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The Limits of Healthy Habits: Exploring the Relationship between Disordered Eating, Body Image, Mindfulness, Social Media, and Dysfunctional Exercise

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THE LIMITS OF HEALTHY HABITS: EXPLORING THE RELATIONSHIP BETWEEN DISORDERED EATING, BODY IMAGE, MINDFULNESS, SOCIAL MEDIA, AND DYSFUNCTIONAL EXERCISE

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ABSTRACT

In recent decades, there has been an increase not only in full syndrome eating disorders, but also in subclinical presentations of disordered eating, many of which include dysfunctional relationships with exercise. Although not full diagnosable syndromes, disordered relationships with food and exercise, as well as a preoccupation with body image, can cause severe physical and psychological stress for individuals who present with these dysfunctional patterns. With the growth of fitness-related social media accounts, the increase in social media usage during the pandemic, and the increase in subclinical disordered eating presentations and dysfunctional relationships with exercise, it is important be aware of the damage that subclinical forms of disorders can have. The present research serves as a way to examine the subclinical forms of disordered eating and dysfunctional exercise and propose how, through mindfulness, the two can be prevented from developing into full syndrome clinical eating disorders, which often lead to in-patient treatment, hospitalization, or in many cases, death.

Keywords: disordered eating; dysfunctional exercise; body image; social media; mindfulness

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INTRODUCTION

On February 18, 2022, President Biden issued a proclamation in honor of National Eating Disorders Awareness Week. Over the past two decades, there has been a rise in clinical eating disorders. The proclamation acknowledges research that reports an 8% increase in eating disorders from 2013 to 2018 (Galmiche et al., 2019). Further, when the COVID-19 pandemic led to worldwide shutdowns and social distancing, the National Eating Disorders Association (NEDA) reported a 78% increase in people messaging its help line compared to the previous year.

Playing a prominent role in the pandemic was the use of social media. Social media became a tool for the spreading of misinformation (Goel & Gupta, 2020). Topics relating to food, exercise, weight, and shape were not exempt from the misinformation, with social media trends revolving around the fear of weight gain during quarantine (Goldberg, 2020). The 15% increase in social media usage observed during the COVID-19 periods of confinement pointed to individuals turning to social media influencers for advice to keep off the "quarantine fifteen" (Ammar et al., 2020).

Health and fitness social media influencers, also known as "fitspiration" or "fitspo," often present as the ideal images of health. Content on social media using the hashtag "fitspiration" features individuals exercising and pictures of health food (Tiggemann & Zaccardo, 2015). Posts also include inspirational quotes relating to strength, personal effort, challenge, and empowerment, such as "healthy is sexy" or "be stronger than your strongest excuse." Many of these influencers have millions of followers and generate income from their fitness-related social media posts (Easton et al., 2018). Fitspiration is promoted as a healthy, even empowering

alternative to the “thinspiration” popular with pro-anorexia blogs and Tumblr pages of past decades that promoted extreme thinness and protruding bones (Talbot et al., 2017).

Although “fitspiration” and a shift toward strength and nutrition may initially appear to be a healthy alternative to an obsession with thinness, today’s “fitspo” often hide behind the veil of health all the while promoting messages of food rigidity, exercise dysfunctionality, and obsessions with body image. A large portion of fitness influencers have been found to score higher on markers of disordered eating and dysfunctional exercise than influencers who post non-fitness-related information (Holland & Tiggemann, 2017). A content analysis of health and fitness blogs and social media posts found evidence of problematic eating and a negative orientation toward food and body image (Boepple & Thompson, 2014). These messages are being passed on to social media users of all ages and genders as the key to health and wellness.

A heavy focus on body image leads the followers of these influencers to believe that a certain appearance is the key to receiving the fame and attention these influencers are given. The fitspiration perpetuates body image ideals for women that are typically presented as lean and thin and for men are presented as very muscular. A previous content analysis of fitspiration found over 80% of the imagery to contain unrealistic photos of thin bodies with emphases on abdominal muscles (Talbot et al., 2017). These images are often sexually objectifying, and although health oriented, promote appearance over health. Further, exposure to fitspirational images has been found to lead to more short-term negative mood, appearance-based comparison, and body dissatisfaction when compared with social media images marked with the “travel” hashtag (Tiggemann & Zaccardo, 2015). The growth of fitness-related social media accounts has contributed to the normalization of disordered eating and dysfunctional exercise behaviors, as well as a heavy focus on body image.

Although the majority of individuals who consume fitness-related social media content do not meet criteria for clinical eating disorders, it is important not to neglect the damage that subclinical forms of mental disorders can have on people's lives. The present literature review examines previous research that has defined differences between eating disorders and disordered eating, as well as the prevalence and significance of the subclinical population of eating disorders. Previous literature examining the role of dysfunctional exercise and its relationship to disordered eating is also explored, as are the findings that point to body image preoccupation serving as a contributing factor to both disordered eating and dysfunctional exercise. Finally, the body of literature surrounding mindfulness as a potential resource for the treatment of disordered eating and dysfunctional exercise is explored.

The present research serves as a way to examine the subclinical forms of disordered eating and dysfunctional exercise and their relation to mindfulness, body image preoccupation, and social media usage. Because of the large portion of eating disorders leading to in-patient treatment, hospitalization, or even death, preventing disordered eating and dysfunctional exercise from growing into full syndrome clinical disorders is crucial. The present research aims to contribute to the growing collection of literature that aids in providing empirical support for the incorporation of proper exercise in the treatment of disordered eating.

Disordered Eating

Clinical Feeding and Eating Disorders

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) has put forth eight categories for feeding and eating disorders. These include six specific diagnoses: Pica, Rumination Disorder (RD), Avoidant/Restrictive Food Intake Disorder (ARFID), Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Binge

Eating Disorder (BED). The DSM-5 also includes two broader diagnoses for individuals who meet some, but not all of the criteria for the aforementioned diagnoses. These include Other Specified Feeding or Eating Disorder (OSFED) and Unspecified Feeding or Eating Disorder (USFED). According to DSM-5 diagnostic criteria, Pica, RD, ARFID, and BED do not include criteria related to body image obsession or disturbance; however, AN and BN have diagnostic criteria that requires body image disturbance. OSFED and USFED may also have components of body image disturbance.

Preoccupation with body image has been found to be a driving force of disordered patterns of eating (McDonald & Thompson, 1992). Body image disturbance can range in intensity that contributes to the severity of disordered eating. In individuals with preoccupations with body image, disordered eating behaviors are often used to manipulate or maintain a certain weight or shape. Thus, a strong preoccupation with body image plays a role in the sustaining of disordered eating patterns in an attempt to control the physical body. For the purposes of the present research, AN, BN, and other presentations of disordered eating that include a preoccupation with body image will be explored.

Anorexia Nervosa

There are three main criteria for individuals to meet diagnostic criteria for anorexia nervosa (AN; American Psychiatric Association, 2013). The first is the restriction of food that causes weight loss, inability to gain weight, or maintenance of a body weight that is significantly lower than what would be expected for individuals given their height and build. The second criterion is individuals show a fear of gaining weight or body fat that interferes with their ability to gain weight. The third criterion required for the diagnosis of AN is individuals must have

distorted views of themselves, their height, their weight, their body shape, or the amount of food they consume.

The DSM-5 also provides two specifiers for AN—restricting type and binge-eating/purging type (American Psychiatric Association, 2013). The restricting type specifier is used for individuals who restrict their food intake but do not experience episodes of binge eating. The binge-eating/purging type specifier is used for individuals who regularly engage in eating an excessively large amount of food in a relatively short period of time followed by a compensatory behavior, such as self-induced vomiting, the misuse of laxatives or diuretics, or excessive amounts of exercise.

Individuals with clinically diagnosable AN have ten times the risk of dying due to medical complications or suicide compared to same age peers (Fichter & Quadflieg, 2016). These statistics account for those individuals who have been diagnosed AN, but do not include individuals who fail to meet full diagnostic criteria. In other words, the deaths and medical complications of individuals who fall below diagnosable levels of AN are not accounted for. Without taking into consideration the medical complications of those who are not diagnosed with full syndrome AN, the severity of medical complications caused by disordered eating patterns is dismissed.

Bulimia Nervosa

Like the binge-eating/purging type specifier for AN, DSM-5 criteria for bulimia nervosa (BN) includes repeated episodes of eating excessive amounts of food in a relatively short period of time, marked by loss of control, and followed by the use of compensatory behaviors, such as self-induced vomiting, excessive exercising, and/or the misuse of diuretics, enemas, or laxatives (American Psychiatric Association, 2013). BN can be distinguished from anorexia nervosa,

binge-eating/purging type because the "significantly low weight" criterion does not need to be met. In other words, BN can exist in the context of what would be considered a normal and healthy body weight. Further criteria for BN to be diagnosed include frequency and severity measures. The binge eating and compensatory behaviors must occur at least once a week for three months and individuals' weight or body shape must have a significant impact on how they view themselves and serve as a driver for their behaviors.

As with AN statistics, the prevalence for BN is based on cases of BN that meet DSM-5 criteria and do not include individuals who meet some but not all of the criteria for BN. Once again, in reporting only full syndrome presentations of the disorder, a significant portion of those with disordered eating behaviors remain unaccounted for, despite the harm that can be caused by subclinical presentations of disorders.

Other Specified Feeding or Eating Disorder/Unspecified Feeding or Eating Disorder

According to the DSM-5, the other specified feeding or eating disorder (OSFED) and unspecified feeding or eating disorder (USFED) diagnoses should be used for individuals who do not meet all of the criteria for a specific feeding or eating disorder, but exhibit pathology related to feeding or eating that causes severe distress or disturbance (American Psychiatric Association, 2013). Diagnosable individuals in these categories may experience the severe restriction and body image disturbance seen in AN but are at a normal weight for their age and height. These diagnoses may also include individuals who do not meet the frequency markers necessary to be diagnosed with BN, but still have severe concerns with body weight and shape that trigger compensatory behaviors.

