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The Relationship Between Disordered Eating Behaviors and Exercise Addiction Among
Selected University Students at Minnesota State University, Mankato

By

Haley M. Wasko

A Thesis Submitted in Partial Fulfillment of the
Requirements of the Degree of
Master of Science
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Minnesota State University, Mankato

Mankato, Minnesota

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The Relationship Between Disordered Eating Behaviors and Exercise Addiction Among
Selected University Students at Minnesota State University, Mankato

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This thesis has been examined and approved by the following members of the thesis
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Abstract

**The Relationship Between Disordered Eating Behaviors and Exercise Addiction
Among Selected University Students at Minnesota State University, Mankato
Wasko, Haley M., *Minnesota State University, Mankato, MN 2012.***

College students are faced with many difficult decisions as they begin to gain independence and adjust to new responsibilities. Some of these decisions may include changes in eating behaviors and exercise patterns. Such changes may lead to unhealthy weight control behaviors such as disordered eating or excessive exercise. The combination of controlling eating and exercise behaviors may be especially detrimental and prevalent in college students. The purpose of this research was to determine whether or not there was a relationship between disordered eating and exercise addiction among university students at Minnesota State University, Mankato. A 50-item survey was used to assess the prevalence of disordered eating behaviors and exercise addiction patterns among undergraduate college students. The survey was administered via email to a random sample of 2,947 undergraduate students attending a mid-sized Midwestern public university. This study examined undergraduate students between the ages of 18-25 years with a mean age was 20.68 years. Data indicated a relationship between disordered eating and exercise addiction in both genders which indicated that females and males are exhibiting these weight control behaviors and should be of concern to health educators. In order to establish a greater understanding of the risk factors associated and reduce the prevalence of such unhealthy weight control behaviors, there is a need for additional research in this area.

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Chapter One: Introduction

Introduction

Disordered eating practices in college students represent a common, yet often overlooked behavior in our society. The terms “disordered eating” and “eating disorder,” while often used synonymously, are very different and require separate definitions (Bryla, 2003). The term “eating disorder” indicates a clinically diagnosable disease and regularly involves serious disturbances in eating behaviors that often require medical intervention, whereas the term “disordered eating” refers to a pattern of abnormal eating behaviors that may ultimately lead to an eating disorder (Bryla, 2003). Due to society’s unfamiliarity with the symptoms and consequences of disordered eating, there is unreliable instrumentation to assess this behavior.

While the etiology of disordered eating remains to be adequately addressed, some signs of disordered eating include: not eating when one is hungry, eating when one is not hungry, skipping meals, eating too little or too much at one time, avoiding certain foods or categories of food, then eating large quantities of these foods, hiding eating from others, feeling guilt after eating, and excessive preoccupation with food and weight (Bryla, 2003). Disordered eating can be difficult to assess because there is a lack of easily distinguishable symptoms. The sensitive nature of disordered eating practices may also compromise self-report. This lack of reliable and valid information results in an unsound identification of disordered eating etiology and consequently an absence of treatment options (Basow, Foran, & Bookwala, 2007).

The college years have been identified as a time when most students experience large changes in their eating behaviors, body image and weight (Basow et al., 2007). Due to the high incidence of eating problems in college students, it is not unreasonable to suspect that an even larger number of college students experience concerns about eating behaviors and exercise patterns (Bryla, 2003). Concerns about weight and body image play a major role as an initial predictor in body image dissatisfaction, disordered eating patterns and possibly even eating disorders (Bryla, 2003). While this life adjustment may be a risk factor in disordered eating, there are many other risk factors that contribute to disordered eating behaviors. These factors include behavioral, social, psychological and environmental risk factors such as gender, socioeconomic status, personality factors, and family (Thatcher & Rhea, 2003).

While disordered eating increases the risk for developing an eating disorder, it can also result in other frequently reported negative consequences such as poorer eating habits, nutritional deficiencies, difficulty in future weight loss and maintenance as a result of weight cycling, and increased binge eating patterns following restrained eating (Neumark-Sztainer, Butler, & Palti, 1995; Toray & Cooley, 1997). For individuals who feel the pressure to conform to an “ideal” body image, intense exercise and eating disordered behaviors are frequently adopted in efforts to gain a greater sense of weight control. Individuals who experience disordered eating and/or exercise addiction use eating and exercise as a control mechanism for managing their weight or manipulating their psychological state, yet they are being controlled by the activity (Gapin, Etnier & Tucker, 2009). This distorted mental state can be detrimental both physically and psychologically and actually may contribute to additional serious conditions such as

obsessive compulsive disorder, depression, panic disorders and anxiety (Cockerill & Riddington, 1996).

Overall, exercise is recognized as an important part of maintaining both physical and psychological well-being (Cockerill & Riddington, 1996). Although exercise is widely known as a positive pastime, individuals who exercise excessively have the potential to inflict both physical and mental damage to their bodies. As previously stated, the sense of control that comes from exercise may drive some individuals to not only participate in exercise, but use it as a tool to closely regulate their appearance. Exercise carried out in such excess could be considered harmful and may even merit treatment (Terry, Attila, & Griffiths, 2004). This excessive exercise as a means of unhealthy weight control could potentially develop into an exercise addiction.

Addictive behaviors are complex and difficult to define. In the past, definitions of addiction were limited to drug and alcohol addiction (Terry et al., 2004). Recently, however, exercise addiction has been a topic of discussion among professionals because excessive exercise in some individuals can trigger severe negative consequences (Terry et al., 2004). Szabo (1995) suggested that addicted exercisers experience more powerful withdrawal or deprivation symptoms than do those who are just committed to an exercise regimen. This indicates that there may be not only physical negative consequences but also negative psychological consequences when an individual engages in too much exercise.

Statement of the Problem

Disordered eating may lead to short-term distress as well as long-term physical consequences among college students. Many college students and health professionals often remain unaware of the symptoms and dangers associated with disordered eating. Together these factors create a dangerous state of silence regarding disordered eating. Without proper identification and awareness of disordered eating, these harmful practices could lead to a life-long struggle with a full scale eating disorder.

Although normally acknowledged as a healthy habit, exercise also has the potential to become an unhealthy obsession. It is important to obtain a greater understanding of the prevalence of exercise addiction among college students and why some individuals become dependent on exercise while others may engage in similar amounts of activity without any pathological consequences. Determining the line between healthy committed exercisers and unhealthy “at risk” exercisers is important and could potentially reduce the patterns that detrimentally alter their physical, mental, financial and social lifestyle (Terry et al., 2004).

Purpose of the Study

This study’s purpose was to determine whether there was a relationship between disordered eating behavior and exercise addiction among selected college students at Minnesota State University, Mankato. By investigating the prevalence of disordered eating practices and the possible relationship with exercise addiction, health educators may effectively reduce the potential harmful overlap of the two disordered behaviors.

This can be accomplished by educating the population about the consequences of disordered eating and exercise addiction practices.

Significance of the Problem

Eating disorders and their precursors, such as disordered eating, affect millions of women and men in the United States each year (National Eating Disorder Association, 2005). Researchers found that 56% of women and 43% of men disliked their overall appearance (Basow et al., 2007). Although the relationship between distorted body image, body dissatisfaction and disordered eating is publicized predominantly among females, millions of men also struggle with body image issues. In the United States, as many as 10 million females and 1 million males are struggling with an eating disorder such as Anorexia Nervosa or Bulimia Nervosa, while millions more are struggling with Binge Eating Disorder and disordered eating (Basow et al., 2007). The majority of individuals with severe eating disorders do not receive adequate care (National Eating Disorder Association, 2005) and men are less likely to seek treatment for disordered eating or an eating disorder because of the perception that these are “women’s diseases” (American Psychiatric Association, 2000).

