</tr>
<tr>
<td>Race</td>
<td>A) White, B) Black or African-American, C) Hispanic or Latino, D) Asian/Pacific Islander, E) Native American or American Indian, F) Other</td>
</tr>
<tr>
<td>Years of Instructing</td>
<td>A) Less than 1 year, B) 1-5 years, C) 6-10 Years, D) More than 10 years</td>
</tr>
<tr>
<td>Number of classes taught per week</td>
<td>A) 1-2 classes, B) 3-4 classes, C) 5-6 classes, D) 7-8 classes, E) 9-10 classes</td>
</tr>
</tbody>
</table>

Correlations

The correlation test showed significant correlations between EDS and DEQ (p<.001), EDS and age (p<.05), DEQ and age (p<.05), and DEQ and BMI (p<.001). Of the statistically significant relationships, there were positive correlations between EDS and DEQ and between DEQ and BMI, and negative correlations between EDS and age and between DEQ and age. The findings indicate the following: as exercise dependence increases, disordered eating behaviors
increase; as BMI increases, disordered eating behaviors increase; as age increases, exercise
development decreases, and vice-versa; and as age increases, disordered eating behaviors
decrease, and vice-versa.

Table 3

<table>
<thead>
<tr>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSot</td>
</tr>
<tr>
<td>EDSot</td>
</tr>
<tr>
<td>DEQ</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>BMI</td>
</tr>
</tbody>
</table>

Correlation  Significance  (1-tailed)

**p<.001, *p<.05

Level of Exercise Dependence

Hypothesis 1: Female group fitness instructors will have high exercise dependence based on their responses on the EDS-21.

This hypothesis was tested using the syntax file created by the EDS authors, Hausenblas and Downs, and the frequencies for exercise dependence, nondependent-symptomatic, and nondependent-asymptomatic categorization were determined (Hausenblas and Downs, 2002). These results are shown in Table 4.

Based on the analysis, only 3 (5.3%) of the participants in the study were categorized as exercise dependent, 77.2% as nondependent symptomatic (at increased risk for exercise
dependence), and 15.8% as nondependent asymptomatic (not at risk). Figure 1 is a histogram depicting the scores for exercise dependent, nondependent symptomatic, and nondependent asymptomatic participants. In this study, only 3 of the participants were exercise dependent, which is less than the number of participants that scored in the other two groups. Thus, hypothesis one was not supported.

Incidence of Disordered Eating Behaviors

Hypothesis 2: Female group fitness instructors will have high levels of disordered eating based on DEQ scores.

To test hypothesis 2, the Disordered Eating Questionnaire (DEQ) was used. Table 4 shows the results of participants’ levels of disordered eating behaviors (DEBs). The DEQ was scored by summing the scores from sections A and B on the DEQ. Section A contained questions regarding how many times per week participants engaged in disordered eating behaviors, such as laxative use, restricting food intake, fasting, bingeing, or purging, within the past three months. The questions in section B asked how often in the past three months participants had certain thoughts or feelings related to body image, self-esteem, and food intake. A score of 30 or more is set to indicate a clinical manifestation of DEBs (12). In this study, only 51 (89.5%) of the participants completed the sections pertaining to the DEQ on the survey. The results show that 26 participants exhibited clinical manifestations of DEBs (Table 4). Figure 3 depicts the distribution of scores. The DEQ scores ranged from 1.00 – 90.0, with a mean score of 33.94 +/- 20.964. Thus, hypothesis 2 was supported.
Table 4

Level of Exercise Dependence and Incidence of Disordered Eating Behaviors in Fitness Instructors

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise Dependent</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Nondependent-symptomatic</td>
<td>44</td>
<td>77.2</td>
</tr>
<tr>
<td>Nondependent-asymptomatic</td>
<td>9</td>
<td>15.8</td>
</tr>
<tr>
<td>Clinical manifestation of DEBs</td>
<td>26</td>
<td>50.9</td>
</tr>
<tr>
<td>No clinical manifestation of DEBs</td>
<td>25</td>
<td>49.02</td>
</tr>
<tr>
<td>TOTAL</td>
<td>56**</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note: Only 51 participants completed the DEQ, thus only 51 responses were collected for data analysis pertaining to hypothesis 2.

**Figure 3: Histogram of DEQ scores.**

- Mean = 33.94
- Std. Dev. = 20.964
- N = 51
The Association between Exercise Dependence and Disordered Eating Behaviors

Hypothesis 3: A relationship exists between exercise dependence and disordered eating behavior among female group fitness instructors at colleges and universities.

This hypothesis was tested using the linear regression model (Table 5). In this model, the dependent variable was EDStot, which was the total score from the Exercise Dependence Scale-21. The independent variable in this model was DEQ, which was the total score from the Disordered Eating Questionnaire. The other variables used (e.g. BMI, and race) were demographic variables.

The assumption for normality of the residuals was met, as can be seen in the following histogram (Figure 4), and normal PP plot of regression standardized residual (Figure 5). The assumption for homoscedasticity was met, as shown below (Figure 6). The scatter plot (Figure 6) of standardized residuals against predicted values is a random pattern centered around the line of zero standard residual value. The majority of points have the same dispersion about this line over the predicted value range. Thus, the assumption that the residual has the same constant variance is satisfied.
The assumption for homoscedasticity was met, as shown below. The following scatter plot (Figure 6) of standardized residuals against predicted values is a random pattern centered about the line of zero standard residual value. The majority of points have the same dispersion.
around this line over the predicted value range. Thus, the assumption that the residual has the same constant variance is satisfied.

Figure 6: Scatter plot of check for homoscedasticity.

There was a statistically significant relationship between EDStot and DEQ, $F(18,30) = 4.89$, $p<.001$, and 73% of variance in DEQ to EDStot was explained. Therefore, hypothesis 3 was supported. Table 5 shows the results of the regression analysis. The results show that exercise dependence was significantly associated with disordered eating behaviors ($p<0.001$).
Table 5
Relationship between Exercise Dependence and Disordered Eating Behaviors in Fitness Instructors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>S.E.</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-</td>
<td>20.67</td>
<td>2.340</td>
<td>.026</td>
</tr>
<tr>
<td>DEQ</td>
<td>.632</td>
<td>.100</td>
<td>4.891</td>
<td>.000*</td>
</tr>
</tbody>
</table>

Note: *p<.001, R² = .729

The results show that the p-value corresponding to DEQ is significant (p< 0.05) and the standardized coefficient is positive (0.632). That means there is relationship between exercise dependence (EDStot) and disordered eating behavior (DEQ). Furthermore, the DEQ was positively correlated to the EDS. Thus, the results show there was a statistically significant relationship (p = .000) between exercise dependence and DEBs.

The Effect of Nutrition Knowledge on DEBs and Exercise Dependence

Hypothesis 4: Participants with higher scores on the general nutrition knowledge questionnaire will have lower exercise dependence, and engage in disordered eating behaviors less often than those with lower scores on the general nutrition knowledge questionnaire.
This hypothesis was tested using Multivariate Analysis of Variance (MANOVA) because there were 2 dependent variables (exercise dependence and disordered eating behaviors) and multiple independent variables (ex. nutrition knowledge, age, race, BMI). The results of MANOVA are shown in Table 6 below.

The assumption for normality of the residuals was met, as shown in the following histograms (Figures 7, 9) and normal QQ plots of regression of standardized residuals (Figures 8, 10) below.

Figure 7: Histogram displaying the check for normality of residual for EDStot.

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standardized Residual for EDStot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean = 1.44E-15</td>
</tr>
<tr>
<td>Std. Dev. = .83</td>
</tr>
<tr>
<td>N = 46</td>
</tr>
</tbody>
</table>

Standardized Residual for EDStot
Figure 8: Shows the QQ plot for standardized residual for EDStot.

Figure 9: Shows check for normality of residuals for DEQ.
There were two dependent variables (EDStot and DEQ) and one independent variable (GNK). The other demographic variables were used as covariates. Because there was more than one dependent variable, Multivariable Analysis of Variance (MANOVA) was used to address hypothesis 4.

The results of MANOVA found a statistically insignificant difference between EDStot and DEQ on GNKQ, $F(2,26) = 1.94$, $p = .164$, partial eta square value = .13. Thus, hypothesis 4 was not supported.

Although the overall model was not statistically significant, univariate analysis was conducted to see if there was any significant relationship between EDStot or DEQ and general nutrition knowledge. The results indicated that there was a statistically significant difference
between DEQ and GNK. The results show that the scores on the general nutrition knowledge questionnaire (GNKQ) were negatively correlated with exercise dependence and disordered eating behaviors. Participants with higher scores on the GNKQ engaged in disordered eating behaviors less often than those with lower scores on the GNKQ, and this relationship is significant (p = 0.041). However, the relationship between GNK and exercise was not statistically significant (p = 0.082).
Table 6

Relationship between Nutrition Knowledge, Exercise Dependence, and Disordered Eating Behaviors in Fitness Instructors

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>EDStot</td>
<td>5228.559&lt;sup&gt;a&lt;/sup&gt;</td>
<td>14</td>
<td>373.469</td>
<td>1.708</td>
<td>.105</td>
</tr>
<tr>
<td></td>
<td>DEQ</td>
<td>11025.605&lt;sup&gt;b&lt;/sup&gt;</td>
<td>14</td>
<td>787.543</td>
<td>2.838</td>
<td>.008</td>
</tr>
<tr>
<td>Intercept</td>
<td>EDStot</td>
<td>0.000</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td>DEQ</td>
<td>0.000</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>GNK</td>
<td>EDStot</td>
<td>707.694</td>
<td>1</td>
<td>707.694</td>
<td>3.237</td>
<td>.082</td>
</tr>
<tr>
<td></td>
<td>DEQ</td>
<td>1261.084</td>
<td>1</td>
<td>1261.084</td>
<td>4.545</td>
<td>.041*</td>
</tr>
</tbody>
</table>

*<p><0.05.
The purpose of this study was to determine if general nutrition knowledge and level of exercise dependence influence disordered eating behaviors in female group fitness instructors employed at college and university recreation centers. Overall, the results support a relationship between general nutrition knowledge and the incidence of disordered eating behaviors and, to a lesser extent, exercise dependence. A negative relationship was observed between general nutrition knowledge and disordered eating behavior, indicating that those with greater nutrition knowledge may be less likely to engage in disordered eating behaviors. Research has suggested that greater nutrition knowledge may serve as a protective factor against disordered eating behaviors, as those who possess greater nutrition knowledge may have a better understanding of the importance of adequate nutrition (4). Fitness instructors who have earned certifications may be at an increased advantage in this regard, since many certification programs feature some type of nutrition education. Those without such nutrition education may be more susceptible to DEBs as a result.
Exercise Dependence

The occurrence of exercise dependence was explored among the participants of this study using the EDS-21. The results from the exercise dependence scale testing revealed that the majority of participants in this study were not exercise dependent. Most (77%) of the participants scored in the nondependent symptomatic category on the EDS, indicating they may be at increased risk for exercise dependence, even though they did not currently exhibit such behavior. Fitness instructors in general may be at increased risk for disordered eating behaviors due to the very nature of their job demands (3), and exercise dependence could be one such risk factor (1; 16). Often, instructors teach multiple classes per week, and choose to exercise during their free time. Exercise while teaching may not seem like exercise because it may be viewed as work. This may lead the instructor to engage in additional exercise in their free time. There is a concern that exercise may become excessive (17). In their study, Mond et al (17) reported that frequency of exercise was an essential factor in determining the relationship between exercise behavior and eating disorder (ED) psychopathology. Additionally, Hoglund and Normen (5) discovered a clear relationship between reported weekly exercise and EDs in their study of 168 female group fitness instructors. The results of this study indicated that the majority of the participants were classified as nondependent symptomatic, meaning they may be at increased risk for exercise dependence. Based on the results, it appears that very few of the participants exhibited a dependence on exercise, but many were classified as at increased risk.

The results of Thompson and Sargent’s (7) study are similar to the results of the current study. The highest percentage (45%) of female group fitness instructors in this study taught an
average of 3-4 class per week, while 34% of participants exercised an additional 3-4 hours during their free time. Over half of the 368 female group fitness instructors in Thompson and Sargent’s (7) study taught an average of 4.68 classes and exercised an average of 6-10 hours per week during their free time. When considering the additional amount of time spent instructing fitness classes, these participants were greatly exceeding the recommend amount of weekly exercise for adults. The mean age in Thompson and Sargent’s (7) study was higher than this study (43.37 years old versus 25.48 years old, respectively), but times spent teaching and exercising during their free time were similar to those reported in our study. It would appear that many of the participants in the current study and in Thompson and Sargent’s (7) study engaged in exercise quite frequently, providing support for hypothesis 2 as high levels of exercise may contribute to the development or progression of disordered eating behaviors (7).

Disordered Eating Behaviors

DEBs in female group fitness instructors have not been widely researched. There are different types of disordered eating behaviors, including bingeing, emotions experienced while eating (i.e. guilt, anxiety), restriction of food intake, and methods of eliminating ingested food (i.e. purging, laxative use). Participants in this study were asked to complete the DEQ, which assessed their levels of DEBs. It is important to note that actual clinical manifestations of DEBs or EDs would need to be determined by a clinical health assessment, and the results discussed here are not meant to diagnose any of the participants with DEBs or EDs as they are based on self-reported responses. The results from the current study suggested that over half (51%) of respondents exhibited a clinical manifestation of DEBs, although, a clinical assessment was not
conducted, thus no actual diagnosis was made. One of the participants reported to have engaged in purging behaviors 3-4 times in the past 3 months, while another reported to have used such behaviors more than once per day in the past 3 months. None of the participants reported laxative use, although two participants reported they used diuretics as a method of weight control.