Research has begun to explore this middle ground between "normal" eating behaviors and clinically diagnosable feeding and eating disorders (Crow et al., 2002; Keski-Rahkonen et

al., 2007; Mond et al., 2014; Thomas et al., 2009). This research has used broader definitions of eating disorders that more accurately reflect the range of eating dysfunction that can occur. The result of the broader definitions is higher prevalence statistics. It has been found that the prevalence for subclinical AN is between 1.1% and 3.0% for both males and females (Mond et al., 2014). The prevalence for subclinical BN falls between 2.0% and 5.4% for both males and females. Overall, partial syndrome eating disorders are more common that full syndrome eating disorders occurring at a ratio of five to one (Dancyger & Garfinkel, 1995).

The Continuum Theory of Disordered Eating

Disordered eating has been conceptualized as cases in which individuals have partial symptoms of AN or BN, show mixed features of both disorders, or have extremely atypical eating behaviors such as chewing and spitting food rather than swallowing food (Thomas et al., 2009). To describe the spectrum of the types and severity of disordered eating that can occur, the continuum hypothesis was developed (Nasser & Katzman, 2003). The continuum hypothesis posits that normal eating falls at one end of the spectrum and extreme forms of clinical eating disorders fall at the other end. In between these two points are a number of disordered eating behaviors of variable intensities and forms.

Normal eating has been defined in terms of intuitive eating, which includes recognizing hunger and fullness cues in the body (Van Dyke & Drinkwater, 2014). It is based on the idea that the body inherently knows the quantity and type of food to eat to maintain health. With intuitive eating, food groups are not restricted. Rather, the body will decide what type of food to eat based on its nutritional needs. Therefore, normal eating is flexible and fluctuates, but not to the point of nutrient deficiency or excess weight loss or gain (Pereira & Alvarenga, 2007). In intuitive eating, thoughts about food, desiring food, and meal planning are a part of individuals' daily lives but do

not dominate it. Individuals who practice intuitive eating have been found to have lower markers of obesity and better psychological health.

According to the continuum hypothesis, there is much overlap between clinical populations of individuals with eating disorders and culturally accepted dieting behaviors in modern society (Rodin et al., 1984). In Western cultures, the promotion of dieting behaviors such as calorie restriction or the elimination of entire macronutrients is common. Restaurants with large portions have made eating to uncomfortable levels of fullness normal (Dancyger & Garfinkel, 1995). Fast food chains and highly processed foods have made instances of binge eating acceptable. Behaviors such as eating in the car, having guilt about eating, skipping meals, eating to cope with stress or emotions, and frequent and strict dieting have become common behaviors (Pereira & Alvarenga, 2007). With the overlap between culturally accepted dieting behaviors and full syndrome eating disorders, dieting behavior is necessary for the diagnosis of eating disorders, but dieting behavior alone is not sufficient for clinical diagnosis.

Defining Disordered Eating

Disordered eating patterns are not considered a clinical eating disorder, but it falls along the continuum somewhere between "normal" eating and clinical diagnoses. There is no absolute definition of disordered eating as is the case for most psychiatric disorders of a functional nature (Dancyger & Garfinkel, 1995). Disordered eating includes a variety troublesome eating behaviors such as purgative practices, bingeing, food restriction, and other methods of controlling weight (Pereira & Alvarenga, 2007; see Table 1). In contrast to clinical eating disorders, disordered eating behaviors occur less frequently or are less severe than full criteria eating disorders. Nevertheless, disordered eating behaviors are still dysfunctional and can cause severe distress.

The subclinical and clinical presentations of disordered eating are more alike than they are different. For example, no significant difference in depression levels of subclinical and clinical presentations of AN has been found (Bunnell et al., 1990). Likewise, both subclinical and clinical populations of BN have high levels of depression and anxiety. The body dissatisfaction necessary for the diagnosis of AN and BN has been found to be equally high in both clinical and subclinical presentations (Dancyger & Garfinkel, 1995). Further, the internal distress caused by disordered eating behaviors cannot be assumed by external markers such as weight or frequency of binges (Thomas et al., 2009). Knowing this, the experiences of individuals with disordered eating behaviors cannot be ignored even though they do not meet criteria to be diagnosed with an eating disorder.

Even when the severity of eating dysfunction is reduced, self-esteem and social adjustment are impaired in the same way as in the clinical severity eating disorders (Crow et al., 2002). Therefore, although disordered eating and clinical eating disorders differ in their severity and/or frequency of behaviors, forms of disordered eating often bring about as much harm and distress as the diagnosable feeding and eating disorders. The knowledge that subclinical forms of eating disorders are often of comparable severity with officially recognized eating disorders shows that the distress disordered eating can cause cannot be left to diagnostic criteria alone.

Conceptualizations of Disordered Eating

In both professional medical realms and in popular culture, formations of disordered eating syndromes have been popularized by terms like “orthorexia” and “clean eating.” One version of disordered eating is “healthy anorexia,” which is the idea that someone can still be healthy while maintaining their disordered eating (Musolino et al., 2015). Healthy anorexia came about with the rise of healthism, which refers to a wellness ideology that promotes healthy living

as the key to self-care and self-improvement. The danger of healthism is the rationalization of disordered eating behaviors not as a mental illness, but as a central part of daily life that is justified as practices of health and care. This is especially dangerous when the pursuit of healthy lifestyles, and attention to appearance and weight, become the center of moral status and virtue, leading to the social acceptance, and even praise, of healthy anorexia.

For example, in a previous qualitative study, participants described their involvement in yoga as a way to maintain disordered eating behaviors (Musolino et al., 2015). One participant who self-identified as having disordered eating said, "I remember reading about yoga and it saying that the picture of a perfect yoga instructor is someone with absolutely no body fat and a smile on their face. I was just like BAM, I'm going to be a yoga instructor" (p.21). In becoming a yoga instructor, the participant's choices around food and exercise became more acceptable to maintain because they were considered normal.

Another participant in the qualitative study, who was previously overweight, described how she began eating only one small meal a day to rapidly lose weight (Musolino et al., 2015). When she socialized with other women, they would praise her shrinking physique and ask her how she lost weight so quickly. They glorified her as a success and sought her help for dieting advice. The maintenance of her disordered eating habits was aided by the praise and encouragement of those around her.

Others maintain their disordered eating by drawing upon ethical food choices and food intolerances. A 25-year-old participant in the qualitative study admitted to telling her family she is vegetarian and lactose intolerant to avoid certain foods (Musolino et al., 2015). This technique for the acceptable restriction of food is supported by many studies that show a link between

eating disorders and the restrictive eating styles of vegetarians and vegans (Baş et al., 2005; Gilbody et al., 1998; Sullivan & Damani, 2000; Vitousek et al., 1998).

Vegetarianism legitimizes food avoidance and justifies to individuals and others the avoidance of a large range of "bad" foods (Gilbody et al., 1998). One individual attested to this saying, "because I'm vegetarian, was vegan, and I guess being vegan gave me a bit of liberty to make those decisions as well because it was, 'Oh no, I can't go there because I can't eat,' even though half the time it was probably because I wasn't comfortable being there" (p. 22). Although this individual's eating behaviors do not meet full criteria for an eating disorder, the eating behaviors caused social dysfunction and distress.

Similar to healthy anorexia, the term orthorexia, derived from the Greek words *orthos* (correct) and *orexis* (appetite), is defined by a fixation on healthy food and is characterized by a substantial amount of time spent worrying about healthy nutrition that leads to food and diet choices becoming the central aspect of life (Dell'Osso et al., 2016). Individuals with orthorexia primarily make food selections based on the perceived healthiness and nutritional properties of food rather than for its taste or enjoyment. Typically, a large portion of time is spent checking food quality, source, packaging, and processing. Apart from the food itself, a large amount of time is spent ruminating on food-related thoughts, which may lead to severe impairment of relationships and the inability to complete school or work duties. Physical health threats, such as nutrient deficiencies can also occur.

Orthorexia uses tropes of natural, pure, raw, and real to tie morals to dietary choices (Dell'Osso et al., 2016). These include "clean eating" or "raw food" diets to cut out all processed foods. The inability to completely remove processed foods from the diet is tied to moral impurity, a lack of will power, guilt, or shame (Musolino et al., 2015). Often orthorexic

individuals partake in cleanses or detoxes as well as diets like paleo, raw food, clean eating, no sugar, low-fat, gluten free, keto, or South Beach, assuming their dieting choices are normal and the pinnacle of health.

Although similar in the levels of distress produced, individuals with orthorexia can be differentiated from individuals with AN (Dell'Osso et al., 2016). AN patients are primarily worried about body image, the quantity of food consumed, and gaining weight. For individuals with AN, self-esteem depends on their ability to lose and keep off weight. Orthorexia, on the other hand, is not always associated with the restriction of food for weight loss, but the need to follow an obsessively rigid diet designed to promote good health.

Other conceptualizations of disordered eating have taken a variety of forms including "diabulimia," which occurs in individuals with Type 1 Diabetes (Dell'Osso et al., 2016). With diabulimia, individuals intentionally avoid taking insulin for the purposes of weight loss. One expression common in college populations has been deemed "drunkorexia." This occurs when food intake is restricted prior to drinking alcohol. What has been termed "pregorexia" occurs when pregnant women try to reduce caloric intake or excessively exercise to control pregnancy weight gain. Although diabulimia, drunkorexia, and pregorexia are not clinically recognized forms of disordered eating, they present a variety of physical and mental health concerns.

Another expression, common to males is what has been called "reverse anorexia" or "bigorexia." The increasing muscularization of the male physique as reflected in popular media, advertising, and action figures has caused a rise in body dissatisfaction among adolescent males with 9% reporting concerns with muscularity (Field et al., 2014). Although these muscle-related conceptualizations have their roots in body image disturbance, the pursuit of muscularity almost always involves dietary alterations, including the overconsumption of protein, the elimination of

nonprotein based foods, periodic engagement in “cheat meals” to boost metabolic rate, eating beyond the point of feeling full, and maintaining continual access to preplanned foods (Murray et al., 2017).