Although both men and women can suffer from this disordered eating behavior, they experience different age onsets and prevalence of the disordered behavior. A recent study of clinical populations determined that men were more likely than women to have a later onset of eating disorders (20.6 years vs. 17.2 years, respectively) (Braun, Sunday, Huang, & Halmi, 1999). Additionally, researchers found that men constituted an increasing percentage of eating disorder admissions between 1984 and 1997, suggesting

that eating problems may be increasing among young men (Braun et al., 1999). Therefore, it is essential to study disordered eating in both men and women alike.

As previously stated, the occurrence, determinants and associated health effects of disordered eating and eating disorders are not confined solely to females. According to results from the National Comorbidity Replication Survey of United States for Adults, the lifetime prevalence of Anorexia Nervosa, Bulimia Nervosa and Binge Eating Disorder was 0.9%, 1.5% and 3.5%, respectively, for females and 0.3%, 0.5% and 2.0%, respectively for males (Hudson, Hiripi, Pope, & Kessler, 2007). Although these prevalence rates seem relatively low, researchers have speculated that much of disordered eating behavior is conceivably underestimated (Pettit, Jacobs, Page, & Porras, 2010) due to the lack of reliable and valid information surrounding disordered eating and treatment options.

Disordered eating includes a wide range of eating behaviors that can eventually lead to more serious eating disorders such as Anorexia Nervosa, Bulimia Nervosa and Binge Eating Disorder (Budd, 2007). Although disordered eating behaviors do not necessarily meet the psychiatric criteria for an eating disorder diagnosis, early identification and treatment of disordered eating may prevent the progression of the condition, relapse and co-morbid consequences (Hudson et al., 2007).

Current data on the prevalence of exercise addiction are minimal, but it is speculated that exercise addiction affects approximately 1-3% of the population (Terry et al., 2004). Although many terms are used to describe this occurrence, such as excessive exercise, obligatory exercise and exercise dependence, the key commonalities of this

group of individuals include low self-esteem and use of exercise as a means of weight reduction and control (Gapin et al., 2009). Individuals who experience exercise addiction often don't realize that they are controlled by such activity, yet they are engaging in exercise as a means of managing and/or manipulating their psychological state (Gapin et al., 2009). This intense commitment to exercise can actually increase body dissatisfaction and make individuals more vulnerable to serious and long-lasting injuries related to overtraining (Cockerill & Riddington, 1996; Gapin et al., 2009). Currently, exercise addiction is not included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as its own category (American Psychiatric Association, 2000); but is included as one of the criteria for the eating disorder Bulimia Nervosa, along with other compensatory behaviors used to prevent weight gain.

It would be beneficial to know if there is a relationship between disordered eating behavior and exercise addiction for prevention education, practical uses in wellness programs and clinical settings for treatment. Health educators could educate the young population about these weight control behaviors in efforts to reduce the potential harmful overlap of these unhealthy weight control behaviors and their negative consequences. This information could lay the ground work for preventative care and disorder management.

Research Questions

This study is based on the following research questions:

1. What is the prevalence of disordered eating behaviors among female students at Minnesota State University, Mankato?

2. What is the prevalence of disordered eating behaviors among male students at Minnesota State University, Mankato?
3. Is there a relationship between disordered eating behaviors and gender among students at Minnesota State University, Mankato?
4. What is the prevalence of exercise addiction among female students at Minnesota State University, Mankato?
5. What is the prevalence of exercise addiction patterns among male students at Minnesota State University, Mankato?
6. Is there a relationship between exercise addiction patterns and gender among students at Minnesota State University, Mankato?
7. Is there a relationship between disordered eating and exercise addiction among female students at Minnesota State University, Mankato?
8. Is there a relationship between disordered eating and exercise addiction among male students at Minnesota State University, Mankato?

Limitations

The following are limitations of this study:

1. Participants may be reluctant to respond to survey questions which may limit the number of valid and completed surveys.
2. The research study used quantitative measurements which required participants to answer with options provided by the researcher.
3. Participants may not answer truthfully due to the sensitive nature of the survey questions.

4. The survey was completed primarily by Caucasian respondents and results may not be generalized to a larger, more diverse population.

Delimitations

The following are delimitations of this study:

1. This study was restricted to students attending a public university in the Midwestern region; results may not accurately generalize to all university students.
2. The electronic survey was available to participants for only one week.

Assumptions

The following are assumptions of the study:

1. Participants clearly understood the survey questions
2. Participants answered the survey questions honestly.
3. Research suggests the prevalence of disordered eating behaviors and exercise addiction patterns among students at Minnesota State University, Mankato.

Definition of terms

The following are definitions of the terms used in this study:

1. Anorexia Nervosa- An intense and irrational fear of body fat and weight gain. Anorexia nervosa is an eating disorder that causes people to obsess about their weight and the food they eat. Normally those who suffer from anorexia nervosa

have a misperception of body weight and shape to the extent that they may have a distorted body image (Shisslak, Crago, & Estes, 1995).

2. **Binge Eating Disorder-** Binge eating disorder is also called compulsive over-eating, and is characterized primarily by periods of continuous eating (Shisslak et al., 1995). Binge eating involves eating large amounts of food in a specific time period while usually feeling a lack of control over eating during the binge (Shisslak et al., 1995). Although there is no purging, there may be sporadic fasts or repetitive diets to maintain a normal weight. Weight can range from normal weight to severe obesity (Shisslak et al., 1995).
3. **Body Dissatisfaction-** Body dissatisfaction is defined as dissatisfaction with one's own body and outer appearance. This may lead to skipping meals or a cycle of dieting, losing weight or gaining weight.
4. **Body Image-** Body image is defined as one's attitude towards size, shape, and perceptual beauty of his or her body (Stevkovski, 2009).
5. **Bulimia Nervosa Disorder-** Bulimia nervosa is a potentially life-threatening disorder when one may binge and purge, consuming a large amount of food in a rapid, automatic, and helpless fashion and then trying to get rid of the calories in an unhealthy manner (Shisslak et al., 1995). Ridding the body of the calories is usually induced vomiting, excessive exercising or laxative and diuretics use (Shisslak et al., 1995).
6. **Disordered Eating-** Disordered eating is an abnormal eating pattern, ranging from less extreme to extreme behaviors. Disordered eating includes a collection of

interrelated eating habits, weight management practices, attitudes about food, weight and body shape, and psychological imbalances (Bryla, 2003).

7. Eating Disorders- Eating disorders are a group of serious conditions in which the individual is so preoccupied with food and weight. The main types of eating disorders are Anorexia Nervosa, Bulimia Nervosa and Binge-Eating Disorder (Bryla, 2003). There is also a category of Eating disorder Not Otherwise Specified (EDNOS) which includes disordered eating behaviors and is shown to be prevalent among college students (American Psychiatric Association, 2000).
8. Exercise addiction patterns- Exercise addiction includes a pattern of exercise once or more daily, along with a priority for exercise over other activities, increased tolerance for exercise over time, withdrawal symptoms including mood changes, conflicts among family members and/or partners about the amount of exercise one engages in, avoidance of withdrawal symptoms by further exercise, subjective awareness of a compulsion to exercise and/or rapid reinstatement of excessive exercise after a period of abstinence (De Coverley Veale, 1987).
9. Weight control behaviors- Behaviors that are carried out in efforts to closely control body weight and shape which includes disordered eating behaviors and exercise addiction.