Hoglund and Normen’s (5) study of 268 female group fitness instructors revealed that 15% of respondents followed a restrictive diet, 30% reported to participating in bingeing behaviors, with exercise and dieting mentioned as the major methods of weight control. As in the study at hand, laxative use was not used often in Hoglund and Normen’s (5) study. The findings of Hoglund and Normen’s study are comparable to our study in that similar methods of weight control and/or disordered eating behaviors were found among both groups of participants. In addition to similar weight control practices, the mean age and mean BMIs of Hoglund and Normen’s study were quite similar to those of the current study’s population, lending support to the current findings (26.8 ± 6.6 years and BMI 21.7 ± 1.9 versus 25.48 ± 7.72 years and BMI 22.84 ± 2.357, respectively).

The DEQ also addressed exercise and asked how often participants had engaged in intense physical exercise to control weight. Only 23 (41.07%) of the 56 total participants denied using exercise, implying that over half of the female group fitness instructors in this study had engaged in this behavior as a means of weight control. This implication and the reports of purging behaviors appear to suggest that even fitness instructors may be susceptible to the pressure to achieve and maintain an idealized body type, and may engage in compensatory behaviors. Viewing fitness instructors as role models may lead participants to engage in similar behaviors, if they become aware of the instructor’s use of them, in order to attain a similar physique (3; 4; 7).
The Association between Exercise Dependence and Disordered Eating Behaviors

The results of this study provided support for a statistically significant relationship between exercise dependence and DEBs (p<0.001). Hoglund and Normen (5) also found a clear relationship between what they termed a high exercise frequency and disordered eating behavior. A high exercise load in their study was defined as greater than 6 hours of exercise per week. Of the total participants, 64 reported a high exercise load, and 15 of them (23.43%) reported currently having an eating disorder. While eating disorders were not specifically addressed in the current study, it is important to recognize that both studies found a significant relationship between increased exercise and the occurrence of disordered eating. Additionally, those who fell into the excessive exercise category in Hoglund and Normen’s (5) study had an existing eating disorder and did not view their exercise as compulsory, although they reported the highest amount of exercise. This suggests that those with disordered eating may have abnormal attitudes about weight control, body shape, and exercise moderation, which could lead them to transfer those thoughts and behaviors to their class participants (5). This could be important when considering the group fitness instructors who teach to college age females, as these behaviors and attitudes may transfer to the participants.

In the current study, a statistically significant relationship between exercise dependence and disordered eating behaviors was found. These findings were supported by other studies, such as that by Thompson and Sargent (7). Their study suggested that a high level of exercise dependence may increase the risk or tendency for individuals to engage in DEBs or develop EDs (7). Another study by Davis (18) noted that an intense commitment to exercise may increase one’s focus on their body, which could increase their body dissatisfaction and ultimately lead to
the use of DEBs to fulfill their desire to have the ideal body. Women may place large value in obtaining the ideal body through increased exercise and use of DEBs to change the parts of their body with which they are unhappy. This is associated with the idea that women often endure body objectification, and may view their bodies as objects that need constant revision in order to be considered acceptable by society. Thus, the potential for a strong relationship between exercise dependence and DEBs is clear. If individuals do not choose exercise as their means of obtaining the ideal body, and do not have the knowledge or motivation to make other lifestyle changes, it then seems likely that they could turn to DEBs given the enormous pressure they feel.

Davis, Brewer, and Ratusny (19) found that individuals who exercise despite being sick or injured, or who feel guilt or upset after missing a day of exercise scored higher on ED symptomatology.

It is worth noting the results of a study of fitness instructors by Martin and Hausenblas (4), which differ from the results of this study. Martin and Hausenblas (4) found that a high frequency of exercise did not automatically indicate a psychologically unhealthy approach to exercise in their participants, thus it may not be associated with DEBs. This finding may not be true for the majority of fitness instructors, and it would be beneficial to test this idea with other population groups. In contrast to Martin and Hausenblas’ (4) study, the findings of this study indicate that there may be a relationship between exercise dependence and DEBs, although research is needed to determine the strength of the relationship.

On the other hand, Cook and Hausenblas (20) noted that the relationship between exercise dependence and DEBs has not been extensively studied. Some researchers have focused on exercise dependence, while others have looked at exercise behaviors. Many of the findings have not been definitive. However, Cook and Hausenblas suggest that once the relationship
between exercise dependence and exercise behavior can be discerned, the resulting effect on eating pathology can be determined. This information may be useful in the treatment and prevention of EDs. In a 2008 study of 448 female undergraduate women at a southeastern university, Cook and Hausenblas found that exercise dependence, and not exercise behavior, was a crucial mediator of eating pathology. Their results indicated that addressing exercise dependence may be the key to changing eating pathology, because this would remove the link between exercise behavior and eating pathology (20). If exercise dependence decreased, the individual may be able to normalize their exercise behaviors, which could potentially decrease their eating pathology. The results of Cook and Hausenblas’ study and this study provide support for the possible relationship between exercise dependence and DEB. While the population in Cook and Hausenblas’ study differs from the current study, the results are similar regarding the relationship between exercise dependence and eating behaviors in both cases. As Cook and Hausenblas (20) noted, the strength of their findings warrant the need for more research is needed in this area.

The Effect of Nutrition Knowledge on Disordered Eating Behaviors and Exercise Dependence

Additional data analysis supported the hypothesis that nutrition knowledge would be negatively associated with DEBs. The findings showed that participants with higher scores on the general nutrition knowledge questionnaire engaged in disordered eating behaviors less often than those with lower scores on the general nutrition knowledge questionnaire. These findings are supported by Martin and Hausenblas’ (4) suggestion that increased nutrition knowledge may serve as a protective factor against DEBs, as increased nutrition knowledge helps the individual
understand the need for proper nutrition. Many group fitness participants may be interested in ways to improve their eating habits, and may turn to their fitness instructors for advice (20). If the fitness instructors have had some nutrition education, they are better equipped to address these questions accurately (21). However, unless they have an educational background in nutrition, it would not be appropriate for the fitness instructor to provide such advice. Misinformation provided to participants could be harmful, and if the fitness instructor exhibits some DEBs, this could negatively influence the advice they give. Even basic nutrition education could help fitness instructors adopt healthy attitudes towards eating (21), which could decrease their risk for DEBs. A more inclusive education would also teach fitness instructors how to balance nutrition and exercise, so they would then know ways to properly fuel their bodies for optimal performance. Malek et al (22) stated that an understanding of nutrition is critical for the fitness professional. They found that the participants in their study who had fitness certifications from certain organizations (i.e. ACSM or NSCA) scored higher on items pertaining to nutrition knowledge than those with certifications from other organizations. Of note, 4 of the participants in this study had earned ACSM certifications, and may they have had better nutrition education than those with different certifications based on the results of Malek et al’s (22) study. This suggests the need for the inclusion of nutrition education in fitness certification programs. A standard nutrition education curriculum for group fitness instructors should be set so that, regardless of the organization through which an individual seeks certification, their nutrition education will meet those standards. This will protect the fitness professional and the participants. If indeed nutrition knowledge can protect against the development of DEBs, or at least promote healthy eating and exercise habits, it would benefit all fitness instructors to have such education.
With regard to the relationship between nutrition knowledge and exercise dependence, the findings were not significant. Nutrition and exercise are related in that proper nutrition is necessary for optimal health. However, the findings of the current study did not reveal a significant relationship between these variables. Due to the lack of research regarding the relationship between nutrition knowledge and DEBs and exercise dependence, more studies should focus on the potential benefits of better nutrition education for fitness instructors.

Effect of Eating Disorder Prevention Programming on Disordered Eating Behaviors

Studies have shown that adolescent girls and women between the ages of 15-19 are most at risk for eating pathology (23, 24). The period during which eating disorders typically manifest may be the most important time for eating disorder interventions to occur (25). Stice et al (26) found that adolescents younger than 15 years old have not developed the abstract reasoning skills and insight to experience the benefits of interventions. Although the majority of the participants in the current study were outside of the 15-19 age range, it is important to consider their previous experience with disordered eating behaviors and whether they were exposed to any interventions. If they developed disordered eating tendencies as young adolescents but did not receive early intervention or treatment once the disordered eating behaviors had emerged, it may be more likely that they would not have the skills to recognize those behaviors in class participants, or urge them to seek help. Stice et al (26) found that intervention programs that focused on increasing skills for resisting sociocultural pressures for thinness, body satisfaction, and weight management would produce a greater effect than programs focused on other factors. Stice et al
also suggested that focusing on behavioral and attitudinal change is more effective than programs with a psychoeducational emphasis. This kind of prevention program for a fitness instructor facing disordered eating behavior issues would be beneficial because they would have the knowledge and skill set to be aware of the messages they send to their participants. This may lead them to use motivational phrases that challenge the societal pressures to achieve the ‘ideal’ body, and encourage participants to focus on strength and health versus appearance. If the fitness instructor has learned to embrace health as a motivator for exercise instead of a method of weight control, for example, they may be more inclined to promote similar inspiration in their class participants. Studies including female fitness instructors who have had previous experience with eating disorder interventions would provide further insight into how this may influence their own thoughts, attitudes, and beliefs about eating and exercise behaviors, and how their class participants may be effected.

Implications

The current study provided support for the relationships between exercise dependence and disordered eating behaviors, and between nutrition knowledge and disordered eating behaviors. Further, the majority of female group fitness instructors in this study were categorized as at increased risk for exercise dependence. There are several suggestions for future research that could delve deeper into the findings of the current study and reveal more about the association between the development of disordered eating behaviors, and perhaps even eating disorders, in female group fitness instructors.
Future research could explore exercise dependence, disordered eating behaviors, and nutrition knowledge in other regions of the United States. This study focused on the Midwestern region, and the results may not be generalizable. Future studies could also examine whether factors such as age, years of teaching, previous nutrition education, previous eating pathology intervention, or types of classes taught play a role in the development of or progression of disordered eating behaviors in this population. Some studies (27) have suggested that age is negatively related to social physique anxiety. The majority of the fitness instructors in this study were young, and it would be interesting to conduct a study comparing younger instructors to older instructors to see if there is a higher occurrence of body dissatisfaction or disordered eating behaviors, as increased social physique anxiety can cause these. Nutrition knowledge was found associated with decreased DEBs in this study, but it would be valuable to test if nutrition knowledge can have the opposite effect, as there is a lack of research on this idea. Reasons for exercise and reasons for teaching would also be important to investigate, as they may help explain the statistically significant relationships between exercise dependence and disordered eating behaviors found in this study. If fitness instructors are motivated to exercise and/or teach for appearance-related reasons versus leadership reasons, could this potentially increase their risk for disordered eating behaviors? Additionally, the influence of disordered eating thoughts and behaviors of fitness instructors on their class participants must be further researched. Understanding the extent to which fitness instructors’ appearance, thoughts, actions, and messages may influence their participants is important as it may lead participants to engage in disordered behaviors as well. Lastly, research including male fitness instructors would be beneficial, as disordered eating behaviors are not exhibited exclusively by females. Male fitness
instructors may influence their class participants in similar ways, and this should be further explored.

Limitations

Some limitations should be noted when interpreting the results of the current study. One limitation is that the results are based on self-reported data, and possibility of participants not answering truthfully due the sensitive nature of the current research must be taken into consideration. A second limitation is the small sample size. Increasing the length of the study may allow for higher participation. If significant relationships between exercise dependence and disordered eating behaviors and between nutrition knowledge and disordered eating behaviors could be found in studies with larger samples, it would provide stronger support for the results of the current study. Additionally, participants in this study were from one region of the United States. Other regions of the country should be included in studies such as this to determine whether similar results can be found in order to provide more support for the current study. The majority of the participants in this study identified as Caucasian. It would be of value to conduct similar studies in more diverse populations. With regard to data pertaining to number of classes taught per week, this study did not ask participants to specify the length of their classes. Because classes can vary in length, this would important to discern because it will clarify how much total time instructors spend exercising while they teach and during their personal time. Lastly, there was some missing data from this study as some participants did not complete the survey in its entirety. The sensitive subject matter may have led some participants to leave their surveys incomplete. The results may have been influenced by the missing data, so it is important to consider this when interpreting the findings.
Conclusion

Overall, the results of this study indicate a significant relationship between GNK and DEBs. In the current study, increased nutrition knowledge was associated with decreased use of disordered eating behaviors, suggesting that nutrition knowledge may serve as a protective factor against the development or progression of disordered eating behaviors. This information may provide support for the importance of nutrition education for fitness instructors, as it may help them understand the role of proper nutrition in achieving and maintaining health.

The majority of participants in the current study did not exhibit exercise dependence, but many were at increased risk for exercise dependence. The findings of this study suggest that increased exercise dependence may put an individual at risk for developing disordered eating behaviors, or may cause them to increase use of such behaviors. This relationship is important to consider not only for the health and safety of the instructors, but for their participants as well. The potential for fitness instructors to have a large social influence on their participants cannot be denied (4). The thoughts and actions of a fitness instructor that surround their own body will likely be noticed by their participants. More research into engagement of DEBs by group fitness instructors is warranted before any definitive conclusions can be drawn. However, the results of this study indicate that this population is not immune to DEBs, and the potential effect this may have on their participants should be studied further.

If the participants indeed view their instructors as role models, it would stand to reason that they may feel compelled to adopt some of those behaviors or thoughts in order to get closer to the ideal body they seek. College-age females are particularly at risk for this because they are within in the age range when pressures to conform to society’s norms are very prominent. The
transitions and new life experiences of college can increase this stress and pressure, and it is important that college age females have proper support around them to ease the transition. Role models, such as fitness instructors, are key in helping these young women navigate through the college years and find out who they are, which leads to learning to respect who they are.