Along with diet, individuals with bigorexia may utilize androgenic anabolic steroids, protein powders, weight gain shakes, or muscle enhancing illicit substances (Eisenberg et al., 2012). Research supports males being affected by muscularity-oriented disorders more frequently than women at a rate of approximately 22% to 5% (Nagata et al., 2019). Like orthorexia, muscularity-oriented disordered eating has been found to cause distress at similar levels of clinical eating disorders and are a risk factor for the development of full syndrome clinical eating disorders (Murray et al., 2017).

Importance of the Disordered Eating Population

There has been considerable research and clinical attention devoted to the population of individuals with DSM-5 diagnosable eating disorders. The population that does not meet clinical diagnostic criteria, but experiences distress and dysfunction surrounding eating patterns, is steadily gaining the attention of researchers and clinicians. This population is noteworthy due to its increasing size as diet culture continues to spread. In Ontario, 27% of schoolgirls between the ages of 12 and 18 exhibited disordered eating, but not clinically diagnosable eating disorders (Jones et al., 2001). The majority of individuals with subclinical eating disorders are never evaluated or treated for disordered behaviors until the behaviors become harder to treat, full-syndrome disorders. Further, approximately 40% of individuals with OSFED or USFED go on to develop clinically diagnosable AN or BN within one to two years of the initial presentation of the eating disturbance (Thomas et al., 2009).

Eating disorders are associated with one of the highest mortality rates of psychiatric disorders and approximately 19% of those with eating disorders require hospitalization (Sharan & Sundar, 2015). Knowing the rates of progression from dieting behavior to full syndrome eating disorder, it is beneficial to study the population of individuals who fall in the dieting and disordered eating category as a means of prevention. It is rare that individuals who are chronic dieters or who experience disordered eating seek treatment, which in turn may allow their disordered eating to progress into full syndrome clinical eating disorders (Jones et al., 2001). The present study addresses individuals with disordered eating as a means to better understand the rise in disordered eating and the distress that often goes unnoticed in this subclinical population.

Dysfunctional Exercise

Benefits of Healthy Exercise

There is an abundance of research demonstrating the benefits of exercise for both physical and mental health, as well as supporting the prevention and treatment of several diseases. Men and women who report increased levels of exercise have reductions in relative risk of death by approximately 35% (Macera et al., 2003). Regular exercise leads to positive physical and mental health effects.

Exercise has been shown to be a primary treatment, in addition to pharmacological treatment, for pulmonary and cardiovascular diseases, metabolic disorders, muscle, bone, and joint diseases, cancer, and cognitive conditions like Alzheimer's disease (Pedersen & Saltin, 2006; Warburton et al., 2006). For treatment of these diseases, exercise is such a beneficial treatment that it should be considered as valuable as pharmacological treatments (Vina et al., 2012). In both treatment and prevention of disease and for general health, the benefits gained

from exercise do not depend on the type of exercise (e.g. aerobic vs. resistance), but rather the inclusion of any form of exercise has been shown to be beneficial (Dunstan et al., 2005).

Additional benefits that can be gained from exercise are a better quality of life, improved performance at work, more enjoyment of daily and social activities, increased energy levels, and improved self-esteem (Calogero & Pedrotty-Stump, 2010). Exercise also has consistently been shown to have an anxiolytic effect in both clinical and non-clinical populations (Callaghan, 2004; Salmon, 2001). A meta-analysis of 42,264 individuals showed that exercise significantly reduced high anxiety levels (Wegner et al., 2014). Likewise, depressive symptoms have been shown to be reduced by just one single session of exercise in both clinically and non-clinically depressed individuals (Callaghan, 2004; Phillips et al., 2003). When compared with different types of antidepressants, physical exercise was found to be as effective as medication (Brenes et al., 2007). Further, in a study on individuals with posttraumatic stress disorder (PTSD), those who completed two weeks of aerobic exercise reported significant clinical reductions in PTSD severity (Fetzner & Asmundson, 2015). Those with schizophrenia showed decreased anxiety and stress and increased subjective wellbeing after a single session of exercise when compared to individuals with schizophrenia who did not exercise (Vancampfort et al., 2011).

The conceptualization of exercise that has been shown to have physical and mental health benefits has been termed "intuitive exercise" (Reel et al., 2013). Intuitive exercise includes exercise decisions based on physical cues and the flexibility to change an exercise routine. Like intuitive eating, which involves making decisions around food based on hunger cues, intuitive exercise is about making exercise decisions based on body cues like tiredness or soreness. In healthy populations, exercise can be an adaptive way to alleviate negative emotions when paired with two key components of intuitive exercise behavior: body trust and flexibility (Reel et al.,

2013). Body trust allows individuals to sense feelings in their bodies and flexibility allows them to change their exercise patterns based on these feelings. Intuitive exercisers view exercise as important, but not central to their lives (Lichtenstein et al., 2017). This means that they are able to adapt if unable to exercise and can change their exercise routine easily if need be. For example, an intuitive exerciser may have a plan to run when they wake up each morning, but after a night of little to no sleep may opt to skip their running for the day or do more restorative exercise like stretching.

Exercise in Eating Disorder Treatment Settings

In many eating disorder treatment approaches, it is common to completely prohibit exercise for patients. Other treatment approaches include exercise based on the belief that the total exclusion of exercise is ineffectual (Beumont et al., 1994). These treatment approaches posit that distorted beliefs about exercise in patients need to be challenged, and a healthy model for exercise needs to be built.

Exercise interventions typically include education about exercise and exposure to various exercise modalities (Lichtenstein et al., 2017). One such approach, "drawing an exercise world," encourages patients to draw their exercise as they experience it, including the people, places, things, thoughts, feelings, and contexts that are part of their exercise distress (Calogero & Pedrotty-Stump, 2010). Patients then examine the drawing to become more aware of their relationship with exercise, the components of their exercise routine that are beneficial, and the parts of it that are dysfunctional. This activity attempts to bring awareness to those aspects of current exercise behaviors that contribute to distress.

Some clinicians utilize guidelines surrounding the incorporation of exercise into treatment for individuals with disordered eating and dysfunctional exercise patterns (Adams et

al., 2003). These guidelines often include using individual psychotherapy to identify and interrupt compulsive exercise behaviors; educating the patient on the health benefits of appropriate exercise; helping the patient develop a strategy to manage excessive exercise impulses; showing the patient new coping mechanisms to replace dysfunctional exercise behaviors; increasing the patient's tolerance and acceptance of less exercise by teaching appropriate self-management skills; unlinking the compulsion and specific triggers related to the dysfunctional exercise behaviors; and, utilizing the patient's support system to help with exercise behaviors.

Using these guidelines, several studies have examined inpatient eating disorder patients using various forms of exercise including resistance training and aerobic activities (Dalle Grave et al., 2008). It has been repeatedly found that participation in exercise groups does not interfere with the primary goal of most treatment protocols—weight gain. The exercising groups studied also experience significantly decreased eating disorder pathology, significantly lower drive for thinness, fewer bulimic symptoms, and less body dissatisfaction (Calogero & Pedrotty-Stump, 2010; Szabo & Green, 2002). Participants relationships with exercise have also been shown to improve upon discharge from treatment with significantly lower markers of excessive involvement with exercise, obligatory attitudes toward exercise, appearance-based motives for exercise, and distress over missing exercise sessions (Calogero & Pedrotty-Stump, 2010; Long et al., 1993; Taranis et al., 2011).

Defining Dysfunctional Exercise

While exercise has been shown to have a place in eating disorder treatment, eating disorder literature is filled with terms such as "activity anorexia" (Epling et al., 1983), "exercise anorexia" (Beumont et al., 1994), "obligatory exercise" (Davis et al., 1993), "exercise addiction"

(Adams & Kirkby, 2002), "exercise dependence (Veale, 1987), "exercise abuse" (Davis & Woodside, 2002), and "excessive exercise" (Le Grange et al., 1992) all describing the dysfunctional nature of exercise in eating disorders. One account of dysfunctional exercise can be found in a 2019 *Men's Health* interview with rapper Eminem. In the interview, he says:

> I got an addict's brain, and when it came to running, I think I got a little carried away. I became a [expletive] hamster. Seventeen miles a day on a treadmill. I would get up in the morning…I would run eight and a half miles in about an hour. Then I'd come home and run another eight and a half. I started getting OCD about the calories, making sure I burned 2,000 every day. In the end I got down to about 149 pounds (Dukoff, 2019).

This demonstrated obsession with exercise is precisely what characterizes dysfunctional exercise.

Among all of the disordered eating symptoms (e.g. starvation, vomiting, laxative abuse), dysfunctional exercise is an outlier because of the health benefits associated with regular exercise (Calogero & Pedrotty-Stump, 2010). This is dangerous considering that high levels of dysfunctional exercise have been found to predict longer periods of hospitalization, quicker relapses, and chronic outcomes in individuals with clinical eating disorders (Solenberger, 2001; Strober et al., 1997). It is also noteworthy that dysfunctional exercise patterns have been found to be one of the last symptoms to subside during treatment of disordered eating (Hockin-Boyers & Warin, 2021; Zeeck et al., 2020).

Previous disordered eating literature has demonstrated that dysfunctional exercise cannot be defined by frequency, volume, or intensity, although these factors may contribute to physical injury. Rather, the underlying psychological motivations and beliefs are what make exercise

dysfunctional (Calogero & Pedrotty-Stump, 2010; see Table 1). A prevailing view is that a dysfunctional relationship with exercise is defined primarily as a weight and shape control behavior that is maintained by compulsivity, behavioral addiction, or affect regulation.