Chapter Two: Review of Literature

Introduction

Balancing healthy eating behaviors and an exercise regimen can be difficult, especially during the college years. Students gain independence and begin to adjust to responsibilities during this time. College students may tend to become overly concerned with body image and focus on appearance. This drive for a “perfect” body may lead to disordered eating behaviors, meaning they have some characteristics of eating disorders but they do not meet the DSM-IV (American Psychiatric Association, 2000) criteria for Anorexia Nervosa, Bulimia, or Binge Eating Disorder (Budd, 2007). Precise definitions of the terms associated with disordered eating are not often specified in the literature but experts (Bryla, 2003; Gleaves, Brown, & Warren, 2004; Pritchard, 2008) describe them as maladaptive and unhealthy behaviors centering around body image dissatisfaction, restrained eating, binge eating, fear of being fat, and compensatory behaviors intended to reduce or control weight. Individuals with disordered eating pathology are often affected less severely or engage in the disordered behavior less frequently than someone with a diagnosed eating disorder but should not be overlooked due to the fact that these disordered behaviors can lead to a more severe clinically diagnosable eating disorder.

Weight control practices are not confined solely to eating behaviors. Exercise patterns may also be of concern as college students strive for perfection. Normally exercise is considered both physically and psychologically beneficial to health (Terry et al., 2004). However, some individuals may exercise without limits and to damaging

degrees which indicates that exercise, in some cases, can be considered harmful. It is important to determine the line between healthy committed exercise, and unhealthy “at risk” exercisers because individuals addicted to exercise engage in workouts that detrimentally alter their lifestyle, causing physical, mental, emotional, financial, medical and social problems (Terry et al., 2004).

This chapter will review literature focusing on recommended healthy lifestyle behaviors, disordered eating behaviors, eating disorder diagnoses and exercise addiction patterns among college students.

Healthy Lifestyle Behaviors

Healthy eating is essential for achieving and sustaining a healthy weight. The total number of calories a person needs each day varies depending on multiple factors, including the person’s age, gender, height, weight, and level of physical activity (United States Department of Agriculture, 2010). Depending on age and physical activity level, calorie estimates range from 1,600 to 2,400 calories per day for adult women and 2,000 to 3,000 calories per day for adult men (United States Department of Agriculture, 2010). It is suggested to stay on the low end of the calorie range for sedentary individuals, and the high end of the caloric range is recommended for active individuals (United States Department of Agriculture, 2010). These are only estimates, and determination of individual calorie needs can be aided with online tools such as those available at *ChooseMyPlate.gov* (United States Department of Agriculture, 2010).

Although exercise is not always a priority in college students’ day-to-day activities, adults who are physically active are healthier and less likely to develop chronic

diseases (United States Department of Health and Human Services, 2008). Adults gain these benefits when they do the equivalent of at least 150 minutes of moderate intensity aerobic activity each week (United States Department of Health and Human Services, 2008). They may even gain additional health and fitness benefits when they engage in even more physical activity and weight training. Though current research does not identify an upper limit of total activity, it does recognize harmful physical and physiological effects when preoccupation with exercise is present. This increased activity could potentially begin an unhealthy relationship with exercise.

Disordered Eating

College is often a time when individuals experience both physical and psychological changes. Students experience significant changes in eating behavior and may become immersed in social settings that focus on appearance and performance (Patrick & Stahl, 2009). This pressure to conform to the “ideal” body shape is often obtained through unhealthy measures (Pritchard, 2008). These unhealthy weight reduction practices may include serious disturbances in eating patterns which can lead to disordered eating or a diagnosed eating disorder. The terms “disordered eating” and “eating disorders,” while often used synonymously, are very different and require separate explanations (Bryla, 2003). The term “eating disorder” indicates a clinically diagnosable disease and often involves serious disturbances in eating behaviors that require medical intervention (Bryla, 2003). The term “disordered eating” refers to a pattern of abnormal eating behaviors that may ultimately lead to an eating disorder. Precise definitions of disordered eating are often not comprehensive but have been described as serious disturbances in eating behaviors which may include extreme

reduction of food intake, severe overeating, feelings of distress, or concern about body weight or shape (National Institute of Mental Health, 2001).

Individuals with disordered eating pathology are affected less severely or engage in the disordered behavior less frequently than someone with a diagnosed eating disorder. However, such individuals should not be overlooked because these disordered behaviors can lead to a more severe clinically diagnosed eating disorder. Because eating disorders are often reported in a clinical setting, health professionals tend to better understand the determinants and prevalence of eating disorders as compared to disordered eating behaviors (Chavez & Insel, 2007). Although many risk factors that contribute to disordered eating behaviors are known, it is essential to understand the factors that most closely affect the behavior in an effort to better understand it. Some factors that may influence disordered eating include behavioral, social, psychological and environmental risk factors such as gender, socioeconomic status, personality factors, and family (Thatcher & Rhea, 2003).

Most eating disorders and their precursors have their onset in late adolescence and emerging adulthood but may continue or recur at any point across the life span (Chavez & Insel, 2007; Striegel-Moore & Bulik, 2007). In a survey by Mitz and Betz, 1988, as many as 61% of female college students reported some type of disordered eating behavior. Although disordered eating is commonly thought of as only affecting females, a substantial number of men suffer the same symptoms as women (Stevkovski, 2009). In a study by O'Dea and Abraham (2002), as many as 25% of male college students reported they worry about their shape and weight and 23% had suffered from disordered eating and reported weight control problems. Individuals who take part in disordered eating

behaviors face a several times greater risk for developing a clinically diagnosed eating disorder than their non-disordered eating counterparts (Bryla, 2003). Therefore, it is imperative to understand the prevalence, risk factors and consequences associated with disordered eating for development of effective disordered eating prevention programs.

In addition to an increased risk for developing eating disorders, disordered eating behaviors can result in other frequently reported physical and psychological symptoms (Bryla, 2003). These may include poor eating habits and nutritional intake, which can result in difficulties in future healthy weight maintenance (Bryla, 2004; Toray & Cooley, 1997). Garner and Wooley (1991) found that physical risks associated with weight fluctuations are comparable to the risk factors of obesity (Garner & Wooley, 1991). These negative risk factors include elevated blood pressure, increased cholesterol, increased risk for heart disease, stroke, and diabetes, among other weight related difficulties (Mayo Clinic, 2012). Women and men who engage in disordered eating behaviors could also potentially develop vitamin and mineral deficiencies, among other more severe complications (Bryla, 2003).

Eating Disorders

Anorexia Nervosa and Bulimia Nervosa are the two most common eating disorders, according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-4th Edition- Text Revised) (American Psychiatric Association, 2000). Individuals who do not meet the diagnostic requirements of the strict criteria for either Anorexia or Bulimia Nervosa, but who have significant concerns about eating and body image fall into the category of eating disorders known as an Eating Disorder Not Otherwise Specified

(EDNOS) (American Psychiatric Association , 2000). This category has been shown in some studies to have the highest death rates of any eating disorder category because it encompasses such a wide range of eating disturbances (National Association of Anorexia Nervosa and Associated Disorders, Inc., 2012).

According to the DSM-IV, body image disturbance is the most common clinical feature of Anorexia Nervosa (American Psychiatric Association, 2000). Anorexia Nervosa is characterized by maintaining minimally normal body weight, intense fear of gaining weight, and significant disturbance in perception of body shape or size. To prevent weight gain or to lose weight, individuals with Anorexia Nervosa may starve themselves and/or exercise excessively. Anorexia Nervosa has the highest mortality rate of all psychological disorders (Shisslak et al., 1995). Bulimia Nervosa was identified as a separate syndrome from Anorexia Nervosa and characterized as recurrent episodes of binge-eating and inappropriate compensatory actions taken to prevent weight gain (e.g., purging, using laxatives) (American Psychiatric Association, 2000). Body image disturbances have been found to be one of the most dominant potential risk factors for development and maintenance of eating issues in both males and females (Stice & Whitenton, 2002).