The results of the current study found that many participants exhibited a clinical manifestation of disordered eating behaviors. This information is useful because people with DEBs might not realize such behaviors and/or thoughts within themselves until they are asked to think about them. This potential unawareness of DEBs may influence the messages (verbal and nonverbal) group fitness instructors send to their participants, and may ultimately impact the participants’ own behaviors and thoughts. Their messages may become more targeted toward body shape or weight, which can lead to an increased focus on body shape or weight. This can change the tone of the class, and may put more emphasis on exercise as a means to a certain body type versus exercising for health reasons.
REFERENCES


APPENDIX A

REVIEW OF THE LITERATURE
Many variables factor into the development of EDs. Through an examination of existing literature, a better understanding of possible correlations between these variables can be explored. A review of the literature pertaining to female group fitness instructors and traits that may increase risk for an ED or DEBs, such as exercise behavior, social physique anxiety, general nutrition knowledge, and others will be discussed.

Self-Presentation

Self-presentation is defined as the processes of monitoring and controlling how one is perceived and evaluated by others, with the goal of creating a good impression (1). People with self-presentational concerns will try to ensure that they only present information about themselves that will support an impression they desire (2). At the same time, they hide things that will detract from this idealized image, because others’ perceptions of us may determine how we will be treated by them (2). In this way, self-presentation is a large part of how self-confidence can influence how we socialize and interact with others. This is important as it has been reported that self-presentational concerns about the body remain relatively strong throughout the lifespan (3), and thus they can play a large role in shaping our lives.

It is common for appearance to affect self-confidence. In situations where people lack self-confidence, self-presentational concerns can grow and cause a desire to do what is necessary to improve how others will view them. Concerns driven by self-presentation can influence body ideals, body image, body dissatisfaction, motivation for exercise and/or teaching, and affective responses (4, 5), which are all relevant to ED or DEB development. This is especially pertinent in regards to fitness instructors whose bodies are constantly on display. Brewer et al’s (6) study
in 86 female aerobics participants sought to discover the relationship among body mass index (BMI), social physique anxiety, and protective self-presentational exercise behaviors. The participants completed a questionnaire, a social physique anxiety measurement tool, and measures of two forms of protective self-presentational exercise behavior. Brewer et al. (6) concluded that women with strong self-presentational concerns are likely to engage in coping behaviors, such as wearing clothing that conceals their bodies and positioning themselves in ways that prevents or limits the ability of others to observe them and draw comparisons.

Interestingly, self-presentational concerns can increase or decrease a person’s likelihood to engage in physical activity. A person with self-presentational concerns may choose to forego exercise because they are worried about their bodies and/or physical abilities being evaluated by others, despite the fact that the exercise could help them obtain a fit physique (2). Conversely, self-presentational concerns can drive individuals to want to exercise in order to achieve the particular ideal body type they desire, which is typically lean and toned (2). In this case, self-presentational concerns lead to increased exercise that will ultimately boost self-confidence and decrease stress about being observed by others (7). It is important to realize that body image issues can motivate or deter participation in exercise.

In regards to the fitness instructor, whose job it is to exercise in front of others, self-presentation concerns can manifest in additional ways. Instructors, while leading a class, must be in full view, and their self-presentation concerns may be represented by the types of clothing they choose to wear. The fear of being evaluated by their class participants can elicit or increase self-presentation concerns in fitness instructors (8) and potentially increase their risk of developing DEBs. One might assume that self-confidence is not an issue for fitness instructors and that they have no concerns with self-presentation. However, the fitness instructor is the most
highly scrutinized person in the exercise setting (8). The possibility of self-presentation concerns and the increased ED or DEB risk that may result are very real concerns.

Loland (9) recognized that self-presentation concerns may be elevated in women who regularly participate in what he calls the “culture of display.” This term refers to the group fitness environment as a place where people can evaluate and observe the bodies of one another; individuals are essentially “on display” as a work in progress (5). Fitness instructors spend copious amounts of time within the fitness culture, and it has the potential to influence multiple variables that can increase their risk of developing EDs or DEBs. One variable in particular, social physique anxiety, is directly related to self-presentation.

Social Physique Anxiety

Social physique anxiety (SPA) is defined as the concern one has that other people are negatively evaluating one’s physical appearance (10). While self-presentation is the process of controlling and monitoring how one is perceived by others, SPA is the anxiety felt about the perceptions of others. Thus, SPA stems from self-presentation concerns, and it is used as an indicator of such concerns via the Social Physique Anxiety Scale (SPAS; 11). The SPAS measures the degree of anxiety people feel when they perceive their physique is being evaluated by others (10). Studies have shown that SPA is related to ED symptomatology and, in fact, it can influence many of the same variables used to measure ED risk that self-presentation can influence (12, 13).

It has been suggested that SPA may be characterized by the desire to control the appearance of one’s body (10). This may manifest as a person participating in exercise to
achieve a certain body type, or it could be a result of constant time spent in front of a mirror with participants watching (14), which is the case for fitness instructors. Given the demands placed on a fitness instructor it is not surprising that they have reported experiencing various disordered eating attitudes in conjunction with increased SPA (9, 10). Researchers have studied these reports and the relationship between SPA and self-presentation in ED or DEB development.

Through a series of interviews with five white female group aerobics instructors and 6 aerobic exercisers, Greenleaf et al (5) explored how SPA and self-presentation influence body ideals, body image, and body dissatisfaction, all of which are relevant in the study of EDs. Instructors expressed concerns about their bodies appearing too muscular because this would be masculine and intimidating. Their ideal body type was lean and toned. It was found that instructors did not necessarily think they had the ideal body, and some felt the pressure from their participants to look good. The exercisers said instructors’ bodies did not need to be perfect, but that they should still be tight, fit, and toned. This is concerning because a tight, fit, and toned body might be viewed by some as perfect and difficult to attain, but these participants seemed to think that this was normal for instructors. It is logical to assume that participant opinions can lead to increased SPA in instructors and have subsequent effects on their body satisfaction. The maintenance of a physically fit and aesthetic appearance is essential if fitness instructors want to receive positive evaluations from their participants (14). Even fitness instructors who view themselves as fit can feel inadequate if their participants’ standards are extreme.

Lantz et al’s (15) study found that SPA was negatively related to exercise behavior of 300 university students and community adults. Further, exercise behavior was lowest in women with high SPA. High SPA caused the women to feel a need to protect themselves from being evaluated by others (15). People with high SPA typically feel greater stress and discomfort and
have more negative thoughts about their bodies when evaluation by others is possible (11). Women who feel confident about their bodies, or who are not concerned with potential evaluation of their bodies by those around them, are not likely to feel anxious about exercising in front of others (15). In contrast, those who are self-conscious about their bodies and experience higher SPA may avoid public exercise in an effort to deter negative social evaluation (15). An individual’s awareness that others are potentially scrutinizing them can heighten SPA (16). SPA may therefore prohibit them from engaging in exercise – the very activity that can improve their physiques. In contrast to Lantz et al.’s study (15), an earlier study by Belling (17) suggested that women with high SPA may actually be motivated to exercise in order to improve their appearance. Further research must be conducted to verify the strength of this idea, but Hausenblas et al (2) reports that it may be true given that women in general are more likely than men to report body dissatisfaction and engage in activities that will improve their body satisfaction (18).

In a study of 286 female aerobics instructors, Hausenblas and Martin (8) found that SPA was not associated with the amount of exposure to exercise settings or years of instructing exercise. This is important because it indicates that repeated exposure of instructors’ bodies to their participants in class does not necessarily reduce or increase their feelings of SPA or self-presentation concerns (8). They did note, however, that there may be reasons for this finding. Firstly, most of their participants were fitness instructors who had been teaching for multiple years – not many had been teaching for less than 2 years. Experienced and new fitness instructors should be studied together to determine the validity of their finding. Second, self-selection may have played a role in that those who experience high SPA may choose not to enter into fitness instructing. This could explain the low SPA reported in their study.
Conversely, older age was associated with lower SPA (8). This is interesting because, for example, an instructor who is 50 years old and has taught for just 2 years is likely to have lower SPA than a 30 year-old instructor who has taught for 10 years. Clearly, length of exposure to the role as a fitness instructor is not as predictive as the stage of life. This may be of particular interest when focusing on instructors working with participants who are of a more influential age, such as college females. If there are more young female fitness instructors than older instructors teaching at college and university recreation centers, the findings by Hausenblas and Martin (8) suggest that there may be higher SPA experienced among the instructors. The increased anxiety felt about the perceptions of others may influence the instructors’ body ideals, body image, and body dissatisfaction as was suggested by Greenleaf et al. (5). The instructors’ beliefs may affect the messages they send to their participants about body ideals and body image.

Hausenblas and Martin (8) also found that higher BMI was associated with greater SPA. They took care to mention, though, that despite the positive relationship between SPA and BMI, this does not mean women with high SPA were more overweight (8). It would be easy to assume that those with high SPA are more likely to be overweight, and, while overweight individuals may experience high SPA, they are no more (or less) likely than non-overweight individuals to experience SPA. This highlights the issue with using BMI as a method of assessing whether an individual is overweight. Higher BMIs can occur due to a high percentage of muscle mass, thus creating an inaccurate measure of body composition (8). For example, most of the fitness instructors in Hausenblas and Martin’s (8) study had BMIs in the healthy range, but the others were classified as ‘overweight’, possibly due to a mesomorphic body type, which features higher muscle and/or bone mass and leads to a higher BMI, even if the individual does not appear to be overweight. Thus, a BMI in the overweight range may be falsely recorded. The potential for this
type of error is important to recognize when considering associations between body composition measured by BMI and variables that measure the risk for EDs and DEBs.

Body Dissatisfaction and Body Image Concerns

It might seem that people who exercise as frequently as fitness instructors do that they would not experience high levels of body dissatisfaction or body image concerns. This may be true for some fitness instructors, as they might have achieved the type of body they wanted and continue to exercise and instruct for reasons besides body image improvement. At the same time, some might turn to DEBs and/or excessive exercise behaviors in an attempt to maintain their body satisfaction (19).

Body image concerns are typically measured by way of the body dissatisfaction subscale from the Eating Disorder Inventory – 2 (EDI-2; 20). This subscale assesses dissatisfaction with different body parts and the degree to which these parts are perceived as too large/fat (10). Alternatively, body dissatisfaction can be measured using Jourard and Secord’s (21) Body Cathexis Scale, which also uses feelings about particular body parts to assess levels of body dissatisfaction.

Hoglund and Normen (22) found that lower BMIs were associated with greater body satisfaction. In a sample of 167 fitness instructors, those who fell in the lowest range of BMI (less than 20) reported one of the following: being happy with their weight, above their desired weight, or that they desired to gain weight. Happiness with current weight decreased, while desire to lose weight and reports of being above desired weight increased as BMI increased. In all, 50% of the participants reported concerns about gaining weight. It is important to note that
many of the instructors who expressed a desire to lose weight had present BMIs within optimal limits (BMI 18.5-24.9) (22). While lower BMIs were associated with decreased body dissatisfaction, it is clear that this did not automatically apply to all of the instructors within this BMI category. Thompson and Sargent (23) found similar results in their study of fitness instructors. Forty-two of the 377 instructors that completed surveys desired to be thinner, and 2% of those within that group were considered underweight according to the BMI classifications. The potential impacts of such findings are unknown, but it can be surmised that those instructors may have unhealthy attitudes about weight and/or body image. Thus, their influences on their participants are of concern, especially if they engage in DEBs and/or provide nutrition advice.

Olson et al (24) found that 40% (n=12) of their sample of 30 female aerobics instructors had scores on body dissatisfaction comparable to those of anorexic restrictors and a symptomatic anorexic group. These high scores on body dissatisfaction do not necessarily mean that those instructors have, or have had, an ED or DEBs. Such a conclusion could only be drawn following further assessment. Body dissatisfaction is common in women in general, and the high body dissatisfaction scores may simply be reflective of a preoccupation with body shape (24). In contrast to Olson et al’s (24) findings, Martin and Hausenblas (25) found that their sample of aerobics instructors exhibited significantly lower scores on body dissatisfaction compared to an eating disordered sample and control group. Despite the differences in research findings, it is important to study the potential for such preoccupations to be influential on a fitness instructor’s participants, especially those who are younger and possibly more susceptible to outside influences.

Similar to Martin and Hausenblas’ study (25), a study by Pritchard and Tiggemann (14) found that the female aerobics instructors scored significantly lower on body dissatisfaction than
the aerobics participants, which was in contrast with their hypothesis. Even after controlling for BMI, the results remained significant. Pritchard and Tiggemann (14) posited that women who are more comfortable with their bodies are more likely to pursue positions as fitness instructors, thus explaining the results that contrasted with their hypotheses. This study shows that being a fitness instructor is not necessarily predictive of one’s body satisfaction or lack thereof as previously assumed. The findings of this study reveal that the common perception that fitness instructors are satisfied with their bodies may be correct. However, conflicting studies highlight the importance of determining a better understanding of the levels of body satisfaction and/or dissatisfaction, along with other risk factors for EDs, within this population in order to assess the potential impacts.

It is common to find that body dissatisfaction centers on a few body parts or areas. In a study of 6 male fitness leaders by Philips and Drummond (26), it was reported that chest, stomach, legs, and height were features of most concern among those who reported body dissatisfaction. Women typically report that they are dissatisfied with their upper arms, legs (especially thighs), posterior, and/or stomach. Some fitness instructors may make exclamations such as “let’s burn that ugly fat” or “let’s reduce those thighs” that are meant to motivate their participants (23). However, Thompson and Sargent (23) suggested that focusing on positive phrases that do not name specific body parts might take the focus off of body dissatisfaction, and work to highlight the improved muscle tone and strength participants will achieve by taking their classes. The instructors might shift the focus away from their own body dissatisfaction by employing such tactics as well.
Self-Objectification

Objectification Theory has been proposed as a framework for understanding the psychological consequences facing women and girls simply due to the fact that they live in a culture that persistently objectifies the female body (19). Western culture is particularly known for portraying beauty as thinness and youth, and for promoting an environment where women are sexually objectified in the media. Women are socialized to consider themselves as objects for others to view and critique, and they become focused on their own physical appearance in the process of what Frederickson and Roberts (27) call “self-objectification”. Objectification theory posits that women self-objectify to varying degrees (19), and that not all women are equally susceptible to an objectifying environment (14).