Dysfunctional exercise is characterized by self-harm, identity maintenance, bodily disconnection, rigid isolation, dread, an all-or-nothing mindset, and the compromise of health (Calogero & Pedrotty-Stump, 2010). Additionally, dysfunctional exercise has been associated with an external orientation, meaning it has a focus on external outcomes (e.g. calories burned, weight loss), may injure the body, ignores the body's signals, and is dreaded. An internal orientation, on the other hand, is associated with exercise for health reasons (e.g. cardiac and bone health) and stress relief.

When looked at through the lens of compulsivity, dysfunctional exercise is not so much associated with the need to exercise, but rather the heightened concerns surrounding the consequences of not exercising (Bamber et al., 2000; Peñas-Lledó et al., 2002). Compulsive exercise is performed to avoid the perceived negative consequences of not exercising and associated guilt (Levallius et al., 2017). In other words, compulsive exercise is negatively reinforcing, which leads to the maintenance of destructive exercise patterns (Young et al., 2017).

Dysfunctional exercise may also include the maintenance of a rigid exercise schedule, priority of exercising over other activities, detailed record keeping, and feelings of distress if unable to exercise (Dalle Grave et al., 2008). Overall, this unhealthy orientation to exercise not only contributes to physical harm to the body, but also causes psychological distress marked by rigid exercise patterns and dread of exercise.

Harmful Effects of Dysfunctional Exercise

Although exercise, even when done to an extreme, is socially praised and can have profound benefits on health and wellness, when exercise is taken to the extreme, it can have a negative impact. These negative consequences are often physical, including the continuation of exercise despite physical injury or illness (Landolfi, 2012). There are also long-term physical risks such as musculoskeletal injuries, low bone-mineral density, and cardiovascular problems like bradycardia.

While the physical detriments of dysfunctional exercise are of concern, the invisible, psychological consequences of dysfunctional exercise can be particularly harmful. With dysfunctional exercise, exercising becomes the priority over everything else. There is little research on the social consequences of dysfunctional exercise; however, it has been found that dysfunctional exercise patterns often lead to strained interpersonal relationships, interference with work, marital problems, and lack of time for other activities (Lichtenstein et al., 2017). Exercise effectively becomes the most important aspect in the lives of those with dysfunctional exercise patterns. Further, more than one-third of dysfunctional exercisers acknowledge the harmful consequences of exercise in their lives, yet they continue their exercise habits despite having this insight (Polivy & Herman, 1993).

Negative mood including feelings of anxiety, depression, and guilt have all been associated with dysfunctional exercise behaviors (Goodwin et al., 2011). Although the physical detriments of excessive exercise are the most readily observable consequences, the emotional and social impacts of dysfunctional exercise cannot be understated. Individuals who partake in dysfunctional exercise behaviors often have strained social relationships due to putting exercise over time with others. They also often experience dread for their exercise routines and guilt

related to missing or changing the exercise routine. As a consequence, those with dysfunctional exercise patterns spend a large amount of time thinking about exercise.

Co-Occurrence with Disordered Eating and Eating Disorders

Dysfunctional exercise has been found to occur in approximately 48% of individuals with eating disorders, which indicates that overlap between the two is common (Lichtenstein et al., 2017). Disordered eating and dysfunctional exercise occur alongside each other so often that some researchers speculate they cannot occur independently. Further, when eating pathology is controlled for, there is no association between exercise and reduced quality of life (Mond et al., 2004).

Exercise dependence has been separated into two types, marked by the presence or absence of an eating disorder (Veale, 1987). Secondary exercise dependence is excessive exercise when individuals with disordered eating use exercise as a tool for weight loss. The exercise occurs as a way to bolster the desired outcome from the disordered eating behaviors (e.g. shape or weight control). In contrast, primary exercise dependence does not begin with disordered eating. Rather, the exercise is an end in itself. There is no goal related to body shape or weight. Any dieting or weight loss that occurs in the context of primary exercise dependence is done to improve performance. It has been found that men and women have the same risk for exercise dependence; however, men often experience primary exercise dependence, whereas women often experience secondary exercise dependence (Lichtenstein et al., 2017).

Individuals' motivations for exercise are key factors in identifying who is at the greatest risk for developing dysfunctional exercise patterns (Freimuth et al., 2011). For individuals with disordered eating, the motives for exercise may change over time alongside changes in weight and shape (Long et al., 1993). Initially, the drive for exercising may come from body

dissatisfaction or the pursuit of fitness; however, as initial exercise involvement progresses, and exercise becomes habitual, other motives may take over. These include the regulation of mood states, the avoidance of guilt and the dependence on social reinforcements.

Body Image Preoccupation

Body Image Preoccupation and Disordered Eating

A core feature of disordered eating and dysfunctional exercise is a preoccupation with body image and the fear of weight gain. Approximately 60% of women over the age of 50 reported a fear of weight gain (Gagne et al., 2012). Likewise, 60% of 13-year-old girls demonstrated a fear of weight gain (Micali et al., 2014). Although less frequently than women, men and boys also exhibit significant fear of weight gain with 39% of 13-year-old boys claiming fear of weight gain (Slof-Op 't Landt et al., 2017). The fear of gaining weight has translated to an increase in dieting behaviors in both genders throughout the lifespan.

Body image concerns are strongly related to the activation and maintenance of disordered eating behaviors (Gagne et al., 2012). For example, individuals who are preoccupied by the size of their stomach may restrict their caloric intake to lose weight and change the shape of their stomach. As the body adapts, more calories will have to be restricted in order to continue seeing changes in the amount of fatty tissue in the stomach. Further, when changes are observed in the size of the stomach, caloric restriction may continue to maintain the desired shape.

The role of body image preoccupation in the development of disordered eating is further described by the spiral model (Polivy & Heatherton, 2017). According to the spiral model, individuals who compare themselves to their perceived image of the ideal physique and do not feel that their appearance matches this ideal physique develop body dissatisfaction. The body dissatisfaction that is experienced leads to attempts to diet to achieve an ideal physique. If the

diet works and the ideal physique is attained, then the spiral stops; however, it is rare that diets produce the desired results, especially for individuals with low self-esteem, who frequently compare themselves to others and are vulnerable to societal pressures to be thin. If the diet does not work, the individual experiences a greater negative impact on self-esteem and mood, which in turn drives more extreme dieting behaviors followed by even worse effects on self-esteem and affect. The continuation of the spiral may lead to clinically diagnosable eating disorders.

Body Image Preoccupation and Dysfunctional Exercise

Just as preoccupation with body image plays a strong role the development of disordered eating, it also largely contributes to the development of dysfunctional exercise. It is estimated that 43% of women are dissatisfied with their body and weight loss has been repeatedly found to be a primary reason reported by both men and women for starting an exercise routine (Davis et al., 1993; McDonald & Thompson, 1992). Exercise motivated by external appearance has been found to predict greater eating related pathology (Adkins & Keel, 2005; Calogero et al., 2009; Maltby & Day, 2001; Strelan et al., 2003). In addition, weight loss often brings with it social reinforcers, which in some individuals may lead to an increased focus on body image (Goodwin et al., 2011).

Dysfunctional exercise is driven by exercising for the primary purpose of changing appearance and feeling intense guilt when exercise is missed (Mond & Calogero, 2009). This has been found to be true for both men and women (Levallius et al., 2017). Further, it has been found that individuals who exercise for reasons other than psychological gratification, such as changing appearance, are at a 77% greater risk of developing dysfunctional exercise patterns (Thornton & Scott, 1995).

Perfectionism in relation to appearance reduces individuals' tolerance for flaws, which in the context of dysfunctional exercise can cause individuals to never be satisfied with their exercise performance or appearance (Beumont et al., 1994). High levels of perfectionism often lead to self-criticism, in that individuals who strive for perfection with exercise performance or body image often fail to reach their perception of perfection. Further, thoughts such as "I hate my fat thighs" or "If I lose weight, then I'll be more attractive" are often strongly held beliefs that become central to individuals' identities (Boskind-White & White, 2000). These thoughts drive the need to follow rigid diet and exercise rules and routines.

Another contributor to body image preoccupation is the fear of a negative evaluation from others (Goodwin et al., 2011). For women, this often leads to changes in eating patterns to manipulate body shape or size. For men it has been found that a tendency toward social comparisons has a stronger impact on exercise behaviors than eating. It has also been found that a body specific form of social anxiety, social physique anxiety, is related to greater exercise frequency.

The excessive concern about physical appearance has been termed *self-objectification*, a form of preoccupation with body image, which is described as mentally scanning the body from an outside perspective (Calogero et al., 2009; Daubenmier, 2005; see Table 1). Self-objectification has been found to lead to self-surveillance, increased body shame, appearance anxiety, and disordered eating. Although self-objectification has been observed in both men and women, it has been seen at higher rates in women, especially women with disordered eating.

Those men who tend to monitor their external appearance are more likely to experience increased body shame, appearance anxiety, disordered eating, and depressed mood (Grammas & Schwartz, 2009). Women who experience high levels of self-objectification also experience

negative psychological consequences such as body shame, a separation from internal bodily experiences, and an inability to focus on the task at hand due to a constant division of attention (Fredrickson & Roberts, 1997). The accumulation of these experiences have been thought to contribute to higher rates of eating disorders, depression, and sexual dysfunction in women.

Individuals with clinical levels of body image preoccupation may be diagnosed with body dysmorphic disorder. Body dysmorphic disorder is an obsessional-compulsive disorder that involves the obsession about a real or imagined flaw in appearance (American Psychiatric Association, 2013). For example, a female with body dysmorphic disorder who is approximately 20% under her healthy body weight may describe herself as "fat" (Chalmers et al., 1985). Because of this belief and a fear of overeating leading to possible weight gain, she is constantly physically active and reduces her caloric intake.