Eating disturbances occur from mild dietary preoccupations to concerns about body weight and shape to extreme weight-control methods (e.g., fasting, purging, excessive exercise, binge-eating) and can develop into a full-scale eating disorder (Gleaves et al., 2004; Williamson, Gleaves, & Stewert, 2005). Eating disturbances might vary by severity and symptoms from fear of fatness and/or compensatory behaviors to an intense drive for thinness (Williamson et al., 2005). Although more is known about

Anorexia Nervosa and Bulimia Nervosa, Eating disorder Not Otherwise Specified (EDNOS) includes disordered eating behaviors and is shown to be prevalent among college students (American Psychiatric Association, 2000; Thomas, Vartanian, & Brownell, 2009).

Eating disorders can cause serious physical problems, and at their most severe can even be life-threatening. The majority of individuals with diagnosed eating disorders are females, but males can also suffer from eating disorders just alike. Treatments for eating disorders usually involve nutrition education, psychotherapy, family counseling, medications and/or hospitalization (Bryla, 2003).

Exercise Addiction

Although much is known about the positive effects of exercise on physical and psychological well-being, there is less evidence on the negative effects of exercise addiction and its associated disorders (Cockerill & Riddington, 1996). For some individuals, habitual exercise patterns can become maladaptive and may contribute to the development of excessive exercise patterns and exercise addiction (Gapin et al., 2009). Addiction has been defined as “any compulsive activity or involvement which decreases a person’s ability to deal with other aspects of his or her life to the point where the activity or involvement compromises the dominant source of emotional reinforcement and identity for the person” (Gapin et al., 2009).

Although the diagnostic factors have yet to be determined, De Coverley Veale (1987) proposed diagnostic criteria for exercise addiction. These factors include a stereotyped pattern of exercise once or more daily, priority for exercise over other

activities, increased tolerance for exercise, withdrawal symptoms including mood changes, avoidance of withdrawal symptoms by further exercise, subjective awareness of a compulsion to exercise and/or rapid reinstatement of excessive exercise after a period of abstinence.

Although exercise addiction is shown to have multiple negative effects on physical and psychological states, a major finding by Steffen and Brehm (1999) concluded that it is not the *amount* of exercise but rather the negative emotionality associated with the exercise activity that may link exercise and eating disorders. In other words, it is the attitude of the exerciser toward the exercise that may be the key to linking problematic exercise to disordered eating behaviors.

Summary

Exercise addiction and disordered eating behaviors impact the health and well-being of students and their families. These unhealthy weight control behaviors are serious and may cause harmful distress to those who engage in them. While these disordered behaviors are often overlooked by society, it is essential to determine the commonness of these disordered behaviors in order to reduce the prevalence of them. Disordered eating behaviors and excessive exercise patterns can detrimentally alter an individual's lifestyle, causing physical, mental, emotional, financial, medical and social problems.

Chapter Three: Methodology

Introduction

College students are faced with many difficult decisions as they begin to gain independence and adjust to new responsibilities. Some of these decisions may include changes in eating behaviors and exercise patterns. Such changes may lead to unhealthy weight control behaviors such as disordered eating or excessive exercise (Greenleaf, Petrie, Carter & Reel, 2009). It has been suggested that there may be a relationship between exercise addiction and disordered eating (Ackard, Brehm, & Steffen, 2002). The combination of controlling eating and exercise behaviors may be especially detrimental because there are many known negative effects of these weight control measures, especially in developing young adults, which can have life-long implications (Bryla, 2003).

This chapter describes the research design, instrumentation, participant selection, data collection, and data analysis of this study. The purpose of this study was to determine whether there was a relationship between disordered eating behavior and exercise addiction among selected college students at Minnesota State University, Mankato.

Description of Research Design

This study was implemented by the means of non-experimental, quantitative research methods to obtain information regarding disordered eating behaviors and

exercise addiction patterns. Two questionnaires were used to determine disordered eating behaviors, exercise addiction behaviors and a possible relationship between these variables in a selected group of undergraduate college students. Undergraduate students in a mid-sized university were asked to complete the voluntary questionnaire in effort to answer the following questions:

1. What is the prevalence of disordered eating behaviors among female students at Minnesota State University, Mankato?
2. What is the prevalence of disordered eating behaviors among male students at Minnesota State University, Mankato?
3. Is there a relationship between disordered eating behaviors and gender among students at Minnesota State University, Mankato?
4. What is the prevalence of exercise addiction among female students at Minnesota State University, Mankato?
5. What is the prevalence of exercise addiction patterns among male students at Minnesota State University, Mankato?
6. Is there a relationship between exercise addiction patterns and gender among students at Minnesota State University, Mankato?
7. Is there a relationship between disordered eating and exercise addiction among female students at Minnesota State University, Mankato?
8. Is there a relationship between disordered eating and exercise addiction among male students at Minnesota State University, Mankato?

Instrumentation

Data were collected by using the Eating Attitudes Test-40 (Garner & Garfinkel, 1979) and the Exercise Addiction Inventory (Terry et al., 2004). The Eating Attitudes Test measured a broad range of behaviors and attitudes characteristic of an eating disorder and their precursors. The Exercise Addiction Inventory measured occurrence of exercise addiction. The survey questions were evaluated by the thesis faculty committee, a university student, and the associate professor and chair of the health science department for content validity ($n = 5$).

The questionnaire consisted of three sections which focused on different topics. The first section included four (4) questions which measured participants' demographic characteristics. The second section consisted of six (6) statements from the Exercise Addiction Inventory (EAI) (Terry et al., 2004) to be answered on a Likert scale with five response options ranging from "strongly disagree" to "strongly agree". This section of the questionnaire measured six behavioral components of addiction: salience, mood modification, tolerance, withdrawal symptoms, conflict and relapse. The internal reliability of the Exercise Addiction Inventory (EAI) (Terry et al., 2004) is strong ($r = 0.84$). The inventory also shows excellent concurrent validity when compared with the Obligatory Exercise Questionnaire (Thompson & Pasman, 1991) and the Exercise Dependence Scale (Hausenblas & Symons Downs, 2002), two psychometrically sound tools.

The third section of the questionnaire consisted of forty (40) questions of the Eating Attitudes Test-40 (EAT-40) (Garner & Garfinkel, 1979) that measured a broad

range of behaviors and attitudes characteristic of an eating disorder and its precursors. The questions were based on a 6 point Likert scale with response options ranging from “always” to “never”. Please see Appendix C for a copy of the questionnaire used. The Eating Attitudes Test (EAT-40) (Garner & Garfinkel, 1979) has excellent internal consistency, with a coefficient alpha of .94 for a combined sample of those with eating disorders and those that exhibit normal eating behaviors. A 23-item prototype of this instrument was tested for known group validity. Scores differed significantly for a sample of those with eating disorders and “normal’s”. This finding was replicated in a separate sample. The EAT-40 was shown to be independent of the restraint scale, weight fluctuation, extraversion, and neuroticism. Post-hoc analysis of a group of recovered eating disordered individuals indicated that scores were in the normal range, suggesting the scale is sensitive to change.

An abbreviated 26-item version of the EAT (EAT-26) was proposed, based on a factor analysis of the original scale (EAT-40) (Garner, Olmsted, Bohr, & Garkinkel, 1982). The EAT-26 is highly correlated with the EAT-40 ($r = 0.98$) and the three factors from subscales which are meaningfully related to bulimia, weight, body-image variables and psychological symptoms (Garner et al., 1982). It was concluded that the 14 items eliminated from EAT-40 were redundant and did not increase the scales predictive power (Garner et al., 1982). The EAT- 26 is the most widely used standardized measure of symptoms and concerns characteristic of eating disorders (Garner & Garfinkel, 1979; Garner et al., 1982). Therefore the EAT-26 scoring criteria were used for data analysis.