Self-objectification is measured using the Self-Objectification Questionnaire. It measures the extent to which individuals view their bodies in observable, appearance-based (objectified) terms versus non-observable, competence-based (non-objectified) terms (19). The questionnaire asks users to rank a list of body attributes in ascending order of how important each is to their physical self-concept, from most important (rank = 1) to least important (rank = 12). The questionnaire uses 12 body attributes, 6 of which are appearance-related (physical attractiveness, coloring, weight, sex appeal, body measurements, and muscle tone), and 6 of which are competence based (muscular strength, coordination, physical fitness level, stamina, health, and physical energy level) (19). Higher scores reflect a greater preoccupation with appearance, which is interpreted as greater self-objectification (19).

Self-objectification has multiple behavioral and emotional consequences, and these may eventually influence the risk of developing EDs (27). Self-objectification increases a woman’s
likelihood of experiencing body shame (19). Shame is a result of self-evaluation according to an internalized or cultural ideal and failing to meet that standard (27). Western culture’s idealization of the female body provides plenty of opportunity for women to compare their bodies to others and feel shame and/or failure if they do not look like those idealized images. This can be a major factor in the development or progression of EDs because it can motivate DEBs such as bingeing and purging (19) in an effort to achieve the idealized look. Noll and Frederickson (19) hypothesized that body shame would motivate women who self-objectify and experience body satisfaction to engage in DEBs to maintain their satisfaction and avoid body shame. This underscores the idea that the negative consequences of self-objectification can occur regardless of a woman’s level of body satisfaction (19). In their sample of 204 undergraduate women, they found that self-objectification contributed directly to DEBs, showing that body shame indeed motivates women who self-objectify to engage in DEBs (19). The authors did note that the evidence is correlational, and that other data are needed before firm conclusions can be drawn (19).

Increased anxiety over potential evaluation of their body by others increases a woman’s likelihood of self-monitoring (or engaging in self-surveillance) to ensure they are not presenting themselves in undesirable ways. The effect of increased anxiety on self-surveillance is brought to the forefront when considering the objectifying nature of the fitness environment itself. Mirrors throughout a fitness facility cause a person to face their reflections and the reflections of others, providing the ability to self-objectify and compare one’s body to others. This is especially relevant in regards to the instructors, who spend lots of time in front of mirrors and perform in front of participants that watch their every move (14). Further, the type of clothing worn may increase the risk of self-surveillance and place women in the “objectification limelight” because
it often clearly displays the body (14). In their study, Pritchard and Tiggemann (14) predicted that women who wore tighter clothing would score higher on self-objectification than those who wore looser clothing. Results of their study of 60 White, female aerobics instructors and 97 female aerobics participants indicated that wearing tighter clothing was significantly positively correlated with self-objectification and self-surveillance (14). Further, self-objectification and self-surveillance were positively correlated with disordered eating symptomatology (14). Pritchard and Tiggemann (14) thus stated that dressing in a manner that enhances self-surveillance can be viewed as a manifestation of self-objectification. Although self-surveillance and self-objectification in relation to clothing preferences within the fitness environment were measured only in aerobics participants in Pritchard and Tiggemann’s (14) study, it stands to reason that fitness instructors would be subjected to the same feelings when they are not instructing, but using the fitness facility on their own time. This can indicate possible increased self-objectification in the instructors.

Derailment of peak motivational states is another consequence of self-objectification, referring to the way that a woman’s physical activities are interrupted when others call attention to the appearance and functions of her body (27). Internalizing the observations of others also interrupts a woman’s physical activities (27). Movement alone draws attention to the body, providing a way for a woman to self-objectify, and sense others’ evaluations, which essentially doubles the interference with her ability to continue exercising (27). The mental toll this could have on a fitness instructor is important to consider, as it could influence their ability to teach, or increase the likelihood that they send unhealthy messages to their participants.

Decreased awareness of internal bodily states is another concern associated with self-objectification (27). If women devote the majority of their focus to their outward appearance and
the observations of others, they may become less sensitive to their own internal body cues. Such would be the case in a person with a restrictive ED, as they center on limiting their eating and choose to ignore hunger cues or eventually lose their hunger cues. A fitness instructor with self-objectification issues may develop extreme exercise habits and remain dedicated to them despite internal cues indicating an injury or strained muscle. Such a situation would put the instructor at risk, and perhaps relay the message that maintenance of an exercise regime is more important than health and safety (27).

In a previously mentioned study, Pritchard and Tiggemann (14) hypothesized that, based on objectification theory, female aerobics instructors would score higher on self-objectification than would aerobic participants and thus be at a greater risk for DEBs. Despite the basis for the hypothesis, fitness instructors scored significantly lower on self-objectification, even after controlling for differences in BMI. Self-objectification was, however, positively correlated with disordered eating and appearance-related reasons for exercise in some instructors. The contrary nature of the results further supported Pritchard and Tiggemann’s (14) speculation that only women who are comfortable with their bodies will enter into professions such as fitness instructing. They noted, however, that perhaps such a career will promote self-objectification. Regardless of the fact that aerobic instructors scored lower, in general, on self-objectification than aerobic participants, the instructors with high scores on self-objectification were more likely to experience greater body dissatisfaction and disordered eating symptomatology (14). It is clear, then, that fitness instructors are not immune to self-objectification and that, although they may experience it at lower levels than their class participants do, it can put them at risk for EDs or DEBs.
Reasons for Exercise

Reasons for exercising can differ on an individual basis. Motivation is one of the greatest determinants of whether people will be physically active or forego exercise and partake in more sedentary activities. Some may say that as long as people exercise, the reasons for participation are not important. However, the motivation can be coming from a place that is not healthy and could cause physical or emotional harm. In the case of the fitness instructor’s motivation to exercise and/or instruct, it is of interest to discover from where their motivation stems because it can influence the experience and motivation of their participants.

The 24-item Reasons for Exercise Inventory (28) tool is often used to assess reasons for exercise, and it examines seven motivational categories: exercising for weight control, for fitness, for health, for mood improvement, enhancing physical attractiveness, for enjoyment, and for increasing body/muscle tone (14). Items must be ranked by importance on a Likert scale ranging from 1 (not at all important) to 7 (extremely important). Motives for instructing can also be assessed via scales that ask the user to rank various reasons based on items used in similar scales (29, 30).

Strelan et al (31) reported an association between high self-objectification and exercising for appearance-related reasons, versus exercising for health/fitness reasons, which was associated with lower self-objectification. The association between high self-objectification and exercising for appearance-related reasons was also shown by Pritchard and Tiggemann (14). It is thought that the tendency for a fitness facility to promote body change through exercising for weight loss can increase self-objectification (14). Some suggest that emphasis on health and or
mood/improvement over weight loss would lessen the pressure felt by individuals to adhere to cultural body ideals and motivate them to exercise from a more positive standpoint.

For some people, exercise may be motivated by self-presentational concerns, such as the desire to maintain a certain physique (2). Self-presentation concerns alone can increase the risk for developing EDs or DEBs, and the effects are more extensive if it simultaneously drives unhealthy exercise behavior. For many women, exercise motivation stems from a desire to achieve a certain aesthetic – the “ideal” body (2). High self-presentation can drive exercise motivation as people will work to maintain the impression they want others to see, and concurrently allow them to hide that which will detract from that image. Diet and exercise have been the primary means by which people feel they will obtain their idea perfect body, and the drive to be successful in this venture can become the dominating reason for exercise. It has been shown that people who are motivated to exercise more for appearance-related reasons seem to exercise less than those who exercise for health and/or fitness reasons (32; 33). Culos-Reed et al (33) found that as concern with appearance increased, frequency of exercise decreased, compared to those who were equally concerned with health and appearance and exercised more often (33). Culos-Reed et al (33) also pointed out that health care professionals (e.g. fitness instructors) should inform those who exercise for self-presentational reasons that self-presentation and health are linked. That is, as health improves, so will a person’s physique (33). In emphasizing this, those with high self-presentation motivations for exercise may realize the benefits of exercising at a level that will improve their health versus focusing mainly on appearance (33).

Improving one’s appearance, though, is a major motivator for exercise. Phillips and Drummond (26) noted that an insistence to be slim and attractive, have low body fat and well-
defined muscles drives exercise motivation for many male fitness instructors. While female fitness instructors might not focus as much on muscle definition, they too are often focused on achieving a slim, attractive body, and this can be a prime factor in exercise motivation.

SPA may also influence reasons for exercise. If SPA is very high, a person may engage in exercise with the goal of improving their appearance (34). Conversely, high SPA may prevent a person from exercising in front of others, as was previously discussed. Hart et al. (11) reported that those with the greatest need for exercise may be least motivated to engage in exercise due to their SPA. It is not difficult to imagine that other means of weight loss could be employed, such as DEBs, if exercise is not viewed as a viable option due to SPA.

In Pritchard and Tiggemann’s (14) study, it was hypothesized that female aerobics instructors would exercise more for appearance-related and/or monetary reasons versus health or mood improvement reasons. They added “to maintain my job” and “to work for money” to Silberstein et al.’s (28) initial 24-item exercise inventory, which did not include such reasoning, but the researchers felt the items were necessary given their sample included aerobics instructors. Their hypothesis was partly true – exercising for monetary reasons was the major motivator for instructors. However, the majority of aerobics instructors also reported exercising more for health and mood improvement versus appearance, and similar results were previously reported. Hoglund and Normen (22) found that the top reason for exercising reported by fitness instructors was for fun or enjoyment. Other reasons, in order of frequency, included: to feel good, to promote health, to improve body shape and tone, and to maintain weight or prevent weight gain (22). However, it is not known if this reasoning is typical for fitness instructors, or if it was unique to this sample.
It is important to note that SPA’s influence is not limited to engaging in or avoiding exercise. High SPA is also a major factor in motivation to instruct exercise. People with high SPA are more likely to teach for self-presentational reasons associated with body appearance than those with low SPA (8). Hausenblas and Martin (8) found that female fitness instructors who taught for self-presentational reasons reported higher SPA than those who taught for affect enhancement, education, and/or leadership reasons. Leadership motives for instructing were associated with low scores on the SPAS (8). They posit that women who instruct for leadership reasons may focus more on physical or psychological improvement of their participants versus their own (8). Further, this may serve to keep their self-presentational concerns by lessening their self-awareness (35) as they choose to focus on what is best for their participants. Overall, they concluded that a large number of women work as fitness instructors to achieve personal success, whether it is in the form of weight loss or mood improvement (8). The authors caution that this could jeopardize participant adherence and lead to high drop-out rates (8), neither of which are conducive to creating an environment that encourages exercising for health benefits.

Exercise Dependence

It would not be surprising to find that a fitness instructor exercises often. Some teach multiple classes in a week, or even in one day, and they may have the desire to work out in their free time as well. For those who find it difficult to engage in physical activity, they may view the frequency of exercise among fitness instructors as excessive. Frequency of exercise is among the dimensions Mond et al (36) considers essential in determining the association between exercise behavior and ED psychopathology. Similarly, in a 2008 study of 448 female undergraduate
women at a southeastern university, Cook and Hausenblas (37) found that exercise dependence, and not exercise behavior, was a crucial mediator of eating pathology. Their results indicated that addressing exercise dependence may be the key to changing eating pathology, because this would remove the link between exercise behavior and eating pathology (37). If exercise dependence decreased, the individual may be able to normalize their exercise behaviors, which could potentially decrease their eating pathology (37). Fitness instructors typically exhibit a high frequency of exercise, and would likely adhere to a scheduled workout regimen, given their teaching commitments and any desire to exercise on their own. Thompson and Sargent (23) found that 56.3% of the instructors in their study exercised an average of 6 to 10 hours per week. The entire sample of instructors taught for an average of 4.68 classes per week and engaged in an average of 4.25 hours of exercise outside of their classes (23). When considering general exercise guidelines for adults (ages 18-64) recommending 2.5 hours of moderate intensity aerobic exercise per week, and resistance training 2 days per week (38), it is clear that these female instructors were exceeding recommended exercise frequencies. This amount of exercise is not necessarily harmful, but a serious commitment to exercise may increase predisposition to and/or progression of EDs or DEBs (23) and/or inspire an exaggerated focus on one’s body (Davis 1990). Additionally, obligatory and pathological aspects of commitment to (or dependence on) exercise are important to consider.

Many instruments exist for measurement of commitment to exercise, exercise dependence, and similar variables. Psychological commitment to exercise may place fitness instructors at risk for ED symptoms (25). To measure commitment to exercise, researchers may use the Commitment to Exercise Scale (CES; 39). The CES (39) assesses psychological commitment to exercise with an 8-item questionnaire addressing pathological and obligatory
aspects of exercising by exploring how extensively feelings of well-being are influenced by exercise, the need to adhere to exercise regimens despite injury or illness, and the level to which exercise interferes with social events. High scores on the EDI-II or the CES indicate a potential increased risk for EDs or DEBs and a more pathological commitment to exercise, respectively. Exercise dependence can be measured using the Exercise Dependence Scale (EDS-21; 41). This is the only tool that operationalizes exercise dependence based on the Diagnostic and Statistical Manual of Mental Disorders (42) criteria. It differentiates between those at risk for dependence, nondependent-symptomatic subjects, and those who are nondependent-asymptomatic (41). Further, it specifies whether subjects are physiologically dependent on exercise (i.e. whether they show evidence of tolerance or withdrawal in the absence of exercise). This scale is beneficial because it can be administered to individuals or groups and takes only 5 minutes to complete. The EDS-21 has been validated (43).