The use of dysfunctional exercise to treat the perceived flaw is especially true for a variant of body dysmorphic disorder, muscle dysmorphia (Lichtenstein et al., 2017). Muscle dysmorphia is characterized by beliefs of insufficient muscle mass. This leads to the need to engage excessively in muscle building activities like weightlifting and the use of anabolic steroids. Muscle dysmorphia often impacts eating behaviors but is mostly reflected in exercise patterns. Male cases have primarily been reported; however, in recent years the female body ideal has shifted as marked by sayings such as "strong is the new skinny." This shift has led more women to develop muscle dysmorphia.

Although not always mutually exclusive, women tend to desire to be thin, whereas men tend to desire to be muscular (Ahern et al., 2011). These body-centric drives are related to negative psychological outcomes. In women, a higher drive for thinness is associated with

greater rates of disordered eating and poorer body image. In men, a higher drive for muscularity is associated with poorer body image.

Cultural Factors and Social Media

The development of dysfunctional exercise behaviors, especially when used to manipulate body shape or weight has been given more attention with the increase of several cultural factors. Modern exercise settings often encourage self-objectifying thoughts through the strategic placement of mirrors, promotion of certain exercise clothing designed to show the physique, and posted images of lean, thin, and muscular bodies touted as the epitome of health and wellness (Prichard & Tiggemann, 2005). Repeated exposure to these cues encourages a greater level of body image preoccupation and less awareness of the body's internal exercise experiences.

The rise of group fitness classes creates a sense of community through fitness; however, such fitness organizations can also create a body image and body training ideal that encourages participants to exercise and eat in a certain way to fit the mold of a perfect body shape (Lichtenstein et al., 2017). The group fitness culture is one of the key drivers of the emergence of dysfunctional exercise behaviors, especially when considering the evolutionary drive to belong to a group and the status that comes along with group membership.

When group membership is exercise based, it brings with it a view of the self that is based in body image, body wellness, achievement, and competition (Lichtenstein et al., 2017). Often, individuals who take part in popular exercise classes are sold certain diets or "cleanses" to adhere to. If the entire group follows the cleanse, failure to participate may result in alienation from the group or a reputation of being less dedicated to wellness than other participants. Once indoctrinated into a dysfunctional exercise regime, it is difficult to stop because reducing

exercise means cutting down on appearance goals and the social acceptance found within the group (Lichtenstein et al., 2017).

In addition, over-exercising has become a socially accepted, and even encouraged, behavior. Cultural acceptance of excessive exercise is supported by theories of unproductive and productive behavioral addictions (Andreassen et al., 2013). Unproductive behavioral addictions, such as gambling and social media over-use, are not considered as socially acceptable as productive behavioral addictions. Productive behavioral addictions like over-exercising and over-working are considered useful, and therefore, acceptable. Those with drug addictions may be viewed by the general public as lacking in willpower or motivation to recover. Those who are dedicated to exercise are viewed by the general public as disciplined and the epitome of health.

Further, a link has been formed between a certain a body image, morals, and achievement (Nasser & Katzman, 2003). For example, for males, being muscular is associated with being healthy and fit, as well as feelings of confidence and power in social situations (Grogan & Richards, 2002). On the other hand, having excess fat is related to a lack of will-power and control. Those who are overweight are often blamed for their size and shape (Gagne et al., 2012). For females, adhering to standards of perfect skin, slender waists, and large breasts are seen as desirable and thought of as attainable if individuals are willing to work hard enough. Those who do not meet the high standard of the ideal body are often viewed as lazy, ugly, and lacking in willpower.

For decades, media images have played a large role in the body image preoccupation that may then play a role in the development of disordered relationships with food and exercise (Rodin et al., 1984). Women have been targeted by a “thin ideal” through art, fashion, and advertisements. Men have been targeted by visuals of lean, muscular physiques. The rise of

dieting culture has also been attributed to the importance society places on attractiveness, the stigmatization of obesity, unnatural shape and beauty ideals, and body size as the central feature of attractiveness.

These messages have been furthered by the rise of social media (Easton et al., 2018). Social media platforms display retouched photographs of models as the ideal body shapes. The use of social media contributes to the comparison of body shapes and types and encourages striving to attain a certain body type. Further, a clear association between social media use and disordered eating has been found (Wilksch et al., 2020). However, whether the association between disordered eating and social media usage is mediated by body image preoccupation is still unknown.

In addition, the rise of social media has led to the popularization of "healthiness" and "fitspiration" (Holland & Tiggemann, 2017). Individuals who are described as fitspiration frequently post images of their bodies and workouts with the intention of motivating others to exercise and achieve a certain body shape. Despite the healthy appearance of fitspiration on social media, individuals who post these images have been found to score higher on measures of disordered eating, drive for muscularity, and compulsive exercise than did individuals who post non-exercise-related images. The growth of fitspiration has become a socially acceptable, and often praised, way of rationalizing disordered eating and dysfunctional exercise.

Mindfulness

Defining Mindfulness

The definition of mindfulness is difficult to pinpoint in precise terms (Block-Lerner et al., 2005; Brown & Ryan, 2004). The operational definition of mindfulness, provided by Kabat-Zinn (1994) and commonly used in literature is "paying attention in a particular way: on purpose, in

the present moment, and nonjudgmentally" (p. 4). Subsequent research has included definitions of mindfulness in four domains: attention, present-focus, awareness, and acceptance/nonjudgement (Brown & Ryan, 2003; Kabat-Zinn, 2003; Marlatt & Kristeller, 1999).

Although a cognitive state, it has been found that mindfulness is not synonymous with sustained attention, working memory, or other cognitive capacities (Baer, 2011). Rather, the attention component of mindfulness is the awareness of internal stimuli (Bishop et al., 2004). Attention can be placed on internal thoughts, feelings, or sensations. The self-regulation of attention maintained on the immediate experience allows for an increased recognition of mental events in the present moment. A focus on the present moment makes mindfulness approaches particularly effective for individuals with whom intolerance of negative affect and behavioral avoidance play a central role. By remaining attentive to everything both internal and external in the environment during negative experiences, tolerance for distress is increased and resiliency is built.

The present moment awareness component of mindfulness is an investigative awareness, in which individuals intentionally observe their private experiences and then work to gain a better understanding of their thoughts and feelings (Bishop et al., 2004). By viewing thoughts and feelings as passing events in the mind rather than inherent aspects of the self, mindfulness allows individuals to gain insight into the nature of their cognitions and emotions. Often, individuals respond to thoughts and feelings in an automatic, habitual pattern of reactivity (Bishop et al., 2004). Bringing awareness to thoughts and feelings allows for space between perceptions and responses, which enables people to respond more reflectively as opposed to reflexively.

The acceptance component of mindfulness involves a conscious decision to allow all current thoughts, feelings, sensations, and experiences, rather than adhering to a set agenda (Hayes et al., 1999). In the context of emotional distress, acceptance changes the psychological experience of the unpleasant thoughts and feelings by making them less threatening (Hayes et al., 1996). Rather than immediately judging a thought with automatic reactivity, acceptance calls for open curiosity to explore any thoughts, feelings, or sensations that appear (Segal et al., 2002).

Acceptance and self-compassion are key components of mindfulness that involve extending grace to oneself in moments of perceived inadequacy, failure, or suffering (Neff, 2011). Self-compassion has been found to be paramount, considering that there is evidence that certain forms of self-focused attention can increase distress and psychopathology (Martin & Tesser, 1996). Increased distress comes from rumination. If a goal is not met, the mind has the tendency to dwell on the perceived discrepancy and seek ways to reduce the discrepancy. Rumination will continue until a goal is either satisfied or given up on (Martin & Tesser, 1989). Some theoretical perspectives posit that increasing self-awareness leads to more negative self-evaluations, especially if there is an unrealistic standard (Duval & Wicklund, 1972; Silvia & Duval, 2001). However, when performed in a nonjudgmental way, it has been found that acceptance allows individuals to disengage from their goals, leading to more adaptive behaviors.

Mindfulness as a Practice vs. Mindfulness as a State of Being

There has been some debate as to whether mindfulness is a practice or a state of being (Bishop et al., 2004). Mindfulness is often treated as a dispositional or trait variable that is considered consistent over time and across situations; however, mindfulness is subject to change with practice. Mindfulness is an inherent human capacity that varies in the general population (Kabat-Zinn, 2003). Put another way, it can be observed that some people are more naturally

inclined to be mindful in daily life, whereas others are inclined to be unmindful, and others fall somewhere in the middle. The state view of mindfulness is largely dependent on practices of mindfulness such as yoga or meditation (Bishop et al., 2004). Rather than being a general disposition, the state of mindfulness is a conscious decision. Mindfulness is closer to a state because its maintenance is dependent on the regulation of attention and an open orientation to experience.

State mindfulness has greater independent effects than trait mindfulness on affect and autonomous motivation in the context of daily life (Brown & Ryan, 2004). Because state mindfulness requires a conscious decision to be aware of thoughts, feelings, and sensations in the present moment, individuals are better able to make decisions that align with their current state of being and self-regulate their behavior. Further, state mindfulness during activity has been associated with decreases in self-objectification and increases in health reasons for exercise (Cox et al., 2015). The ability to come into mindfulness prior, during, and after exercise allows individuals to make decisions about exercise based on their current mental, emotional, or physical state, even if this requires not participating in previously planned exercise.

Common State Mindfulness Practices

Yoga utilizes specific breathing techniques to produce physical and mental relaxation and emphasizes being present in the body, which helps individuals explore how attention to physical experience relates to the perception of self (Cox et al., 2015). Hatha yoga, the most popular yoga practice in Western culture today, consists of physical postures, breathing exercises, and meditation (Riley, 2004). Yoga practitioners are encouraged to take a nonjudgmental view of their practice and focus on how their bodies feel. In traditional yoga classes, instructors give

opportunities to modify poses to match their practitioners' physical needs, as well as discourage comparison to others.