Participant Selection

Prior to data collection, approval from the Minnesota State University, Mankato, MN Institutional Review Board was obtained (see Appendix A). A random sample of 2,947 undergraduate students was selected by Information Technology Services (ITS) from a mid-sized public university. The survey was developed using Zoomerang™, a professional online survey software system (see Appendix C). Zoomerang™ helps to design, plan, and implement the survey to the intended population.

Data Collection

An email was sent out February 1, 2012 inviting the randomly selected undergraduate students to voluntarily participate in the research by completing the online questionnaire. Participants were required to be 18 years of age or older to participate in the research. The purpose of the study, potential risks of the participants, and the rights of the participants were stated immediately following the age requirement statement. The participants were informed that all the information collected from the survey would remain confidential and that they had the right to exit the survey at any time (see Appendix B). After the introduction and description of the survey's purpose, a web address was provided for the students to access the survey online. The email instructed students to access the survey in order to participate in the study. Prior to the first question of the survey, students were reminded that their participation was voluntary and they could withdraw from the survey at any time.

A reminder email was sent out February 7, 2012 to all participants who had not completed the questionnaire by day seven. The survey then closed on the evening of

February 8, 2012. Results obtained by 493 completed Zoomerang™ questionnaires and 25 partially completed Zoomerang™ questionnaires were sent to the researcher in anonymous, comprehensive form to maintain confidentiality.

Data Analysis

Data were collected between February 1, 2012 and February 8, 2012. The findings were quantitatively analyzed using the results of the survey provided. Data were entered into an SPSS™ spreadsheet for analyses. The statistical procedures employed for the analysis of the data included: descriptive statistics and Chi-Square. Descriptive statistics were used to produce summary statistics for the demographic information and the scales utilized in the investigation. Chi-square analyses were used to analyze a potential relationship between disordered eating behaviors and gender as well as a potential relationship between disordered eating behaviors and exercise addiction among college students.

Chapter Four: Results and Discussion

Introduction

The purpose of this research was to determine whether or not there was a relationship between disordered eating and exercise addiction among university students at Minnesota State University, Mankato. Data for this study were collected through Zoomerang™, a professional online survey software system. A 50-item survey was used to assess the prevalence of disordered eating behaviors and exercise addiction patterns among undergraduate college students. The survey was administered via email, to a random sample of 2,947 undergraduate students attending a mid-sized Midwestern public university. This chapter discusses results obtained from the quantitative analysis of data, and the findings are organized in correspondence to each research question. When reporting results, a valid percent was used to account for missing cases.

The questions related to exercise addiction were measured by the exercise addiction inventory (EAI) (Terry et al., 2004). The EAI cut-off score for individuals considered at-risk for exercise addiction was 24. High scores were considered most problematic for individuals. A score of 13-23 was chosen to be indicative of a symptomatic individual and a score of 0-12 was deemed to indicate an asymptomatic individual. The questions were answered on a Likert scale with five response options ranging from “strongly disagree” to “strongly agree”.

The questions related to disordered eating were measured by the EAT-40 (Garner & Garfinkel, 1979). The results were scored according to the abbreviated EAT-26

(Garner et al, 1982). A score of 20 or higher indicated that the individual had a high-level of concern about dieting, body weight or problematic eating behaviors and should seek advice from a qualified mental health professional that has experience with treating disordered eating and eating disorders. High scores on self-report measures do not necessarily mean the respondent has an eating disorder, but do denote concerns regarding body, weight, body image and eating. Consequently, low scores should not be interpreted to mean that either clinically significant eating disorders symptoms or a form eating disorder is not present. A 6 point Likert scale was used to measure the EAT-40 with response options ranging from “always” to “never”. The scoring system for EAT-26 was coded for questions 1-25; 1=3, 2=2, 3=1, 4=0, 5=0, and 6=0. Question 26 was coded as follows; 1=0, 2=0, 3=0, 4=1, 5=2, and 6=3.

Demographic Results

The demographic results of this research are presented in Table 1. The study sample consisted of (518) students. However, sixteen ($n = 16$) cases were removed since they only provided demographic characteristics. Also, in an effort to study behaviors and prevalence among “traditional college students”, participants under the age of 18, or over the age of 25 were removed from this research ($n = 108$). This provided an adjusted rate response of ($n = 394$) participants to be analyzed. Undergraduate participants ($n = 394$) that were analyzed for this survey are presented in Table 1, and of the sample, 71.9% were female ($n = 281$) and 28.1% were male ($n = 110$). The mean age of participants was 20.68 years old ($SD = 1.90$), with a range of seven (18-25) years of age.

Table 1

Demographic Characteristics of the Undergraduate Students

Characteristic	<i>n</i>	%	M (SD)
Gender	391		
Male	110	28.1	
Female	281	71.9	
Age	394		20.68 (1.90)
18	53	13.5	
19	75	19.0	
20	64	16.2	
21	71	18.0	
22	68	17.3	
23	25	6.3	
24	23	5.8	
25	15	3.8	
Ethnicity	393		
Caucasian	343	87.3	
African American	9	2.3	
Asian or Pacific Islander	10	2.5	
Hispanic or Latino	18	4.6	
American Indian/Alaskan Native	1	0.3	
Year in School	393		
Freshman	93	23.7	
Sophomore	74	18.8	
Junior	76	19.3	
Senior	72	18.3	
5 th year Undergraduate or More	43	10.9	

The ethnicity distribution of this sample was comprised of 87.3% Caucasian ($n = 343$), 2.3% African American ($n = 9$), 2.5% Asian or Pacific Islander ($n = 10$), 4.6% Hispanic or Latino ($n = 18$), and 0.3% American Indian or Alaskan Native ($n = 1$). Among the participants 23.7% of the participants were enrolled as freshmen in college ($n = 93$), 18.8% were sophomores ($n = 74$), 19.3% were juniors ($n = 76$), 18.3% were seniors ($n = 72$), and 10.9% were 5th year or more undergraduate students ($n = 43$).

Findings Related to Research Questions

The following section describes the results of the study related to the research questions.

Research Question 1: What is the prevalence of disordered eating behaviors among female college students at Minnesota State University, Mankato? Participants were asked a variety of forty (40) questions related to disordered eating behaviors in efforts to answer research question one (survey questions 11-50). The frequency distributions (n), percentages (%), and chi-square values for disordered eating by gender are presented in Table 2. Of the 230 total females who answered the questions related to disordered eating behavior, 84.3% ($n = 194$) did not meet the criteria for exhibiting symptoms of disordered eating behavior. However, 15.7 % ($n = 36$) did meet a score of 20 or higher indicating that they have a high-level of concern about dieting, body weight or problematic eating behaviors and should seek advice from a qualified mental health professional that has experience with treating disordered eating and eating disorders.

Table 2

Frequency Distributions (n), Percentages (%), and Chi-Square Values for Crosstabulations of Disordered Eating by Gender

Disordered Eating	Gender			
	Female		Male	
	<i>n</i>	%	<i>n</i>	%
Yes	36	15.7	10	11.6
No	194	84.3	76	88.4
Total	230	100.0	86	100.0
$\chi^2 = 0.82$				

Research Question 2: What is the prevalence of disordered eating behaviors among male college students at Minnesota State University, Mankato? Participants were asked a variety of forty (40) questions related to disordered eating in an effort to answer research question two (survey questions 11-50). The frequency and prevalence of disordered eating among male college students are presented in Table 2. Of the 86 total males who answered the questions related to disordered eating behavior, 88.4% ($n = 76$) did not meet the criteria for the cut off score for exhibiting symptoms of disordered eating behavior (see Table 2). However, 11.6% ($n = 10$) did meet a score of 20 or higher indicating that they have a high-level of concern about dieting, body weight or problematic eating behaviors and should seek advice from a qualified mental health professional that has experience with treating disordered eating and eating disorders.