Obligatory exercise, defined as exercise taken to an extreme, regardless of social or physical consequence, can be measured using the Blumenthal Obligatory Exercise Questionnaire (44). This 21-item true-false questionnaire studies and individual’s psychological characteristics, and a score of 15 indicates a person is an obligatory exerciser (23). Thompson and Pasman (45) also created an instrument called the Obligatory Exercise Questionnaire, which is a non-specific measure of exercise activity and has been psychometrically validated (46).

The psychological toll that commitment to exercise can have on the development of EDs or DEBs is worthy of investigation. Davis, Brewer, and Ratusny (40) found that individuals whose commitment to exercise was pathological (e.g., continuing even when sick or injured) and obligatory (e.g., becoming upset when missing a day of exercise) score higher on a measure of
eating disorder symptomatology. This association was not significant, but it shows that excessive exercise has a psychological component that may be reflected by commitment to exercise (40).

Martin and Hausenblas (25) sought to compare aerobic instructors’ attitudes and commitment to exercise to that displayed by other high-level exercisers (high-exercising female AN patients, high-exercising non-ED women, and moderate-exercising non-ED women), and analyze the generalizability of this relationship. Instructors scored low on the CES compared to other high-exercising populations and their scores on the EDI-II were low compared to published norms (25). Bivariate correlations between exercise frequency, commitment to exercise, and ED symptomatology found that instructors with greater commitment to exercise generally reported greater ED symptomatology (25).

Phillips and Drummond (26) investigated exercise expectations of and commitment to exercise in male fitness leaders. One instructors commented, “Not enough people have got the willpower”, while another said, “Most of these people are normally weak,” (p.101). These comments indicate that perhaps the instructors feel enough commitment will bring forth desirable results (26). What they do not understand is that the level of commitment fitness instructors possess is likely not experienced by those they teach and, in fact, their definition of ‘enough’ might be quite extreme (26). Because fitness instructors often engage in extreme exercise, some may believe that others should be able to do the same. Such a strong commitment to exercise and very high expectations not only for themselves, but also for their participants, can create a distorted view of normative exercise levels (26). Because it has been shown that high commitment to exercise can be associated with greater eating disorder symptomatology (25), it is pertinent to discover if the line of thinking displayed by the instructors in Phillips and Drummond’s (26) study is common among other instructors.
Despite the fact that aspects of fitness instructors’ jobs could contribute to higher CES scores, this was not demonstrated in the study by Martin and Hausenblas (25). This suggests that perhaps fitness instructors are not excessive exercisers as defined by their psychological commitment to exercise. Further, even if fitness instructors do exercise at a greater frequency, high exercise levels do not necessarily cause a psychologically unhealthy approach to exercise, despite being in an environment that emphasizes leanness (25). Even instructors with increasing pathological exercise behavior responded to Hoglund and Normen’s (22) questionnaire in ways that corresponded to healthy behavior. Martin and Hausenblas (25) speculate that this buffer effect may be due to the nutrition education some certified fitness instructors receive, thus they would know the benefits of maintaining healthy eating and exercise habits (certified versus non-certified fitness instructors will be discussed later). Still, Hoglund and Normen (22) reported that 31% of the instructors in their study said they do not refrain from planned exercise, and this was due to a variety of reasons. This represents the possible compulsion towards exercise, sometimes excessive, that may exist in some fitness instructors, even those with training and/or education.

What constitutes excessive exercise? The DSM-IV (42) defined excessive exercise as exercise that “significantly interferes with important activities, occurs at inappropriate times or in inappropriate settings, or continues despite injury or other medical complications” (p.546). Coen and Ogles (47) defined it as physical activity that is extreme in frequency and duration, relatively resistant to change, and often accompanied by an irresistible impulse to exercise even when injury, fatigue, or other personal demands persist. Mond et al (36) contended that the clinical DSM-IV definition of excessive exercise needed revision in order to be appropriately applied to the general population. Further, they suggested that there are 3 dimensions of exercise behavior warranting consideration when determining a definition of excessive exercise, namely, frequency.
or amount of exercise, obligatory exercise, and motivation for exercise (36). In an earlier study, Mond et al. (48) found that feelings of guilt upon the postponement of exercise (i.e. obligatory exercise) were the strongest predictors of elevated ED psychopathology. Mond et al.’s 2006 study aimed to build upon the findings of the 2004 study. They hypothesized that a sample of subjects from the general population would exhibit feelings of intense guilt upon the postponement of exercise that resembled those felt by ED patients (36). Findings in support of this hypothesis would show the importance of revising the DSM-IV definition of excessive exercise to include the feelings of guilt criterion. The results of the study indicated that feelings of guilt after missing an exercise session were the best predictors of disordered eating behavior (36), much like in Mond et al’s 2004 study. They also found that ‘exercising despite the presence of an injury’ and ‘exercise that interferes with social events’ (i.e. pathological exercise) were not associated with higher levels of ED psychopathology (36). They concluded that “exercise is excessive when its postponement is accompanied by intense guilt or when it is undertaken solely to influence weight or shape” (36; p 151). In addition to assessing potential excessive exercise behaviors in the study of EDs, it is necessary to consider exercise load, especially since it tends to be elevated in fitness instructors.

Exercise load is defined as the number of hours of training per week. In a study of 169 female fitness instructors, Hoglund and Normen (22) hypothesized that those with higher exercise loads would be more focused on body weight and shape, thus increasing the risk of weight control behaviors and EDs (22). A clear relationship between reported weekly exercise load and EDs was discovered. A majority of the responders with a previous ED experience reported exercising 3-5.9 times per week, which was categorized as a medium exercise load. Responders with current EDs (n=18) were mainly found in the high exercise load category,
indicating exercising more than 6 times per week. It should be considered whether exercise habits were established prior to, or after ED onset. For those with ED experiences (n=59), most reported they exercised before developing their ED, but that their exercise loads increased as the ED continued. Also, many with current EDs did not view exercise as compulsory prior to their ED, but this changed as the ED progressed, and this group reported the highest exercise load. Many of the instructors who had recovered from their EDs (n=20) did not consider exercise as a necessity, which was reflected by the fact that this group reported lower exercise loads than the group as a whole (22). Interestingly, Mond et al (36) suggested that excessive exercise may prevent the employment of other disordered eating and/or weight control behaviors, such as purging or laxative use. Also, excessive exercise could signal recovery among those who previously engaged in purging behaviors (49), and Mond et al (36) noted the potential usefulness of knowledge of exercise behavior within ED prevention programs.

The intensity of exercise factors into the equation as well. Exercise recommendations for adults mention “moderate exercise” (38), but there is also low- and vigorous-intensity exercise to consider. Ransdell et al (50) found that vigorous exercise in women was associated with lower SPA, which is important to note because SPA and body composition are positively related. Ransdell et al (50) also reported that exercising for longer durations was associated with lower SPA, but frequency of exercise was not. Fitness instructors would likely be viewed as vigorous exercisers, and thus would experience lower SPA based on Ransdell et al’s findings. Frequency of their exercise it seems would not factor into their experience of SPA, but this does not mean that fitness instructors would not experience SPA. None of the articles currently being reviewed discussed the difference among intensity of exercise, except for Ransdell et al (50) who spoke of vigorous exercise. Could this also be a determinant of risk for ED? Is there a difference in
personality traits, and possibly risk for EDs, among fitness instructors who teach at different levels of intensity (i.e. low-impact versus high-impact classes)?

Body Ideals

It has been suggested that women are socialized to believe that there is an ideal body type, and that they must strive for this body type by participating in exercise (5). It is through this exercise that they will supposedly achieve this ideal and subsequently increase their social acceptance. Women are told the ideal body type is one that is thin and toned (i.e. low body fat and physically fit), and men are told they must be lean and muscular (i.e. low body fat and muscular, especially in the upper body) (51;52). If fitness instructors succumb to social physique ideals, they may experience increased negative body image issues (18), and can develop habits that place them at risk for EDs or DEBs. The cultural ideals are very popular, but rarely do they exist naturally (5); some are simply unattainable due to differences in body structure and genetics, and will certainly not be possible without diet and exercise, but people do not always realize nor accept this.

Fitness instructors face pressure to maintain an ideal body type, and this pressure can be self-induced or applied by their participants. Further, they may feel that the participants are assessing their professional aptitude based on their appearance or ability to achieve and maintain the ideal body type (5). What confounds this issue is that different participants have different beliefs about what constitutes the ideal body type, and opinions can vary by gender. A study by Evans and Cotter (53) found that women prefer fitness instructors with thinner physiques than do
men. The instructors have their own ideas of what their ideal body type is, and it might not parallel that of the participants.

Greenleaf et al (5) discussed body ideals with their mixed sample of fitness instructors and participants from a large university. One instructor mentioned that being too muscular can be intimidating and/or overwhelming, but being strong is important (5). Muscles symbolize masculinity and can be seen as unnatural for women, and the concern over looking too masculine was shared among 4 of the 5 female fitness instructors in the study (5). Some instructors did focus on nonappearance ideals. Two of them commented their ideal body will allow them to feel healthy and live a good life, and that exercise is means by which to attain such a body. It was widely believed, though, that it would take extreme effort, dedication, and discipline to achieve the ideal body (5). The accomplishment of the ideal body can be so difficult that one instructor claimed she does not feel she will ever reach what she considers perfect. This is disturbing given that she may be basing her idea of perfection on the dominating cultural ideas, which can change with time. Fitness instructors should try to find their individual ideal physique, work towards it, and encourage their participants to do the same. It is likely that the ideal physique in the eyes of an instructor is not possible for their participants, yet the participants may try to look like their instructors.

Philips and Drummond’s (26) study with male fitness leaders revealed that a lean body was deemed the “embodiment of power and competency” (p.100). Leanness and definition were more important for these men than size, and they separated the achievement of low body fat from body weight. The ideal body for this sample of instructors was not centered on a low weight, as may be common with women, but instead focused on low body fat and high muscle definition (26). This demonstrates that there are many levels of differences in the idea of what the perfect
body looks like, whether those differences exist between fitness instructors and their participants, or between male and female fitness instructors. Regardless of the source of the opinions, all parties involved feel pressure to be successful in their effort to come close to or develop the ideal, and this can drive the risk for EDs or disordered eating symptomatology.

Nutrition Knowledge

Exercise participants may look to their fitness instructors for nutrition advice to complement their physical activity. It is important to recognize that not all fitness instructors are qualified to provide such information as they may lack a background in nutrition education. Fitness instructors are not required by law to possess a license or certification to teach, but some certification programs include nutrition education that could be beneficial for both the instructor and their participants. The issue is further complicated by the fact that not all certification programs are the same, and the level of nutrition education provided may vary, or perhaps the program lacks nutrition education. Years of experience in the field does not qualify a person to provide nutrition advice either, though some might feel experience translates into the right or know-how to offer such information. Thomas et al. (54) found that 41% of the 58 fitness professionals in their study had more than 6 years experience, but 84% of that group recommended a higher percentage of protein in daily caloric intake than is advised by the US Food and Drug Administration. Having a Fitness Nutrition Specialty Certification from the American Council on Exercise (ACE), for example, would provide a fitness instructor with sound nutrition advice suited for informing their participants. This certification program includes 2 nutrition courses – ACE Fitness Nutrition and Sports Nutrition for Health and Performance.
(ACE website). Fitness instructors would learn the function of nutrients in the body, their effect on health, read research on a variety of nutrition issues, and helps the instructors understand how to remain within the scope of their practice (ACE website).

Fuller et al. (55) identified 13 core courses they felt were necessary for preparation as a personal trainer or fitness instructor, including a general nutrition course and a course in nutrition, exercise, and weight control. Malek et al. (56) stated that a solid understanding of nutrition is of critical importance in developing and administering an optimal fitness program for participants. In their study of 115 fitness professionals, they found that those with certifications from the American College of Sports Medicine (ACSM) or National Strength and Conditioning Association (NSCA) scored much higher on a questionnaire that included items pertaining to nutrition knowledge than those with certifications from other organizations, or even certification from several other organizations. This highlights the fact that simply being certified does not ensure increased nutrition knowledge – the education provided varies across organizations.

In a study of 286 female aerobic instructors, Hausenblas and Martin (25) found that participants generally had healthy attitudes towards exercise and eating despite being employed in a field that emphasizes leanness. The authors suggested that health education could be an important factor contributing to their healthy attitudes towards exercise and eating, and those who do not complete a fitness certification program that includes nutrition education may be at increased risk for DEBs and excessive exercise behavior (25). A fitness instructor’s level of nutrition education, or lack thereof, could potentially affect their participants. The nutrition information they provide may be inaccurate, influenced by their own beliefs about nutrition, or stem from an unhealthy perspective. Additionally, limited nutrition knowledge would likely
leave the fitness instructor without the awareness that not all nutrition needs are the same for every person. Nutrition is very individual and should be tailored to meet specific needs.

Disordered Eating Behavior (DEB)

DEBs include emotions that are experienced (e.g. guilt, anxiety) while eating, and methods of limiting food intake (e.g. fasting, restricting), eliminating ingested food from the body (e.g. purging, misuse of laxatives, diuretics), and compulsive exercise. Bingeing is also a DEB, which involves uncontrolled intake of unusually large amounts of food in a discrete amount of time (Academy for Eating Disorders [AED]). Those who suffer EDs sometimes resort to extreme measures to maintain a particular body weight or feel a sense of control over their bodies, and their attempts often lead to engaging in DEBs. The types of DEBs a person exhibits often help identify the ED from which the person is suffering (e.g. Anorexia Nervosa [AN], Bulimia Nervosa [BN], Binge Eating Disorder [BED], Eating Disorder Not Otherwise Specified [ED-NOS]). However, there is a lot of overlap among the symptoms, and specific diagnoses can be difficult to ascertain (AED).