A large part of the skill of yoga has been described as the ability to sense how far to move the body into a pose (Daubenmier, 2005). This allows yoga practitioners to learn to listen to the sensations in their bodies for feedback and value this feedback. The enhanced awareness and responsiveness helps to diminish the value placed on physical appearance through increased autonomic processes and physical abilities. Greater yoga experience, measured by the number of hours practiced per week and level of expertise, is associated with less self-objectification and greater body satisfaction (Cox et al., 2015; Impett et al., 2006). The more time spent practicing yoga directly contradicts previous literature linking more time spent exercising to greater risk for the development of disordered eating and dysfunctional exercise behaviors (Brehm & Steffen, 1998).

In addition, improvements in negative affect were found after an intensive six-day yoga workshop in a sample of women with histories of disordered eating (Dale et al., 2009). In a randomized controlled clinical trial conducted on outpatient eating disorder patients, individualized yoga was found to significantly reduce eating disorder pathology and did not interfere with weight gain/maintenance when compared to a no yoga control group (Carei et al., 2010). Epidemiological studies have shown that individuals who regularly practice yoga have a decreased risk for developing eating disorders (Ostermann et al., 2019). Previous research suggests that yoga positively impacts individuals with distorted body image by addressing the negative body schema in a relaxing and empowering way.

Although previous research has found positive outcomes for the use of yoga in disordered eating populations, experts in the treatment of disordered eating have expressed concern with the

use of yoga, despite its mindful orientation, being used by those with disordered eating in an unhealthy way (Ostermann et al., 2019). This may include the use of yoga to burn calories or suppress hunger signals. Further research on the use of yoga interventions in populations with disordered eating and body image preoccupation should be conducted.

Another state mindfulness practice often cited is meditation. Meditation is associated with focusing full attention on the breath, with the goal of observing thoughts as they arise without attachment to them (Falsafi, 2016). Although this is the common view of meditation, meditation can take on a variety of other forms including focus on the senses, walking meditations, and guided meditations. Regardless of the form, all meditation encourages the focus of attention on stimuli that are observable in the present moment and detachment and observation without judgement when thoughts, emotions, or sensations arise (Baer, 2011). This has been further described as viewing all thoughts, emotions, and sensations with openness, curiosity, kindness, and friendliness, even if they are unpleasant or unwanted.

Mindfulness in the Context of Exercise

State mindfulness is associated with improvements in cognitive inhibition (Bishop et al., 2004). Mindfulness allows individuals to block out irrelevant stimuli to better be able to make decisions and regulate emotions. Another result of mindfulness is the ability to generate various representations of cognitive and emotional experiences, such as the ability to distinguish feelings from bodily sensations (Tiggemann & Slater, 2013). Mindfulness based approaches encourage attention to internal experiences, which may reduce negative appearance-based judgments regarding oneself and others. A mindfulness of internal bodily sensations and emotional states shifts attention away from a focus on external factors, such as body size or shape.

Although yoga has been traditionally described as the sole mindful exercise intervention and has been the primary source of exercise used in disordered eating studies, the idea of mindfulness-based exercise can be applied to all types of physical activity and exercise protocols (Baer, 2011; see Table 1). Mindful exercise embodies the qualities of mindfulness, but in the context of exercise. Therefore, mindful exercise includes an orientation to the present moment, internal processes, enhanced mind-body connection, alleviation of mental and physical strain, rejuvenation of the body, and a source of pleasure and joy. An aware, attentive, and non-judgmental view of the present moment allows for physical, mental, and emotional experiences to be observed and used as a tool for guiding exercise, rather than exercising according to a structured plan.

Body image preoccupation may interfere with the ability to value and respond appropriately to bodily signals (Daubenmier, 2005). A focus on body image rather than awareness of bodily signals may contribute to the tendency for individuals with dysfunctional exercise to ignore and override their body's signals. It is not that those with dysfunctional exercise tendencies are unaware of their physical, mental, and emotional experiences during exercise, but rather, they are pushing through any internal experience telling them to stop in favor of continuing the exercise for the external change it may bring. For example, if out for a run, when an individual without dysfunctional exercise patterns gets tired, they may stop. On the other hand, when an individual with a dysfunctional exercise mindset gets tired, they will continue to push themselves through pain and exhaustion.

A distinction has been made between body-oriented exercise and mind-body exercise (Parsons & Betz, 2001). Mind-body exercise explicitly encourages body awareness and responsiveness and has been found to promote healthy eating patterns. Yoga is the typical

example associated with mind-body exercise because of its strong focus on sensations in the body. In contrast, body-oriented exercise, especially that with an emphasis placed on leanness, is associated with greater body shame and eating problems. Body-oriented exercise is typically associated with aerobics or weightlifting.

Mind-body exercises require individuals to focus on what they are doing during their exercise and how their movements feel. Aerobic exercises, such as running or swimming, have been described as being repetitive rhythmical and predictive movements when preformed in the absence of competition (Berger & Owen, 1992). Often with traditional aerobic and weightlifting exercises, there is a relative disconnect between the mind and movements of the body, which makes it more difficult to connect fully with the body in the context of these exercises (La Forge, 2005). With aerobic or weightlifting exercises, there is the tendency to push the body to extremes. For example, individuals may run further than the day before or progressively lift more weight. While not inherently dangerous, this mentality can be problematic in the context of dysfunctional exercise.

This orientation can be applied to any exercise modality, whether considered to be traditionally mind-body focused or not (Lidor & Bar-Eli, 1999). Mindfulness in exercise calls for awareness of internal states over external drives. The belief is that if individuals' exercise experience is focused on the internal physical aspects, then this will reduce the mental resources available to devote to focus on outward physical appearance (Impett et al., 2006). Disordered eating and dysfunctional exercise involve a combination of distorted thought patterns, difficulty with emotional regulation, disrupted interpersonal relationships, and a response to cultural pressures, all mediated through the body (Cook-Cottone, 2006). Knowing this, body focused techniques could serve as a key component of the treatment of disordered eating.

Present Study

There is an established connection between individuals with disordered eating and dysfunctional exercise behaviors. Although exercise may be beneficial for the general population, its detriments are evident for those who take it to an extreme (Freimuth et al., 2011; Keys et al., 1950; Kirschenbaum, 1987; Lichtenstein et al., 2017; Long et al., 1993; Mond et al., 2004; Veale, 1987). The connection between disordered eating and dysfunctional exercise serves as a growing interest area for research.

Researchers have proposed varying formulas for the best treatment approaches. One proposed addition to mitigate the dysfunction of problematic exercise behaviors is the incorporation of mindfulness practices (Carei et al., 2010; Cook-Cottone, 2006; Cox et al., 2015; Dale et al., 2009; Daubenmier, 2005; Falsafi, 2016; Impett et al., 2006; Tiggemann & Slater, 2013). Ultimately, researchers must seek to understand how to help individuals with disordered eating gain the benefits of exercise without it becoming dysfunctional and harmful for those in this population. The present study aims to better understand the relationship between disordered eating and dysfunctional exercise, as well as the role social media, body image preoccupation, and mindfulness play in the relationship between the two.

Hypothesis Sets and Exploratory Hypotheses

Hypothesis Set 1: Predictors of Dysfunctional Exercise.

$H1_a$: Preoccupation with body image, time spent on social media, disordered eating, and time spent exercising will all be significant predictors of dysfunctional exercise.

$H1_b$: Preoccupation with body image will be the best predictor of dysfunctional exercise.

$H1_c$: Drive for muscularity will be a better predictor of dysfunctional exercise for males than for females.

$H1_d$: Drive for thinness will be a better predictor of dysfunctional exercise for females than for males.

$H1_e$: There will be no significant difference between male ratings of dysfunctional exercise and female ratings of dysfunctional exercise.

Previous research has found dysfunctional exercise to be connected to several factors, including body image, disordered eating, and social media usage. It is believed that preoccupation with body image, time spent on social media, disordered eating, and time spent exercising will all, individually, be significant predictors of dysfunctional exercise. Further, it has been shown that people who show excessive concern about their body image, shape, and weight are more likely to be impacted by dysfunctional exercise patterns (Landolfi, 2012). Therefore, preoccupation with body image will be the best predictor of dysfunctional exercise.

The small body of research surrounding muscle dysmorphia has primarily cited male cases (Lichtenstein et al., 2017). Therefore, drive for muscularity will be a better predictor of dysfunctional exercise for males, whereas drive for thinness will be a better predictor of dysfunctional exercise in females. Because both males and females are impacted by these variations of body image preoccupation (Holland & Tiggemann, 2017), there will be no significant difference between male dysfunctional exercise and female dysfunctional exercise.

Hypothesis Set 2: Social Media.

$H2_a$: Disordered eating will predict dysfunctional exercise when higher levels of body image preoccupation are present.

$H2_b$: There will be a positive correlation between time spent on social media and preoccupation with body image, such that more time on social media will be related to greater preoccupation with body image.

$H2_c$: Disordered eating will predict dysfunctional exercise when more time is spent on social media.

Body image concerns have become accepted as factors that contribute to both disordered eating and dysfunctional exercise (Adkins & Keel, 2005; Calogero et al., 2009). Both eating and exercise can be used by individuals to change body shape or size or treat a perceived flaw, as characterized by secondary exercise dependence (Lichtenstein et al., 2017). Therefore, when greater levels of body image preoccupation are present, there will be a stronger positive correlation between disordered eating and dysfunctional exercise.

In addition, social media platforms have contributed to the popularization and glamorization of health and fitness trends. Previous research has found that although health and fitness social media platforms are socially acceptable, they often promote messages related to disordered eating and dysfunctional exercise (Holland & Tiggemann, 2017). Therefore, more time spent on social media will be related to greater preoccupation with body image. Further, the relationship between disordered eating and dysfunctional exercise will be strengthened by time spent on social media.

Hypothesis Set 3: Mindfulness and Dysfunctional Exercise.

$H3_a$: Body image preoccupation will predict dysfunctional exercise which will be less pronounced when greater levels of mindfulness during exercise are present.

$H3_b$: There will be a negative correlation between mindfulness during exercise and dysfunctional exercise, such that greater levels of mindfulness during exercise will lead to less dysfunctional exercise.