Research Question 3: Is there a relationship between disordered eating behaviors and gender among college students at Minnesota State University,

Mankato? Participants were asked a variety of forty (40) questions related to disordered eating in an effort to answer research question three (survey questions 11-50). The frequency distributions (n), percentages (%), and chi-square values for disordered eating by gender are presented in Table 2. A chi-square analysis was conducted using SPSS to analyze a potential relationship between disordered eating behaviors and gender among college students. The results were not significant ($\chi^2 = 0.82, p > .05$) indicating there was not a significant relationship between disordered eating behaviors and gender among college students at Minnesota State University, Mankato (see Table 2).

Research Question 4: What is the prevalence of exercise addiction among female college students at Minnesota State University, Mankato? The frequency distributions (n), percentages (%), and chi-square values for exercise addiction by gender are presented in Table 3. Participants were asked six (6) questions related to exercise addiction in an effort to answer research question four (survey questions 5-10). Of the 272 total females who answered the questions related to exercise addiction patterns, 93% ($n = 253$) did not meet the criteria for exercise addiction behaviors. However, 7.0 % ($n = 19$) did meet the EAI cut-off score of 24 or higher for individuals considered at-risk for exercise addiction. High scores on the EAI scale were considered most problematic for individuals and indicated they may be symptomatic of exercise addiction.

Table 3

Frequency Distributions (n), Percentages (%), and Chi-Square Values for Crosstabulations of Exercise Addiction by Gender

Exercise Addiction	Gender			
	Female		Male	
	<i>n</i>	%	<i>n</i>	%
Yes	19	7.0	15	13.9
No	253	93.0	93	86.1
Total	272	100.0	108	100.0
$\chi^2 = 4.52^*$				

* $p < .05$

Research Question 5: What is the prevalence of exercise addiction patterns among male college students at Minnesota State University, Mankato? Participants were asked six (6) questions related to exercise addiction in an effort to answer research question five (survey questions 5-10). The frequency distributions (*n*), percentages (%), and chi-square values for exercise addiction by gender are presented in Table 3. Of the 108 total males who answered the questions related to exercise addiction, 86.1% ($n = 93$) did not meet the criteria for the cut off score for exercise addiction behaviors. However, 13.9% ($n = 15$) did meet the EAI cut-off score of 24 or higher for individuals considered at-risk for exercise addiction. Scores of 24 or higher on the EAI were considered most problematic for individuals.

Research Question 6: Is there a relationship between exercise addiction patterns and gender among college students at Minnesota State University,

Mankato? Participants were asked six (6) questions related to exercise addiction in an effort to answer research question six (survey questions 5-10). Findings related to exercise addiction and gender among college students are presented in Table 3. A chi-square analysis was conducted using SPSS to analyze a potential relationship between exercise addiction patterns and gender among college students. The results were significant ($\chi^2 = 4.52, p < .05$) indicating that there was a relationship between exercise addiction and gender. Males were disproportionately more likely to exhibit exercise addiction tendencies than females (see Table 3).

Research Question 7: Is there a relationship between disordered eating and exercise addiction among female college students at Minnesota State University, Mankato? Frequency distributions (*n*), percentages (%), and chi-square values for disordered eating and exercise addiction among females are presented in Table 4. The chi-square analysis showed the results were significant ($\chi^2 = 10.34, p < .01$) indicating there was a relationship between disordered eating and exercise addiction among females. Those who exhibited disordered eating indicated they also were symptomatic of exercise addiction.

Table 4

Frequency Distributions (n), Percentages (%), and Chi-Square Values for Crosstabulations of Disordered Eating and Exercise Addiction Among Females

Disordered Eating	Yes		Exercise Addiction		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Yes	7	3.1	28	12.5	35	15.6
No	9	4.0	180	80.4	189	84.4
Total	16	7.1	208	92.9	224	100.0

$\chi^2 = 10.34^*$

* $p < .01$

Research Question 8: Is there a relationship between disordered eating and exercise addiction among male college students at Minnesota State University, Mankato? Frequency distributions (*n*), percentages (%), and chi-square values for disordered eating and exercise addiction among males are presented in Table 5. The chi-square analysis showed the results were significant ($\chi^2 = 5.52, p < .05$) for a relationship between disordered eating and exercise addiction among males. However, the analysis results in Table 5 violated the assumptions related to the use of Chi-Square that no more than 20% of the variables can have values of less than 5. Therefore, these results are not large enough to generalize, for this population, in regards to disordered eating and exercise addiction among males.

Table 5

Frequency Distributions (n), Percentages (%), and Chi-Square Values for Crosstabulations of Disordered Eating and Exercise Addiction Among Males

Disordered Eating	Yes		Exercise Addiction		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Yes	3	3.6	7	8.3	74	88.1
No	5	6.0	69	82.1	10	11.9
Total	8	9.5	76	90.5	84	100.0

$\chi^2 = 5.52^*$

* $p < .05$

Discussion

The focus of this study was to determine whether there was a relationship between disordered eating behaviors and exercise addiction among undergraduate students at Minnesota State University, Mankato. This research looked at the prevalence of disordered eating and exercise addiction among gender. Five hundred and eighteen random undergraduate students participated in this study. However, sixteen cases were removed since they only provided demographic characteristics. Also, in an effort to study behaviors and prevalence among “traditional college students”, participants under the age of 18, or over the age of 25 were removed from this research ($n = 108$). This provided an adjusted rate response of three hundred ninety four participants to be analyzed.

Results from this study showed gender differences for disordered eating behaviors in agreement with prior research conducted by Pettit et al (2010). Both studies showed that disordered eating behaviors continue to be more prevalent among females than males (Pettit et al., 2010). However a fair amount of males, in this study, indicated they are symptomatic of disordered eating behaviors.

Although disordered eating is often times more prevalent in females rather than males, exercise addiction is frequently presented equally in both females and males (Cockerill et al., 1996). This study showed that males were disproportionately more likely to exhibit exercise addiction than females. It is important to recognize that while much is known of the benefits of regular exercise to physical and psychological well-being, the criteria presently used to determine 'How much is too much' remains to be established more precisely (Hausenblas & Symons Downs, 2002).

Overall, this study found that there was a relationship between disordered eating and exercise addiction among college students at Minnesota State University, Mankato. The relationship between disordered eating behavior and exercise addiction is in agreement with research by Gapin et al (2009), indicating that individuals addicted to exercise did not necessarily have a clinical eating disorder but may have a negative exercise-eating relationship and be symptomatic of disordered eating behaviors. Even though most respondents did not exhibit disordered eating or exercise addiction, a greater proportion of females were symptomatic of disordered eating behaviors than males. Furthermore, those with disordered eating behaviors were more likely to be symptomatic of disordered eating behavior solely, whereas those who indicated they were symptomatic of exercise addiction tended to also exhibit disordered eating behaviors. These results are

consistent with multiple previous findings (Gapin et al., 2009; Shisslak et al, 1995) and indicate that there is a notable need to better understand why these weight control behaviors may occur mutually in some individuals.