There are several tools used to measure DEBs, such as the Eating Attitudes Tests (EAT-40 and EAT-26; 58), the Eating Disorder Inventories 1, 2, and 3, and the SCOFF questionnaire (59). The EATs and EDIs have been used in many studies and in multiple countries. The SCOFF questionnaire is very brief (5 items with a “Yes” or “No” answer scale) and has low internal consistency. Another DEB measurement tool, the Disordered Eating Questionnaire (DEQ), contains 29 items and addresses the issues Lombardo et al. (60) suggests plague other ED measurement tools. First, Lombardo et al. (60) stated that many ED questionnaires were created
for adolescent females and do not sufficiently account for males with EDs. Additionally, Lombardo et al. (60) stated that many questionnaires do not ask subjects about the weekly frequency of their DEBs, and only use “never, seldom, often” and other terms instead. Lombardo (2011) states that this makes it difficult to determine the severity of ED symptoms and their changes over time. Lombardo et al. (60) created the DEQ in an effort to make up for the shortcomings of other ED measurement tools. It can be used with males and females of different ages, explores AN and BN symptoms, and features a more detailed frequency scale (never, 1-2 times per week, 3-4 times per week, every day, several times per day) referring to a 3-month time period (60). The DEQ was validated using a sample of men and women from the general population and was shown to have acceptable concurrent and criterion-related validity. The DEQ’s sensitivity and specificity are comparable to that of the EAT-40 and better than that of the EDI-2 (60).

There is limited research regarding DEBs in female group fitness instructors. The potential influence a female group fitness instructor with DEBs may have on their participants is worth investigating. Additionally, DEBs may seem normal for some people who engage in them if they have been engaging in them for an extended period of time. If this is the case for female group fitness instructors, they may not be aware of the possible influence their behaviors and attitudes can have on their participants.

Summary of Literature Review

Overall, it is clear that there are many factors that influence the development of EDs or DEBs. Fitness instructors are not immune to the societal, environmental, and personal pressures
to maintain a certain body type, and this can impact their body image and risk for developing EDs or DEBs. Further research in this population is warranted due to the possible influences they may have on their participants; especially college-age females who feel great pressure to adhere to the ideal body type. These participants may look to their fitness instructors as role models, and they may adopt their fitness instructors’ behaviors with respect to exercise and eating patterns in order to look like them (23). A participant in the study by Vogel (61) commented that, “The fact that my instructor had incredible muscle definition somehow legitimized her as an instructor, although her actual instructing skills seemed quite weak,” (p.43). Not all participants in this study equated the fitness instructor’s physique with their ability to teach (61), but it demonstrates the potential judgment and critical evaluation directed toward the instructor by their participants. This can ultimately factor into the fitness instructor’s risk of developing an ED or DEBs. The appearance and actions of the fitness instructor can impact the body image perceptions of their participants (61), but some instructors may not be aware of this when they teach; especially the impact of comments pertaining to improving body shape or losing weight. The potential risk for exercise dependence, DEB, and level of general nutrition knowledge among female group fitness instructors employed at college and university recreation centers is worth investigating, and will be the focus of this study. The influence their comments, beliefs, and behaviors can have on their participants cannot be ignored. Future studies can delve deeper into the risk for participants to develop EDs or DEBs based on the influences of their instructors.
REFERENCES


APPENDIX B

IRB APPLICATION
Application for Institutional Review of Research
IN VOLVING HUMAN SUBJECTS

Note: Please complete this form thoroughly keeping in mind that the primary concern is the potential risk (economic, ethical, legal, physical, political, psychological/emotional, social, breach of confidentiality, or other) to the participants. Provide copies of all materials to be used in the investigation. The Institutional Review Board (IRB) must have enough information about the transactions with the participants to evaluate the risks of participation.

Name(s) and employee ID for faculty, Z-ID for students:

Sania Aguirre       21685903

Status:             □ Faculty  ☒ Graduate Student  □ Undergraduate Student

Department:

ECS

Mailing Address (if not department):

319 Cedar Court, Apartment 2, DeKalb, IL 60115

Phone:   651-442-3524       E-mail: aguirres30@gmail.com

Project Title:

Proposed Data Collection Start Date: ___________

Note: Unless the authorized departmental reviewer (e.g., chair or designee) has deemed on the screening form that IRB review is not needed, all projects must receive formal written clearance from the IRB Chair (or an IRB member designated by the Chair) prior to the start of data collection.

Type of Project (Check one)

□ Departmental Research (faculty/student projects not externally funded and not indicated below)

☒ Graduate Thesis/Dissertation (IRB application should be submitted AFTER proposal defense)

Advisor/Committee Chair (& e-mail): Dr. J Umoren     jcn1@umn.edu

□ Undergraduate Project (Senior thesis/EXI/thesis, research, research, independent study)

Advisor/Committee Chair (& e-mail):

□ Externally Sponsored Research

A complete copy of the grant proposal or contract must accompany this application form for IRB review to take place.

• Source of Funding:

• Title of grant proposal (if different from IRB protocol):

• Name of principal investigator on grant proposal:

• Office of Sponsored Projects file number (Note: this is not the grant number):

□ Other

Specify: 
Part I. Purpose and Procedures:

1) Describe the purpose of your study and the reason(s) this study is needed. Include any necessary background information and a description of your hypothesis or your research question.

The focus of the study is the health beliefs and attitudes of female group fitness instructors employed at college and university recreation centers. Specifically, the beliefs about and knowledge of nutrition, exercise, and health are of interest. Information gathered from questionnaires measuring exercise dependence, disordered eating behaviors, and general nutrition knowledge will be used in an attempt to determine if this population is at risk for disordered eating behaviors. The potential risk factors on their participants, especially college females, many of whom typically experience body image issues and engage in dieting, is also of interest. It is hypothesized that female group fitness instructors classified as exercise dependent and who possess limited nutritional knowledge will be at increased risk for disordered eating behaviors. Research of disordered eating behaviors in female fitness instructors and other fitness professionals is lacking. Some research suggests that fitness instructors may be at an elevated risk for disordered eating behaviors due to various reasons, including frequent participation in exercise, possible drive to maintain a particular body type, and potential anxiety over their bodies being judged by others.

Debate remains as to whether dependence on exercise places a person at risk for disordered eating behavior, or leads to a protective effect. Additionally, it is not certain that fitness instructors possess adequate nutrition knowledge. Some fitness certification programs include nutrition education, but certification is not required for all disciplines. Thus, those without nutrition education or those who have limited nutrition knowledge may be at increased risk for disordered eating behavior. Further, they may relay incorrect or harmful information to their class participants.

Group fitness instructors were chosen because they face the challenges of performing in front of their participants. The potential for anxiety about their bodies, making mistakes, and frequent participation in exercise for work and leisure are important factors in determining the risk for disordered eating behavior. Because there is more research regarding disordered eating in females, the study will focus on female instructors.

2) The following items will help the PEB reviewers understand the step-by-step procedures of your study:

2A) Explain the participant eligibility and exclusion criteria that will be used.

To be eligible, participants must be female group fitness instructors employed at a college or university recreation center. Only subjects 18 years old and over will be allowed to participate.

2B) Explain the recruitment procedures (how will participants learn about the study?). If using the snowballing technique, please explain who contacts potential participants (other participants or the researcher).

Please attach recruitment scripts, flyers, or postings [Appendix A].

Participants will be recruited through emails sent to the directors of campus recreation at colleges and universities in the midwest region of the US. Directors of recreation will be emailed requesting permission to contact their female group fitness instructors regarding participation in a thesis study about their health beliefs and attitudes and how this influences their health behaviors. A recruitment package will be created and forwarded to the directors of campus recreation to send to the female group fitness instructors. The package contains a flyer that indicates the purpose of the study, explains that confidentiality and privacy will be maintained, and that participation is voluntary. Participation in and completion of the survey will grant the subject the chance to enter into a drawing for a gift card. If interested, the participant will be asked to email the researcher and provide contact information in order to receive the gift card in the event they win. They will be informed that provision of contact information to enter the drawing will not be linked to any completed surveys, and all responses and contact information will be kept private.

2C) Explain the consent process (verbal and/or written procedures for informing participants of the nature of the study and what they will do).

[Please attach all documents (assent, consent, parent permission – Appendix B) that are appropriate for each group of subjects participating in the study. Consent forms should be prepared for adult participants (age 18 or over). Assent forms should be prepared for minor subjects appropriate to their ages, and permission formats for parents or legally authorized representatives should also be prepared. For children too young to comprehend a simple explanation of participation, parental permission is sufficient only if the research will provide direct benefit to the subject, a member of the subject's family, or other children with the same condition as the subject.]
Participants will need to complete a consent form prior to volunteering to complete the survey. The consent form acknowledges that all information will be used solely for research purposes and will be kept confidential. Once the consent form is signed and submitted, the participant will be allowed to click on a link taking them to the survey.

2D) Describe the data collection procedures, including what will be collected (include a description of any interventions to be used), the duration of participation in the study session(s), and how the session(s) will end.

Data will be collected using a questionnaire composed of three instruments measuring exercise dependence, disordered eating behaviors, and general nutrition knowledge, respectively. A demographic section including items pertaining to gender, race, educational background, years of experience interacting with type of patient class, diet, fitness certifications held, and other topics will also be included. The questionnaire will be available on survey.com. A link to the questionnaire will be provided to the participants in the email containing the consent form. Once the consent form is signed, access to the questionnaire will be allowed by clicking on the provided link. The questionnaire will take between 15-20 minutes to complete.

Please note: It is the researcher’s responsibility to seek out permission to use copyrighted materials. Please indicate whether you have permission to use any copyrighted materials for your project:

☐ Yes, I have permission to use any copyrighted materials for this project
☐ No, I do not yet have permission to use any copyrighted materials for this project
☐ This is not relevant for the materials being used in this project

2E) If applicable, explain the procedures for providing compensation.

Participants will be invited to enter into a drawing for a gift card upon completion and submission of the questionnaire. They will be asked to email the researcher and provide their contact information in order to receive the prize in the event they win. All contact information will remain confidential and will not be linked to any completed questionnaire.

2F) If applicable, explain the procedures for debriefing participants. Please attach a debriefing script or sheet [Appendix D]

N/A

Reminder: As appendices to this application, attach copies of all: A) Recruitment information (script/flyer/etc.), B) Informed consent documents (parent/parent permission/requests/etc.), C) Materials (questionnaires/surveys/interview questions/interview topics/other instruments/etc.), D) Debriefing information (document/script), E) Referral list (if appropriate). It is the responsibility of the researcher to obtain any relevant permission for copyrighted materials. If the research involves an oral interview or focus group discussion that could evolve as it progresses, include a list of discussion topics and any “starter” questions for each topic that can reasonably be expected to be covered. If a draft of a written questionnaire or survey is attached, it should be clearly labeled as such and a final version must be submitted before data collection begins. PLEASE NOTE THAT ANY ITEMS CAN BE ATTACHED AS SEPARATE DOCUMENTS IF NEEDED.

Part II: Research Participants
3) Participant demographics:
   - Gender:  
     ☐ Male ☐ Female ☐ Both ☐
   - Estimated age(s):
     ☐ 18 and older
   - Are any subjects under age 18? Yes ☐ No ☒
   - Potentially vulnerable populations (please indicate if any of the following groups are the target population of the study):
     ☐ Pregnant or breast-feeding
     ☐ Children, youth, and adolescents
     ☐ Older persons
     ☐ Mentally disabled
     ☐ Specific ethnic group(s) (list in box):
If any potentially “vulnerable populations” have been indicated above, please explain the necessity for using this particular group, or if specific groups are excluded from the study, please indicate the exclusion criteria used.

- Target number of participants in the entire study (including controls) from start to finish (keep in mind that this is just an estimate of the total):
  380

4) Please explain any outside institutional (i.e., schools, hospital(s) approval) you will need to obtain and how approval will be sought. Provide scripts, letters, or emails providing any information that will be used to obtain needed approvals/permissions. It is the responsibility of the researcher to follow all applicable policies of any outside institution(s).

Permission to contact potential participants will be sought from the directors of campus recreation at colleges and universities in the midwest region of the US. Initial emails describing the purpose of the study will be sent. If the directors agree to allow their staff to participate, recruitment flyers will be emailed to them to forward to their staff. The recruitment flyers will explain the study with a description similar to that in the initial email sent to the directors of campus recreation.

Part III: Risk/Benefit assessment

5) What knowledge/benefit(s) to the field will be gained from the study?

Currently, there is a lack of research regarding the risk for disordered eating behavior in female group fitness instructors. This is particularly true for those employed at college and university recreation centers. It has been shown that college-age females face increased pressure to adhere to body image ideals, and they may be more easily influenced by the world around them to engage in dieting and/or exercise behaviors to induce weight loss. The role of the group fitness instructor is crucial because they may often serve as a role model for the participant. The messages they communicate and the ways in which they promote exercise and disordered eating behaviors can be particularly impactful for college-age females. This is important to gain a better understanding of the nutrition beliefs and attitudes of female group fitness instructors and how these influence their own health, exercise, and eating behaviors because they may have an effect on those they teach.

6) What direct benefit(s) are there to the participant(s) (if any) from the proposed research? [For example, learning a new skill, psychological insight, teaching experience] [Please note that compensation is NOT considered a direct benefit.]

There are no direct benefits for participants, however, participation may raise their awareness of need for accurate nutrition information.

7) Describe any potential risks (breach of confidentiality, economic, ethical, legal, physical, political, psychological/emotional, social, or other) to the subjects posed by the proposed research. (Note: Some studies may have “no reasonably foreseeable risks.”) Investigators are required to report all unexpected and/or adverse events to the IRB. Therefore, it is important that you list all reasonably anticipated risks because unanticipated adverse events may need to be reported by NIU to OHRP.

While there are no reasonably foreseeable risks associated with participation in this study, the questions may possibly make some participants uncomfortable with their body awareness and eating habits.

8) Federal regulations require that researchers use procedures that minimize any risks to participants. What procedures will be used to minimize each risk and/or deal with the challenge(s) stated in #7 above?

No foreseeable risks but a list of resources will be made available as listed in #9.