$H3_c$: Mindfulness practices involving bodily movement will reflect greater dysfunctional exercise than sedentary mindfulness practices.

$H3_d$: State mindfulness during exercise will be a better predictor of dysfunctional exercise for sedentary mindfulness practices than mindfulness practices involving bodily movement.

Previous research has proposed active mindfulness practices, such as yoga or tai chi, as possible bridges for those who struggle with dysfunctional exercise to transition to healthier patterns of exercise (Beumont et al., 1994; Calogero & Pedrotty-Stump, 2010; Carei et al., 2010; Ostermann et al., 2019). However, little research has been done on the possibility of active mindfulness practices like yoga to become dysfunctional themselves. When not considered in the context of disordered eating, previous studies have found that yoga has been shown to promote a more positive body image in both men and women (Carei et al., 2010). Body image and self-objectification have been shown to interfere with the ability to respond appropriately to bodily signals (Daubenmier, 2005). Therefore, concern with body image will predict dysfunctional exercise; however, this relationship will be less pronounced when greater levels of mindfulness during exercise are present.

Researchers have argued that the qualities of mindfulness can be applied to any kind of physical activity (Baer, 2011). Therefore, greater levels of mindfulness during exercise activity will be correlated with less dysfunctional exercise. However, individuals with disordered eating have been found to override their body's signals, although mindfully aware of them (Daubenmier, 2005). So, the negative correlation between mindfulness during exercise activity and dysfunctional exercise is expected to be weaker in the context of disordered eating.

Because clinicians who treat disordered eating have expressed concern with the use of yoga as a possible means for individuals to further their exercise dysfunction (Ostermann et al., 2019), it is hypothesized that when in the context of disordered eating, mindfulness practices involving bodily movement will predict greater dysfunctional exercise than sedentary

mindfulness practices. Further, sedentary mindfulness practices will predict higher measures of state mindfulness during exercise than mindfulness practices involving bodily movement.

Exploratory Hypotheses

Because little is known about the impact of age on body image preoccupation, mindfulness, disordered eating, and dysfunctional exercise, no specific predictions have been made. Just as clothing trends go in and out of style, ideal body types change across time. Body image ideals of the time may impact individuals' views of their own bodies as well as the type of behaviors they use to alter their own bodies, and the extent to which they use these behaviors. For example, anecdotal evidence points to younger females having a stronger drive for muscularity than in past generations (McCreary & Sasse, 2000). Further, social media has been demonstrated to play a role in body image preoccupation; however, it has only become a massive platform for the sharing and spreading of information in the past decade (Boepple & Thompson, 2014; Easton et al., 2018; Goel & Gupta, 2020; Holland & Tiggemann, 2017; Tiggemann & Slater, 2013). Because social media is a relatively new platform, its impact on body image preoccupation across generations should be considered.

An additional question for exploration involves the recent growth and popularization of mindfulness. In the past two decades, mindfulness has become a popularized term with apps focused on ways for individuals to encourage mindfulness in their daily lives, as well as the growth of yoga and meditation studios (Bishop et al., 2004). With this newfound draw toward mindfulness, the generational impacts of mindfulness and how it relates to eating and exercise patterns should be explored.

Finally, this research takes a predominately cisgender approach to the conceptualizations of body image, dysfunctional exercise, and disordered eating. Little research has been done on

the experiences of individuals who identify as non-binary, transgender, gender fluid, or genderqueer. If a large enough sample of individuals who identify outside of the male-female gender binary are obtained, correlations on the relationships between body image, dysfunctional exercise, disordered eating, and mindfulness will be run to serve as a preliminary source of data to be further researched.

METHODS

Participants

Recruitment of Participants and Sample Size

For the current study, efforts were made to recruit a diverse sample with respect to each of the variables of interest. Participants were recruited through three main sampling methods: Fort Hays State University convenience sampling, Amazon's Mechanical Turk (MTurk), and various social media platforms (e.g., Facebook). By utilizing these three different sampling methods, the sample obtained was more diverse with respect to age, race, ethnicity, and gender identity. Doing so helped add to the generalizability of the overall findings and also may have helped to control for extraneous variables (i.e. professional athletes, medically necessary dietary restrictions).

We recruited 1078 participants for the current study; this sample size suggests acceptable levels of power for the main analyses. No specific population was targeted for inclusion; however, to avoid sampling from protected populations, individuals under the age of 18 years and above the age of 65 years were excluded. Participants who chose to complete the survey were presented with a recruiting script (see Appendix A), informed consent (see Appendix B), and, upon completion of the survey, a debriefing statement (see Appendix C).

Sample Demographic Information

In the current study, a total of 1078 participants completed the survey materials. Of the 1078 total participants who completed the survey, 825 participated through MTurk (76.5%), 192 participated through Fort Hays State University undergraduate classes (17.8%), and 61 participated through social media (5.7%). The mean age of the sample was 34.18 years old (*SD*=10.95), and the age ranged between 18 and 65 years old.

Of those who responded to the race/ethnicity item on the survey, the current study consisted of 704 participants who identified as White or Caucasian (65.3%), 168 participants who identified as Asian (15.6%), 80 participants who identified as Black or African American (7.4%), 57 participants who identified as Latino or Hispanic (5.3%), and 5 participants who identified as Native American or Alaska Native (0.5%). In addition, 25 participants identified their racial identity as other than listed (2.3%).

The current study also asked participants to identify their gender. Among those who answered this questions, 485 participants identified as male (45%), 535 participants identified as female (49%), 3 participants identified as transgender female (0.3%), 1 participant identified as transgender male (0.1%), 3 participants identified as non-binary/gender queer (0.3%), and 1 participant indicated they identified as another, not listed gender expression.

In addition, the current study asked participants to identify their level of involvement with competitive sports. Participants indicated if they identified as an elite athlete (i.e. collegiate, semi-professional, professional) or in training for an elite athletic event (i.e. marathon, iron man). Of those who responded to this question, 549 participants identify as elite athletes (50.4%) and 489 participants do not identify as elite athletes (45.4%). An additional 46 participants did not respond to this question (4.3%).

Additional information was gathered about participants' current, medically necessary dietary restrictions. Participants identified if they currently followed a physician-recommended, medically necessary restricted diet (i.e. low sodium to manage high blood pressure, lactose intolerance). Of the participants who responded to this question, 549 followed a medically necessary restricted diet (50.9%) and 490 did not follow a medically necessary restricted diet (45.5%). An additional 39 participants did not respond to this question (3.6%).

Materials

All participants completed questionnaires using the online software system Qualtrics. The presentation of the questionnaires were given in a randomized order. However, the demographic questions (see Appendix D) were presented first to ensure participants were between the ages of 18 and 65 and possessed the capacity to consent.

Body Image Preoccupation. To measure participants' motivations for muscular bodies and the attitudes and behaviors that reflect the degree of preoccupation with increasing the size or changing the shape of their muscles, the *Drive for Muscularity Scale* (McCreary & Sasse, 2000) was used. This scale was made up of 15 items, which were assessed on a 5-point Likert-type Scale ranging from 1 (Never) to 5 (Almost Always). Sample items include statements like "I wish I were more muscular" or "I think I would feel more confident if I gained more muscle mass." Higher scores on this scale indicated stronger drives for muscularity. A composite score was created by averaging the responses to the 15 items. Past research studies utilizing this scale indicated reliable psychometric properties, such as an internal consistency or Cronbach's alpha (α) of .75 and above. For the current study, Cronbach's Alpha was .94, indicating a strong reliability. For a complete list of items, see Appendix E.

The dieting subscale of the *Eating Attitudes Test* (EAT; Garner et al., 1982) was used to measure participants' drive for thinness. This scale is made up of 13 items, which are assessed on a 5-point Likert-type Scale ranging from 1 (Never) to 5 (Almost Always). Sample items include statements like "I am preoccupied with a desire to be thinner" and "I am terrified about being overweight." Higher scores on this scale indicated stronger drives for thinness. A composite score was created by averaging the responses to the 13 items. Past research studies which have utilized this scale indicated reliable psychometric properties, such as an internal consistency or

Cronbach's alpha (α) of .75 and above. For the current study, Cronbach's Alpha was .93, indicating a strong reliability. For a complete list of items, see Appendix F.

The Body Surveillance subscale of the *Objectified Body Consciousness Scale* (OBCS; McKinley & Hyde, 1996) was used to measure the extent to which individuals focus on how their bodies appear to others versus how their bodies feel or function. This scale is made up of 8 items, which are assessed on a 7-point Likert-type Scale ranging from 1 (strongly disagree) to 7 (strongly agree). Sample items include "I think more about how my body feels than how my body looks." Higher scores on this scale indicated higher body image preoccupation. To align the direction of scores to other scales used in this study (i.e., higher scores indicate higher/more of an outcome), we reverse scored 6 items from this scale. A composite score was created by averaging the responses to the 8 items. Past research studies which have utilized this subscale indicated reliable psychometric properties, such as an internal consistency or Cronbach's alpha (α) of .79 and above. For the current study, Cronbach's Alpha was .77, indicating a strong reliability. For a complete list of items, see Appendix G.

Scores from the *Drive for Muscularity Scale*, the *EAT Dieting* subscale, and the *OBCS Body Surveillance* subscale were averaged together to create a body image preoccupation composite score. For the current study, Cronbach's Alpha for the combined scales was .96, indicating strong reliability.

Time Spent on Social Media. Time spent on social media was measured by two questions assessing minutes per day and days per week spent on social media. Participant responses for each question were multiplied together to create a minutes per day composite score for time spent on social media (see Appendix H).

Disordered Eating. To measure disordered eating, we utilized the *Eating Disorder Examination-Questionnaire* (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q is a well-established and widely used measure of eating pathology. The four subscales of the EDE-Q assess dietary restraint (e.g., "Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?"), eating concern (e.g., "Have you been afraid of losing control overeating?"), shape concern (e.g., "Has your shape influenced how you think about yourself as a person?"), and weight concern (e.g., "Have you had a strong desire to lose weight?").