Chapter Five: Summary, Conclusion, and Future Recommendations

Introduction

College is often a time when individuals are faced with many difficult decisions as they begin to gain independence and adjust to new responsibilities. The transition from high school to college may lead students on the quest to feel accepted, introducing them to unhealthy weight control measures. Such changes in eating and exercise behaviors may lead to serious, life-altering weight control behaviors such as disordered eating or excessive exercise (Greenleaf et al., 2009). This chapter will discuss the summary, conclusions and future recommendations of this study.

Summary

In this study, consisting primarily of Caucasian students, participants were asked about their present eating behaviors and exercise patterns. Data for this study were collected through a 50-item survey to assess the prevalence of disordered eating behaviors and exercise addiction patterns among undergraduate college students. The survey was administered via email, to a random sample of 2,947 undergraduate students attending a mid-sized Midwestern public university.

Gender differences were noted in this study. Despite the fact that 84.3% ($n = 194$) of females did not meet the criteria for exhibiting symptoms of disordered eating behavior, 15.7 % ($n = 36$) did meet a score of 20 or higher. This indicated that they had a high-level of concern about dieting, body weight or problematic eating behaviors and should seek advice from a qualified mental health professional that has experience with

treating disordered eating and eating disorders. Alternatively, 88.4% ($n = 76$) of males did not meet the criteria for the cut off score for exhibiting symptoms of disordered eating behavior. However, 11.6% ($n = 10$) did meet a score of 20 or higher indicating that they have a high-level of concern about dieting, body weight or problematic eating behaviors. The gender groups that were symptomatic of disordered eating were relatively high considering the sample size.

Additional gender differences were noted in this study in regards to exercise addiction. In this study, 93% ($n = 253$) of females did not meet the criteria for exercise addiction behaviors while 7.0 % ($n = 19$) of females did meet the EAI cut-off score of 24 or higher for individuals considered symptomatic and at-risk for exercise addiction. In contrast, 86.1% ($n = 93$) of males did not meet the criteria for the cut off score for exercise addiction behaviors while 13.9% ($n = 15$) of males did meet the EAI cut-off score of 24 or higher for individuals considered at-risk for exercise addiction. This shows that males were disproportionately more likely, in this study, to be symptomatic or at-risk of exercise addiction.

Lastly, this study determined that there was not a significant relationship between disordered eating behavior and gender. However, this study indicated that there was a significant relationship between exercise addiction and gender. Females were more likely to exhibit disordered eating behaviors, while males were disproportionately more likely to exhibit exercise addiction. Overall, this study presented a significant positive relationship between disordered eating and exercise addiction in both females ($p < .01$) and males ($p < .05$) among college students at Minnesota State University, Mankato.

Conclusions

In this study, a relationship between disordered eating and exercise addiction was found among college students at Minnesota State University, Mankato. Upon analyzing data, many factors must be considered. The responses regarding disordered eating and exercise addiction were based on self-reported data. The responses may have reflected some bias due to the sensitive nature of the questions. Participants were randomly selected at an educational institution located in the upper Midwest region of the United States. The results reflect only information from respondents in this study ($n = 518$) but may be representative of a larger population. However, the analysis results in Table 5 violated the assumptions related to the use of Chi-Square that no more than 20% of the variables can have values of less than 5. Therefore, these results for males in table 5 are not large enough to generalize, for this population, in regards to disordered eating and exercise addiction.

It was concluded that most respondents are not symptomatic of disordered eating and/or exercise addiction. There were a larger proportion of those symptomatic of disordered eating behaviors than those symptomatic of exercise addiction. Analysis of the results indicates those who were indicative of disordered eating were more likely to exhibit characteristics of disordered eating only, while those who were symptomatic of exercise addiction tended to also be symptomatic of disordered eating. This suggests that there is a relationship between disordered eating and exercise addiction.

Future Recommendations

Future recommendations related to this study include both recommendations for health educators as well as recommendations for future research.

Future recommendations for health educators can be drawn from this study. First, because exercise, diet and health are current preoccupations of a very large number of people in many countries, it is appropriate to consider encouraging healthy lifestyles at an early age. Primary intervention for disordered eating behaviors and exercise addiction should occur before adolescence and needs to involve activities for building self-esteem, healthy body images, peer acceptance, and open, appropriate expression of emotions. Other prevention efforts should focus on acknowledging negative emotions associated with exercise and disordered eating patterns, and evaluating existing coping strategies including maintaining health management strategies and replacing unhealthy weight control behaviors with lifelong health habits such as moderate exercise, balanced eating and other activities.

It is unlikely that the topic of disordered eating and exercise addiction are discussed prior to puberty and throughout high school and college but it is shown that the onset of these disorders occurs early in adolescence and continues through adulthood. Educating students on these topics as early as middle school and throughout college may be useful in reducing the life-long implications as a result of these weight control behaviors. It is important for students to understand the importance of a healthy relationship with eating and exercise. Health educators must emphasize the fact that disordered eating behaviors and exercise addiction patterns can be interrelated and cause

physical risks and long-term consequences when practiced. Early education on the prevalence, risk factors and long-term health implications of disordered eating and exercise addiction is vital to individuals at all ages.

Recommendations for future research can be drawn from this study. First, it would be beneficial to modify the analysis of the study to attain a better investigation of the results. The analysis used to study the relationship between disordered eating and exercise addiction among college students was a Chi-Square but the data may be better evaluated using a correlation matrix related to the data results. This would assist researchers to better understand the strength of the relationship. Also, since we know disordered eating and exercise addiction behaviors are not solely limited this group of undergraduate students, a more diverse age group and more culturally diverse population would yield improved results.

Further research might also focus on the risk factors of disordered eating and exercise addiction in efforts to better understand the reasons why individuals engage in these weight control behaviors. Some risk factors to be studied may include behavioral, social, psychological and environmental risk factors such as gender, socioeconomic status, personality factors, and family. Understanding the risk factors associated with disordered eating and exercise addiction are significant and may result in additional information regarding why an individual engages in such weight control behaviors and what can be done to help prevent individuals from engaging in them.

Furthermore, future research could explore a qualitative study to distinguish the perceptions, attitudes and emotionality of individuals that exhibit disordered eating

behaviors. It may be beneficial to examine the extent to which emotional intelligence plays a role in the impact of known risk factors of disordered eating and exercise addiction symptoms. Also, future research should examine the relationship between perceived emotional intelligence and unhealthy weight control behaviors through separate data analyses for males and females. This would provide greater insight regarding the influence of gender and the underlying perceived emotional intelligence with disordered eating and exercise addiction symptoms.

Finally, it would be practical to determine whether social norms influence the personal decision of disordered eating and exercise addiction behaviors. Understanding and knowing why some individuals engage in unhealthy weight control behaviors is important in preliminary identification of disordered eating behaviors and exercise addiction and could lay the groundwork for reliable instrumentation in prevention programs. Prevention is essential to reducing the prevalence of disordered eating and exercise addiction and can be accomplished through further research.

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Appendices

Appendix A: Copy of Institutional Review Board (IRB) Approval



December 5, 2011

Dear Dawn Larsen, PhD:

Re: IRB Proposal entitled "[290324-2] The relationship between disordered eating behaviors and exercise addiction among university students at Minnesota State University, Mankato."
Review Level: Level I

Your IRB Proposal has been approved as of December 4, 2011. On behalf of the Minnesota State University, I wish you success with your study. Remember that you must seek approval for any changes in your study, its design, funding source, consent process, or any part of the study that may affect participants in the study. Should any of the participants in your study suffer a research-related injury or other harmful outcome, you are required to report them to the IRB as soon as possible.

The approval of your study is for one calendar year from the approval date. When you complete your data collection or should you discontinue your study, you must notify the IRB. Please include your log number with any correspondence with the IRB.