9) If support services are required to minimize risk of harm to participants, explain what will be provided (list of services available – Appendix E). [A resource list for the DeKalb area is available on the ORC website – if using this, please provide a copy with your application.]
A list of available resources for assistance with emotional discomfort will be made available to all participants. Contact information for the participating school’s counseling centers will be provided as follows: http://www.purdue.edu/caps/ (Purdue University Counseling & Psychological Services); http://healthcenters.indiana.edu/counseling/ (Indiana University at Bloomington Counseling & Psychological Services); http://counseling.cornell.edu/ (Cornell University Counseling Services); http://www.cs.ohio-state.edu/ (Ohio State University Counseling & Consultation Service); http://health.umn.edu/counseling-and-psychological-services-caps (University of Nebraska-Lincoln Counseling & Psychological Services); http://www.uhn.wisc.edu/services/counseling/ (University of Wisconsin-Madison Health Services); http://www.northwestern.edu/counseling/ (Northwestern University Counseling & Psychological Services); http://www.counselingcenter.illinois.edu/ (University of Illinois Urbana-Champaign Counseling Center).

10) How do the potential benefits of the study justify the potential risks to the participants?

A list of available resources will be provided to all participants. One benefit of this study is the newfound knowledge regarding how the beliefs and attitudes about health, nutrition, and exercise influence the health behaviors and risk for disordered eating behaviors of female group fitness instructors employed at college and university recreation centers. Research of disordered eating behaviors in this population is limited. There is potential for determining how the beliefs and attitudes about health, nutrition, and exercise of female group fitness instructors affect those beliefs and attitudes held by their participants – especially the female participants. Additionally, if it is shown that prior nutrition education benefits the group fitness instructor and assists them in choosing more health and strength focused reinforcement while teaching, as opposed to statements aimed at improving body image or weight, support for increased nutrition education among fitness professionals may be provided. Studies have suggested that nutrition education may serve as a protective factor against the development of disordered eating behavior and/or eating disorders for fitness professionals, as they will be equipped with proper information about fueling the body for performance. This may, in turn, provide positive outcomes for their participants.

If it is found that disordered eating behaviors and exercise dependence exist in some of the female group fitness instructors, ways to mediate the potential for their beliefs, attitudes, and practices to influence their participants can be determined. This study will not only provide insight into how group fitness instructors can modify their own belief about health and nutrition, but can also help them promote more positive health and nutrition messages for their participants.

Part IV: Consent Document Variations

11) Will audio, video, or film recording be used?  
Yes  ☐  No  ☑

If yes, specify the recording format to be used.

Please keep in mind that specific consent must be sought in the informed consent document(s) by including a separate signature line giving consent for recording. This is in addition to the signature line giving consent to participate in the research project.

12) Will this project require the use of consent/assent documents written in a language other than English?  
Yes  ☐  No  ☑

Reminder: If non-English documents will be used, please have the document translated provide documentation (email or written) that the translation is equivalent to the English version. [This can be done after the protocol is approved in order to minimize the number of changes needed.]

13) Are you requesting a waiver of a signed informed consent document?  
Yes  ☐  No  ☑

Please indicate the justification for requesting this waiver:
☐ The only record linking the subject to the research would be the signed consent document and the principal risk of the research would be breach of confidentiality.
☐ The research involves minimal risk to the subjects and involves no procedures for which written consent is normally required outside of the research context (e.g., online surveys).

14) Are you requesting a waiver/alteration of some other aspect of the informed consent document?  
[This section is relevant for studies involving deception]  
Yes  ☐  No  ☑
14a) Please explain which aspects of informed consent will be missing or altered along with a justification for the change.

14b) Please explain how the project meets all of the following criteria:

1) The research presents no more than minimal risk of harm to the participants.

2) The waiver/alteration will not adversely affect the rights or welfare of the participants.

3) The research could not practically be carried out without the waiver or alteration.

4) Whenever appropriate, the participants will be provided with additional pertinent information after participation.

15) Will any HIPAA protected health information be collected as part of the data? Yes ☐ No ☒
    If yes, describe the procedures for protecting the information.

[Please provide a copy of your HIPAA disclosure form to be given to participants.]

16) Will any protected school records be collected as part of the data? Yes ☐ No ☒
    If yes, describe the procedures for protecting the information.

Part V: Confidentiality and Anonymity

17) Will identifying information be connected to the data (even through an identification key linking identities to a pseudonym or code that is kept separate from the data)? Yes ☐ (confidential data) No ☒ (anonymous data)

18) If you answered yes to the above question, describe precautions to insure the privacy of the subjects, and the confidentiality of the data, both in your possession and in reports and publications.

19) How will the records (data, recordings, and consent forms) be stored? Also indicate how long records will be kept and how and when they will be disposed of. [Data: Signed informed consent documents must be maintained for 5 years following completion of the study.]

Part VI: Does this project involving deception? Yes ☐ No ☒
[Complete this section only if your study includes deception]

20) Describe the deception being used. Be sure to clarify whether this is deception by omission (an important aspect of the study is withheld from the participants) or commission (the participant is misled about some aspect of the study) or both. [Complete item 14 if aspects of consent are missing.]

21) Why is deception a necessary and unavoidable component of the experimental design?

22) Debriefing of participants will be:

☐ Immediate (directly following the research session)
Delayed

a) If debriefing is delayed, why is the delay necessary, and when will it occur?

b) If debriefing is partial, why is the partial debriefing necessary? Would the participant be harmed in any way by full debriefing?

c) If debriefing is partial, will full debriefing occur later?

d) Does the presence of deception increase risk of harm to the participants?

e) Is the respondent free to withdraw his/her data after being fully debriefed?

23) Who will provide the debriefing?

Reminder: Please include a copy of your debriefing script/sheet with this application [Appendix D].

Part VIII: Credit and Compensation

24) If participants will receive course credit for participation, please describe it below.

25) If participants will receive some other form of compensation for participation, please describe it below.

26) Describe any alternative tasks that will be available for participants to earn the credit or compensation.

Participants will have the option to enter into a drawing for a gift card upon completion and submission of the survey. They will need to provide their contact information to the researcher at gfl diagnosis@gmail.com. The winner will be contacted in order to claim their prize. All contact information will be kept confidential and will not be used for purposes other than identifying a winner. No contact information will be used to link survey responses to participants.

Part VIII: Conflict of Interest

27) Do any of the researchers conducting this study have any potential conflicts of interest?

[Conflicts of interest may include financial or personal interest, or any condition in which the investigator's judgment regarding a primary interest may be biased by a secondary interest.]

Yes ☐ No ☐

28) If yes to the above question, please describe the nature of the conflict of interest.

Please use the following link to access the NIU research conflict of interest policy:

Part IX: Researcher Qualifications:
29) In addition to listing the investigators' names, indicate their qualifications to conduct procedures to be used in this study (specifically describe past experience conducting research with humans or how training will occur).

Sarita Aguirre is a graduate student and took the graduate Research Methods and statistics course. Also participated in Use of Human Subjects workshop in August 2012. Dr. J. Xanxen is graduate faculty and researcher with experience directing thesis.

30) State the date of completion of CITI Human Subjects Protection training program(s) for the individuals listed in the above question. (Note: NU Policy requires that research investigators must complete appropriate training before conducting human subjects research.) If you have comparable training, please attach certification indicating this.

CITI (Collaborative Institutional Training Initiative) training is thorough and well recognized: https://www.citiprogram.org/Default.asp?

11/9/2012
APPENDIX C

IRB APPROVAL
Dear Sarita Aguirre,

Your application for institutional review of research involving human subjects was reviewed by Institutional Review Board #2 on 09-Apr-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), 2

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 (HS14-0118) 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 D

RECRUITMENT PACKAGE
Email sent to Directors of Campus Recreation

Good Morning,

My name is Sarita Aguirre and I am a graduate student at Northern Illinois University pursuing my M.S. in Nutrition and Dietetics. I am currently in the early stages of my thesis that is required for my degree program completion. My interest is in fitness instructors and how their personal attitudes and beliefs towards health and nutrition may impact their overall health behaviors. For my thesis, I plan to survey only female group fitness instructors employed at college and university recreational centers. I am asking if you would be willing to help me with my study by providing me access to the female group fitness instructors at your university recreational center. Participation in the study will require voluntary consent and completion of a 15- to 20-minute online questionnaire (surveymonkey.com) and those who complete and submit the survey will have the chance to enter into a drawing for a $50 Target gift card.

This study will be conducted following all guidelines and standards of Northern Illinois University's Institutional Review Board (IRB) for the use of human subjects.

As of now, the desired time frame for administering the survey is during the spring 2014 semester; hopefully during the last 2 weeks of February through the first two weeks of March in spring 2014 semester.

If you are willing to help me, I would send you the link to the online survey to distribute to your university's female group fitness instructors or I can send it directly to them, based on your recommendations. Please note I will not administer the survey until mid February - I am simply seeking sources from which I can draw participants for now. I will follow up with the survey link once I am ready to collect responses.

If you would like more information or have any questions, please feel free to contact me, aguirresarita@gmail.com, or my thesis advisor Dr. J. Umoren, who can be reached at 815/753-6351 or jxu1@niu.edu.

Thank you very much for your time, and have a great day,

Sarita Aguirre
Nutrition Graduate Student
Northern Illinois University
Attention Female Group Fitness Instructors!

Participants wanted for a thesis research study on

exercise habits and health

All you have to do is complete an online questionnaire that will only take

15-20 minutes!

Interested in participating, or want more information?
- check your email for a message from your Director of Campus Recreation describing the study
- check back for an email from your Director of Campus Recreation with
  a link to the questionnaire
- feel free to contact Sarita Aguirre at gfistudy@gmail.com, or Dr. J. Umoren at
  jxu1@niu.edu with any questions or concerns

THANK YOU FOR YOUR TIME AND PARTICIPATION!!
Recruitment Email Sent to Potential Participants by Directors of Campus Recreation

Hello,

My name is Sarita Aguirre and I am a graduate student at Northern Illinois University pursuing my M.S. in Nutrition and Dietetics. I am currently working on my thesis and my interest is in female group fitness instructors and how their personal attitudes and beliefs towards health, exercise, and nutrition may influence their overall health behaviors. I am focusing on female group fitness instructors employed at college and university recreation centers. I am asking if you would be willing to help me with my study by participating in a survey regarding your attitudes and beliefs towards health and nutrition. The survey will be administered online, and will take between 15-20 minutes to complete. The survey will be available for a 4-week period from the end of February until the middle of March 2014. A link to the survey will be provided, and it will take you directly to the surveymonkey.com page where the survey is located. Should you choose to complete and submit the survey, you will have the chance to be entered into a drawing for a $50 Target gift card.

The study will be conducted following all guidelines and standards of Northern Illinois University’s Institutional Review Board (IRB) for the use of human subjects. The survey will be anonymous and responses will be collected and analyzed for research purposes only. All information will be kept confidential.

I look forward to your participation in my study, and thank you for your time and consideration. If you have any questions or concerns, please feel free to contact me at gfistudy@gmail.com, or my thesis advisor Dr. J. Umorer, who can be reached at (815)753-6351 or jxu@niu.edu.

Thank you very much and have a great day,

Sarita Aguirre
Nutrition Graduate Student
Northern Illinois University
APPENDIX E

CONSENT FORM
Consent Form

I understand that by agreeing to participate in this study I will be asked to complete a questionnaire regarding factors related to exercise behaviors, beliefs about eating, and general nutrition knowledge. The questionnaire will take approximately 15 to 20 minutes to complete.

I understand that my participation in this study is completely voluntary and that I will not endure any penalty or punishment should I choose to rescind at any time. If I have any questions or concerns, I may contact Sarita Aguirre at (651)442-5624 or gfistudy@gmail.com, or Dr. J. Umoren at (815)753-6351 or jxu@niu.edu. If I would like more information about the rights of research subjects, I can contact the Office of Research Compliance at Northern Illinois University, (815)753-8588.

I understand that any information I provide on the questionnaire will be kept confidential, and any data will be used solely for research purposes. No information will be shared with or sent to any other organization or contacts. I know that there are no serious risks or predictable harm associated with participation in this study, and I choose to participate despite any unforeseeable risks.

I am aware that by completing and submitting this questionnaire, I am eligible to enter a drawing for a $50 Target gift card. Should I be interested in entering the drawing, I will send an email expressing my interest to gfistudy@gmail.com and enter “Gift Card Drawing” in the subject line. I will include my contact information (name, email/telephone/address) so I can receive the gift card in the event I am the winner. I understand my contact information will not be used to identify my complete survey, and it will be kept strictly confidential.

If the statement below applies to you, choose YES to agree to participate. You will then be allowed to begin the questionnaire. Thank you for your participation.
“I have read and understand the above consent form. I understand that all information I provide will be kept confidential. I am a female group fitness instructor employed at a college or university recreation center and I am 18 years of age or older.”

YES
APPENDIX F

INSTRUMENTS
Exercise Dependence Scale-21
Hausenblas and Symons Downs (2002)

Instructions.
Using the scale provided below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months. Please place your answer in the blank space provided after each statement.

1 (Never)---------2-----------3-----------4-----------5-----------6 (Always)

1. I exercise to avoid feeling irritable._____
2. I exercise despite recurring physical problems._____
3. I continually increase my exercise intensity to achieve the desired effects/benefits._____
4. I am unable to reduce how long I exercise._____
5. I would rather exercise than spend time with family/friends._____
6. I spend a lot of time exercising._____
7. I exercise longer than I intend._____
8. I exercise to avoid feeling anxious._____
9. I exercise when injured._____
10. I continually increase my exercise frequency to achieve the desired effects/benefits._____
11. I am unable to reduce how often I exercise._____
12. I think about exercise when I should be concentrating on school/work._____
13. I spend most of my free time exercising._____
14. I exercise longer than I expect._____
15. I exercise to avoid feeling tense._____
16. I exercise despite persistent physical problems._____
17. I continually increase my exercise duration to achieve the desired effects/benefits._____
18. I am unable to reduce how intense I exercise._____
19. I choose to exercise so that I can get out of spending time with family/friends._____
20. A great deal of my time is spent exercising._____
21. I exercise longer than I plan._____
## APPENDIX

**DISORDERED EATING QUESTIONNAIRE (F)**

Read the following items carefully and then answer each one by putting a cross in the box which best describes your own experience.