This approval is considered final when the full IRB approves the monthly decisions and active log. The IRB reserves the right to review each study as part of its continuing review process. Continuing reviews are usually scheduled. However, under some conditions the IRB may choose not to announce a continuing review. If you have any questions, feel free to contact me at patricia.hargrove@mnsu.edu or 507-389-1415.

Sincerely,

A handwritten signature in cursive script that reads "Patricia Hargrove".

Patricia Hargrove, Ph.D.
IRB Coordinator

A handwritten signature in cursive script that reads "Mary Hadley".

Mary Hadley, Ph.D.
IRB Co-Chair

A handwritten signature in black ink that reads "Richard Auger". The signature is written in a cursive style with a large, looped initial 'R' and a long, sweeping tail on the 'g'.

Richard Auger, Ph.D.
IRB Co-Chair

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Minnesota State University's records.

Appendix B: Informed Consent to Participants in Research Study

Title: The relationship between disordered eating behaviors and exercise addiction among university students.

Hello, my name is Haley Wasko and I am a graduate student in the Health Science Department at Minnesota State University, Mankato, currently working on my thesis. My study is titled The relationship between disordered eating behaviors and exercise addiction among university students. The purpose of my study is to determine whether there is an association between disordered eating behavior and exercise addiction among college students at Minnesota State University, Mankato.

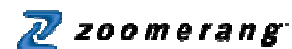
You are invited to participate in this research study which will be supervised by Dr. Dawn Larsen. This survey should take about 10-15 minutes to complete. Participation is voluntary and responses will be kept confidential. You have the option to not respond to any question you choose. Participation or nonparticipation will not impact your relationship with Minnesota State University, Mankato. Please be aware that whenever one works with the internet and/or email there is always a risk of compromising confidentiality, privacy and/or anonymity. Due to the sensitive information that will be collected in the survey, there is a potential for emotional distress. Despite the possibility, the risks to your physical, emotional, social and professional well-being are considered to be less than minimal. Submission of the completed survey will be understood as your informed consent to participate and confirm that you are at least 18 years of age.

If you have any questions regarding the research related to this study, please contact me via email at haley.wasko@mnsu.edu, or Dr. Dawn Larsen at dawn.larsen@mnsu.edu. If you have questions about the treatment of human subjects, contact the IRB Administrator, Patricia Hargrove at patricia.hargrove@mnsu.edu. If you would like more information about the specific privacy risks posed by online surveys, please contact the Minnesota State University, Mankato Information Technology Services Help Desk (507-389-6654) and ask to speak to the Information Security Manager.

Sincerely,

Haley Wasko

Appendix C: Copy of Survey



The Relationship Between Disordered Eating Behaviors and Exercise Addiction Among University Students

The Relationship Between Disordered Eating Behaviors and Exercise Addiction Among University Students.

Page 1 - Heading

The first four (4) questions ask about demographic characteristics. Please answer with the response which most appropriately applies to you.

Description

Page 1 - Question 1 - Choice - One Answer (Bullets)

Gender

- Male
- Female

Page 1 - Question 2 - Open Ended - Comments Box

I am __ years old.

Page 1 - Question 3 - Choice - One Answer (Bullets)

Year in school

- 1st year undergraduate
- 2nd year undergraduate
- 3rd year undergraduate
- 4th year undergraduate
- 5th year or more undergraduate
- Other

Page 1 - Question 4 - Choice - One Answer (Bullets)

Ethnicity

- Caucasian
- African American
- Hispanic or Latino

- Asian or Pacific Island
- American Indian
- Other

Page 2 - Heading

The following six (6) questions ask about your current exercise routine. Please answer with the response which most appropriately applies to you.

Description

Page 2 - Question 5 - Rating Scale - Matrix

Exercise is the most important thing in my life.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 2 - Question 6 - Rating Scale - Matrix

Conflicts have arisen between me and my family and/or my partner about the amount of exercise I do.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 2 - Question 7 - Rating Scale - Matrix

I use exercise as a way of changing my mood.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 2 - Question 8 - Rating Scale - Matrix

Over time I have increased the amount of exercise I do in a day.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 2 - Question 9 - Rating Scale - Matrix

If I miss an exercise session I feel moody and irritable.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 2 - Question 10 - Rating Scale - Matrix

If I cut down on the amount of exercise I do, and then start again, I always end up exercising as often as I did before.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 3 - Heading

The following twenty (20) questions ask about your present eating attitudes and behaviors. Please answer with the response that most appropriately applies to you.

Description

Page 3 - Question 11 - Rating Scale - Matrix

Like eating with other people.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 12 - Rating Scale - Matrix

Prepare food for others but do not eat what I cook.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 13 - Rating Scale - Matrix

Become anxious prior to eating.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 14 - Rating Scale - Matrix

Am terrified about being overweight.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 15 - Rating Scale - Matrix

Avoid eating when I am hungry.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 16 - Rating Scale - Matrix

Find myself preoccupied with food.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 17 - Rating Scale - Matrix

Have gone on eating binges where I feel that I may not be able to stop.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 18 - Rating Scale - Matrix

Cut my food into small pieces.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 19 - Rating Scale - Matrix

Aware of the calorie content of foods that I eat.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 20 - Rating Scale - Matrix

Particularly avoid foods with high carbohydrate content (e.g., bread, potatoes, rice, etc.)

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 21 - Rating Scale - Matrix

Feel bloated after meals.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 22 - Rating Scale - Matrix

Feel that others would prefer if I ate more.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 23 - Rating Scale - Matrix

Vomit after I have eaten.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 24 - Rating Scale - Matrix

Feel extremely guilty after eating.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 25 - Rating Scale - Matrix

Am preoccupied with a desire to be thinner.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 26 - Rating Scale - Matrix

Exercise strenuously to burn off calories.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 27 - Rating Scale - Matrix

Weigh myself several times a day.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 28 - Rating Scale - Matrix

Like my clothes to fit tightly.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 29 - Rating Scale - Matrix

Enjoy eating meat.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 3 - Question 30 - Rating Scale - Matrix

Wake up early in the morning.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Heading

The final twenty (20) questions are about your present eating attitudes and behaviors. Please answer with the response that most appropriately applies to you.

Description

Page 4 - Question 31 - Rating Scale - Matrix

Eat the same food day after day.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 32 - Rating Scale - Matrix

Think about burning my calories when I exercise.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 33 - Rating Scale - Matrix

Have regular menstrual periods.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 34 - Rating Scale - Matrix

Other people think I am too thin.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 35 - Rating Scale - Matrix

Am preoccupied with the thought of having fat on my body.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 36 - Rating Scale - Matrix

Take long than others to eat my meals.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 37 - Rating Scale - Matrix

Enjoy eating at restaurants.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 38 - Rating Scale - Matrix

Take laxatives.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 39 - Rating Scale - Matrix

Avoid foods with sugar in them.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 40 - Rating Scale - Matrix

Eat diet foods.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 41 - Rating Scale - Matrix

Feel that food controls my life.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 42 - Rating Scale - Matrix

Display self control around food.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 43 - Rating Scale - Matrix

Feel that others pressure me to eat.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 44 - Rating Scale - Matrix

Give too much time and thought to food.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 45 - Rating Scale - Matrix

Suffer from constipation.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 46 - Rating Scale - Matrix

Feel uncomfortable after eating sweets.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 47 - Rating Scale - Matrix

Engage in dieting behavior.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 48 - Rating Scale - Matrix

Like my stomach to be empty.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 49 - Rating Scale - Matrix

Enjoy trying new rich foods.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6

Page 4 - Question 50 - Rating Scale - Matrix

Have the impulse to vomit after meals.

Always	Very Often	Often	Sometimes	Rarely	Never
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> 6