### A) ON AVERAGE, OVER THE LAST THREE MONTHS, HOW MANY TIMES A WEEK YOU:

<table>
<thead>
<tr>
<th>Item</th>
<th>Never</th>
<th>Once or twice</th>
<th>1-4 times</th>
<th>5-6 times</th>
<th>Every day</th>
<th>More than once a day</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1) Reduced your intake of food or calories in order to lose weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>A2) Fasted for eight consecutive wake hours or more</td>
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<tr>
<td>A3) Checked your intake of food or calories in order to maintain your weight</td>
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<tr>
<td>A4) Regretted for having eaten</td>
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<tr>
<td>A5) Had intrusive thoughts between meals about how much food or how many calories you have taken in</td>
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<tr>
<td>A6) Spent a long time thinking about your weight or how some parts of your body look</td>
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<tr>
<td>A7) Felt you had eaten too much</td>
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<tr>
<td>A8) Were unable to resist the urge to eat a certain food</td>
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<tr>
<td>A9) Felt guilty after eating</td>
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<td>A10) Ate in secret</td>
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<td>A11) Were ashamed to eat in presence of others</td>
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<tr>
<td>A12) Were unable to stop eating a certain food</td>
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<tr>
<td>A13) Voluntarily vomited to keep your weight under control</td>
<td></td>
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<tr>
<td>A14) Took laxatives to keep your weight under control</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>A15) Took diuretics to keep your weight under control</td>
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<tr>
<td>A16) Took other drugs (not laxatives or diuretics) in order to lose weight</td>
<td></td>
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<td></td>
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<tr>
<td>A17) Did intense physical exercise in order to lose weight</td>
<td></td>
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<tr>
<td>A18) Avoided wearing clothes that emphasize your body</td>
<td></td>
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</tr>
</tbody>
</table>

### B) STILL REFERRING TO THE LAST THREE MONTHS, PUT A CROSS ON A NUMBER FROM 0 TO 6 (0 = NOT AT ALL; 6 = VERY MUCH) TO INDICATE HOW MUCH YOU:

<table>
<thead>
<tr>
<th>Item</th>
<th>Not at all</th>
<th>Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1) Felt uncomfortable showing your body to other people (e.g., wearing tight clothes, in a gym changing room, on the beach, etc.)</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
<tr>
<td>B2) Felt uneasy seeing your body in a mirror</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
<tr>
<td>B3) Had thoughts about food or calories distracting you from what you were doing at that moment</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
<tr>
<td>B4) Had thoughts about your weight or how several parts of your body look distracting you from what you were doing at that moment</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
<tr>
<td>B5) Felt your self-esteem influenced (positively or negatively) by thoughts about your intake of food or calories</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
<tr>
<td>B6) Felt your self-esteem influenced (positively or negatively) by thoughts about your height or about the way several parts of your body look</td>
<td>0  1  2  3  4  5  6</td>
<td></td>
</tr>
</tbody>
</table>
## Food and Nutrition Questionnaire

1. The main energy sources for the athlete are:
   - A. Carbohydrates
   - B. Proteins
   - C. Fats

2. Bread and pasta are important because they supply:
   - A. Vitamins
   - B. Proteins
   - C. Carbohydrates

3. Meat is important because it supplies:
   - A. Vitamins
   - B. Proteins
   - C. Carbohydrates

4. The protein content is greater in 100 grams of:
   - A. Legumes
   - B. Milk
   - C. Vegetables

5. The best "healthy fat" is:
   - A. Butter
   - B. Margarine
   - C. Olive oil

(continued)

## Appendix (continued)

5. The energy (and fat) content is greater in 100 grams of:
   - A. Chicken
   - B. Mozzarella
   - C. Eggplant

7. Do eggs contain cholesterol?
   - A. Yes, in the yolk
   - B. Yes, in the white
   - C. No

8. Vegetables, cereals, and fruits are important because they supply:
   - A. Fats
   - B. Fibers
   - C. Carbohydrates

9. Fruits are important because they supply:
   - A. Fats
   - B. Vitamins
   - C. Proteins

10. Which is the main source of calcium?
    - A. Milk and cheese
    - B. Lettuce
    - C. Steak

11. Which is the better source of iron?
    - A. Meat
    - B. Spinach
    - C. Bread

12. In the case of abundant sweating, it is better:
    - A. Drink small amounts of fresh water, at regular intervals
    - B. Drink a great amount of soft saline drinks before the performance
    - C. Drink abundantly only after the end of the physical activity

13. Do you think sparkling mineral water is fattening?
    - A. Yes, it is
    - B. No, it is not
    - C. I do not know

14. Lower energy intake is supplied by a glass of:
    - A. Coca Cola
    - B. Beer
    - C. Sparkling mineral water

15. When do athletes need an extra food ration?
    - A. Always
    - B. Never
    - C. When the performance begins 3 or more hours after the meal

16. Which one of these snacks is the best for the athletes?
    - A. Ice cream
    - B. "Big Mac"
    - C. Chips

17. Does eating a lot of meat increase muscles size?
    - A. Yes, it does
    - B. No, it does not
    - C. I do not know

18. Dietary supplements are useful on:
    - A. Unbalanced diet
    - B. Balanced diet
    - C. Fasting (starvation)

19. How do you correct overweight?
    - A. Sweating a lot
    - B. Fasting all the day
    - C. Lowering the energy intake at meals

20. Which is the first procedure to lose weight?
    - A. Stop drinking water
    - B. Skip meals
    - C. Decrease the consume of pastries, sweetness, oil
Demographic Items

1. Please indicate your gender.
2. Please indicate your age.
3. Please indicate your weight (pounds).
4. Please indicate your height.
5. Please indicate your race (select all that apply).
   A. White
   B. Black or African-American
   C. Hispanic or Latine
   D. Asian/Asian-Islander
   E. Native American or American Indian
   F. Other
6. Please indicate how many years you have been instructing group fitness classes.
   A. Less than 1 year
   B. 1-5 years
   C. 6-10 years
   D. More than 10 years
7. Please indicate how frequently you teach per week (average number of classes per week).
   A. 1-2 classes
   B. 3-4 classes
   C. 5-6 classes
   D. 7-8 classes
   E. 9-10 classes
   F. More than 10 classes
8. Please indicate, on average, how many hours you spend per week exercising on your own personal time (not counting time spent teaching classes).
   A. 0 hours
   B. 1-2 hours
   C. 3-4 hours
   D. 5-6 hours
   E. 7-8 hours
   F. 9-10 hours
   G. More than 10 hours
9. Please list the type(s) of class(es) you teach (i.e. cardio, strength, flexibility).
10. Please state your educational background (college major and degree level).
11. Please indicate any fitness certification you currently have (select all that apply).
    A. American College of Sports Medicine (ACSM)
    B. American Council on Exercise (ACE)
    C. American Fitness Professionals & Associates (AFPA)
    D. Other (please specify)
12. Please comment on what you thought of this questionnaire. Your feedback is greatly appreciated.
APPENDIX G

PERMISSION TO USE INSTRUMENTS
Permission to use the EDS-21

Sarita Aguirre <aguirresarita@gmail.com>  
Mon, Dec 30, 2013 at 10:10 AM

To: hhausen@ju.edu

Good Morning Dr. Hausenblas,

My name is Sarita Aguirre and I am a graduate student studying nutrition at Northern Illinois University. I am currently working on my thesis and would like permission to use the EDS-21 for my study survey. I feel it would greatly enhance my study regarding the health beliefs and behaviors of female group fitness instructors. If you need any more information about my study, please feel free to ask.

Thanks so much, and Happy New Year!

Sarita Aguirre
Nutrition Graduate Student
Northern Illinois University

Hausenblas, Heather <hhausen@ju.edu>  
Sun, Jan 5, 2014 at 6:18 AM

To: Sarita Aguirre <aguirresarita@gmail.com>
Cc: "dsd11@psu.edu" <dsd11@psu.edu>

Dear Sarita,

Thank you for your interest in our scale. Yes, you have our permission to use our EDS-21 in your study. We do ask, however, that you keep us informed of your study progress and any presentations/publications from the study because we are tracking this information.

Best of luck with your research.

Heather Hausenblas, PhD
Associate Professor
College of Health Sciences
Jacksonville University
Phone: 904.256.7975
Email: hhausen@ju.edu
Permission to use the DEQ

2014/1/20 Sarita Aguirre <saguirre2@niu.edu>

Hello Professor Lombardo,

My name is Sarita Aguirre and I am a graduate student studying nutrition at Northern Illinois University in DeKalb, IL (USA). As part of my academic requirements I must write a thesis. I would like to use your DEQ for my study on female group fitness instructors and the incidence of disordered eating and exercise dependence. Your questionnaire would greatly enhance my research and facilitate the process. I would be more than happy to share the results of my study with you if you are interested.

Thank you in advance for your assistance in this matter. Your help is greatly appreciated.

Have a wonderful day,

Sarita Aguirre
Nutrition Graduate Student

Re: DEQ

From: Caterina Lombardo <caterina.lombardo@uniroma1.it>
To: saguirre2@niu.edu
Date: Monday - January 20, 2014 12:31 PM
Subject: Re: DEQ
Attachments: TEXT.htm; EWD_11_03_e188s.pdf; Mime.822

Dear Sarita Aguirre

I'm very pleased to help you in your work.
Attached please find the validation paper of the DEQ that includes the questionnaire.
Feel free to ask any further question.

Best regards

Caterina Lombardo
Professor of Clinical Psychology
Department of Psychology
Sapienza University of Rome
tel. +39 06 49917529
Permission to use Cupisti’s General Nutrition Knowledge Questionnaire

Sarita Aguirre <aguirresarita@gmail.com>  
Mon, Jan 20, 2014 at 10:13 AM

To: acupisti@med.unipi.it

Good Morning Dr. Cupisti,

My name is Sarita Aguirre and I am a graduate student studying nutrition at Northern Illinois University in DeKalb, IL (USA). I recently came across the food and nutrition questionnaire you and your co-authors used in your Nutrition Knowledge and Dietary Composition in Italian Female Athletes and Non-Athletes study, and I think this would be a great tool for my thesis study. I am focusing on the attitudes and beliefs about nutrition, health, and exercise in female group fitness instructors. Your questionnaire would provide some great insight for my research. I am writing to request permission to use your Food and Nutrition Questionnaire - it would be greatly appreciated. I look forward to hearing from you soon.

Thank you very much and have a great day,

Sarita Aguirre

Nutrition Graduate Student

ADAMASCO CUPISTI <adamasco.cupisti@med.unipi.it>  
Mon, Jan 20, 2014 at 1:54 PM

To: Sarita Aguirre <aguirresarita@gmail.com>

Dear,

Sure, you can use our questionnaire! I wish you good luck for your thesis studies

Kind regards

Adamasco Cupisti
Assistant Professor of Nephrology
Department of Clinical and Experimental Medicine
University of Pisa
via Roma 67, 56126 Pisa, Italy
tel, 0039.50.997291
mobile 0039.335.6377876
adamasco.cupisti@med.unipi.it
APPENDIX H

PILOT STUDY EMAIL
Hi Fellow Group Fitness Instructors!

I am working on my thesis and my area of interest is female group fitness instructors employed at college and university recreation centers. I am looking at their exercise and health habits and will be asking them to complete a 15-20 minute online questionnaire. I would like to pilot test the questionnaire I intend to use, and I would GREATLY appreciate it you would all take the time to complete it for me! Your feedback is most appreciated, as I want to make sure this questionnaire is in good shape before I send it to participants elsewhere, so if you find typos, etc, please note them in the comment box at the end of the questionnaire. As I mentioned, the survey is online, and you will find the link below. Just copy and paste it into your browser and it will take you right to the questionnaire. If you have any questions or concerns, please let me know.

Lastly, if you could complete the survey as soon as possible, that would be great!

Thank you so much for your help!

Sarita

Survey Link: https://www.surveymonkey.com/s/female_gfi_pilot

P.S. You will see and option to enter a drawing for a gift card. Unfortunately, this does not apply for the pilot test! So there is no need to send me your contact information.
APPENDIX I

REMINDER EMAIL TO COMPLETE SURVEY
Good Morning!

Once more, I want to thank you and your staff for your help and support with my thesis study. This is the final week that the online questionnaire will be open, so I am writing to kindly ask that you remind your female group fitness instructors to complete the questionnaire if they have not yet done so. Every extra bit of participation is tremendously helpful, so if you would not mind giving a gentle reminder as we cruise through the final week of data collection, I would be most appreciative.

Thank you SO much! As always, any questions or concerns, please let me know.

Have a great day!
APPENDIX J

LIST OF RESOURCES FOR PARTICIPANTS
The following is a list of resources for assistance should you experience any emotional discomfort after completing the online survey:

Purdue University Counseling and Psychological Services, http://www.purdue.edu/caps

Indiana University at Bloomington Counseling and Psychological Services, http://healthcenter/indiana.edu/counseling/

University of Iowa Counseling Service, http://counseling.studentlife.uiowa.edu/

Ohio State University Counseling and Consultation Service, http://www.ccs.ohio-state.edu/

University of Nebraska-Lincoln Counseling and Psychological Services, http://health.unl.edu/counseling-and-psychological-services-caps

University of Wisconsin-Madison Health Services, http://uhs.wisc.edu/services/counseling/

Northwestern University Counseling and Psychological Services, http://northwestern.edu/counseling/

University of Illinois Urbana-Champaign Counseling Center, http://www.counselingcenter.illinois.edu/