This scale consisted of 28-items, which are assessed on a 6-point Likert Scale ranging from 1 (No Days) to 6 (Everyday). Six questions that do not contribute to the global EDE-Q score were omitted from the survey. Higher scores on this scale indicated higher levels of disordered eating. A composite score was created by averaging the responses to the 22 items. Past studies that have utilized this scale indicated reliable psychometric properties, such as α = .94 and above. Cronbach's Alpha for the current study was .96, indicating acceptable reliability. For a complete list of items, see Appendix I.

Active Mindfulness. Mindfulness was assessed using the *State Mindfulness Scale for Physical Activity* (SMS-PA; Cox et al., 2016). The SMS-PA assessed the attention individuals give to their physical exertion, muscular engagement, and bodily movements. The SMS-PA included both objects of mindfulness (e.g., physical and mental events) and the qualities of mindfulness (e.g., attention, awareness, and openness). The SMS-PA is intended to assess the specific experience of mindfulness and was completed based on recent experiences of physical activity.

The SMS-PA was a 12-item measure with the first six items assessing state mindfulness of the mind (e.g., thoughts and emotions) and the last six items assessing state mindfulness of the body (e.g., movement, body sensations, and muscle engagement). Responses were rated on a 5-point Likert-type scale ranging from 0 (Not at all) to 4 (Very much) with higher scores reflecting greater levels of mindfulness during physical activity. A composite score was created by averaging the responses to the items measuring attitudes. Past studies that have utilized this scale indicated reliable psychometric properties, such as $\alpha = .93$ and above. Cronbach's Alpha for the current study was .90, indicating acceptable reliability. For a complete list of items, see Appendix K.

Primary Type of Mindfulness Activity. The primary type of mindfulness activity individuals participate in was assessed with one question. This question aimed to assess whether the mindfulness practice involves movement (e.g., running, yoga, tai chi) or is sedentary (e.g., meditation, seated breathing, journaling, art). For this question, participants also had the option to respond that they did not currently participate in any form of mindfulness practice.

Time Spent Practicing Mindfulness Activity. Similar to time spent on social media, two questions evaluated the amount of time participants spend practicing their primary form of mindfulness. These questions asked how many minutes per day and days per week participants spend practicing their primary mindfulness activity (see Appendix L). Participant responses for each question were multiplied together to create a minutes per day composite score for time spent practicing the primary mindfulness activity.

Dysfunctional Exercise. Dysfunctional exercise was assessed using four of the five subscales of the *Compulsive Exercise Test* (CET; Taranis et al., 2011). The Avoidance and Rule-Driven Behavior subscale consisted of eight items measuring the guilt experienced when

exercise is missed (e.g., “If I miss an exercise session, I will try and make up for it when I next exercise”). The Weight Control Exercise subscale consisted of five items that reflect the use of exercise for weight or shape reasons (e.g., “If I cannot exercise, I worry that I will gain weight”). The Lack of Exercise Enjoyment subscale included three items measuring the experience of exercise as a chore with little to no enjoyment derived from it (e.g., “I find exercise a chore”). The Exercise Rigidity subscale consisted of three items reflecting rigid behavioral exercise patterns (e.g., “I follow a set routine for my exercise sessions, such as walking or running the same route, particular exercises, same amount of time”).

Each item was rated on a 6-point Likert-type scale ranging from 0 (Never) to 6 (Always) Higher scores on this scale indicated greater exercise dysfunction. To align the direction of scores to other scales used in this study (i.e., higher scores indicate higher/more of an outcome), we reverse scored 2 items from this scale. A composite score was then created by averaging the responses to the 19 items. Past research studies that have utilized this scale indicated reliable psychometric properties, such as Cronbach’s alpha (α) of .88 and above. For the current study, Cronbach’s Alpha was .90, indicating a strong reliability. For a complete list of items, see Appendix M.

Procedure

One of the main recruitment methods used to gather participants from various age groups and backgrounds was convenience sampling through Fort Hays State University. We began by contacting the instructors of courses from a variety of disciplines (i.e. Health and Human Performance, Social Work, Psychology, Communications). For their participation, these participants may have been offered extra credit towards their overall course grade; however, this was at the discretion of each instructor.

Amazon's MTurk was also utilized to obtain participants. MTurk was chosen to diversify the age, race, ethnicity, gender, and affiliation with competitive athletics of the participant sample. These participants were financially compensated ($.50) via MTurk. To fund this compensation, the researchers applied for and were awarded compensation from the Graduate Association for Students in Psychology (GASP), which is an on-campus Fort Hays State University student organization.

The survey was also administered online through social media platforms (i.e., Facebook). Participants who participated through social media did not receive compensation for completing the survey. All forms of recruitment and procedure for this research study occurred online due to the novel coronavirus and global pandemic of SARS-CoV-2 (COVID-19). This decision ensured the health and safety of the researchers and participants. Overall, these three main forms of recruitment helped to ensure as best as possible a diverse range of ages, ethnicities, and genders, as well as participants with various competitive athletic experiences and dietary requirements.

All IRB and APA standards and regulations for safe and ethical data collection occurred (e.g., participants received an informed consent and debriefing and were reminded that their participation is voluntary). Contact information for the researcher and faculty advisor were provided in the debriefing form, as well as contact information for Fort Hays State University counseling services and the National Eating Disorder Association helpline.

RESULTS

Data Analytic Plan

Based on the hypotheses and research questions of this current study, we analyzed our results through a series of statistical tests. First, simultaneous regression analyses were used. This analysis was the most appropriate based on Hypotheses 1a and 1b assessing if the independent variables (i.e., preoccupation with body image, time spent on social media, and disordered eating) served as predictors of the dependent variable (dysfunctional exercise). Simple regression analyses were used to test hypotheses 1c and 1d, assessing gender differences between drive for muscularity and drive for thinness as a predictor for dysfunctional exercise, respectively. When testing Hypothesis Set 1, we also conducted an independent samples t-test to assess if the participants' gender impacted the level of dysfunctional exercise as mentioned in Hypothesis 1e.

To analyze Hypothesis Set 2, a moderation analysis was used to assess the prediction of dysfunctional exercise from disordered eating and body image preoccupation as discussed in Hypothesis 2a. A moderation analysis was also performed to assess the prediction of dysfunctional exercise from disordered eating and social media as mentioned in Hypothesis 2c. To complete testing of Hypothesis Set 2, a bivariate correlation was performed to assess the relationship between time spent on social media and preoccupation with body image as mentioned in Hypothesis 2b.

To analyze Hypothesis Set 3, a moderation analysis was used to assess the prediction of dysfunctional exercise from body image preoccupation and mindfulness during exercise as discussed in Hypothesis 3a. To analyze the relationship between mindfulness during exercise and dysfunctional exercise, as discussed in Hypothesis 3b, a bivariate correlation was performed. When comparing sedentary mindfulness practices to mindfulness practices involving bodily

movement, as observed in Hypothesis 3c, an independent samples t-test was used. To complete testing of Hypothesis Set 3, a regression analysis was conducted to analyze Hypothesis 3d, assessing if the independent variables (i.e., mindfulness practices involving bodily movement and sedentary mindfulness practices) served as predictors of our dependent variables, dysfunctional exercise and mindfulness during exercise, respectively. To assess the Exploratory Hypotheses, we utilized a series of regression analyses to analyze the relationship between age and the variables of interest.

Data Screening

Data were screened using the explore function of SPSS. First, missing data and irrelevant responding were assessed. Participants were deleted from the analyses for either not meeting the requirements of the study or for not completing the study in full. Deleted participants consisted of 19 participants from college sample, 22 from the social media sample, and 103 from the MTurk sample. This left a total sample size of 934. Examination of boxplots indicated no outliers were present for the main variables of interest. Examination of histograms indicated that the distribution shape for the variables of interest were normally distributed; however, skewness and kurtosis scores were examined to further assess these distributions. Skewness and kurtosis scores were within the acceptable range (-1 to 1) for all main variables with the exception of time spent on social media and time spent in mindfulness. For these variables, kurtosis was found to be outside of the accepted range. A log transformation was conducted to improve kurtosis; however, after examination, the original data for these variables was used for analyses.

Simultaneous Regression Analyses

For each hypothesis using a simultaneous regression (i.e., hypotheses 1a-1d), the data were screened to test the assumptions of a multiple regression including the assumption of

multicollinearity. Results suggest that all assumptions were met; collinearity diagnostics for tolerance and VIF indicated that multicollinearity was not an issue when assessing the predictor variables for the analyses, and all predictor variables were entered simultaneously when testing each hypothesis.

Independent Samples t-Tests

For each hypothesis using an independent samples *t*-test, the data were screened to test the assumptions of a *t*-test including the assumption of homogeneity of variance. Results suggest that this assumption was not met; Levene's test for homogeneity of variance indicated that both groups did not have the relatively equal variance when assessing the predictor variables for the analyses. Therefore, equal variances were not assumed, and the test correction was applied when conducting these analyses.

Moderation Analyses

For each hypothesis using a moderation analysis, the variables were standardized to reduce any possible issues of multicollinearity. Interaction terms were created using those standardized variables. A hierarchical regression analysis was then performed to evaluate whether the interaction terms were predictive of the dependent variable.

Hypothesis Set 1

Hypothesis 1a

It was hypothesized that dysfunctional exercise (Y) could be predicted from preoccupation with body image (X^1), time spent on social media (X^2), and disordered eating (X^3). A simultaneous regression analysis was used to test this hypothesis. Overall, the regression model testing these predictors was significant [F (3, 930) = 577.56, p <.001; R = .81; Adjusted

R^2 = .65]. About 65% of the variance in dysfunctional exercise can be explained by these predictors (See Table 2).

Hypothesis 1b

When assessing each predictor individually, results suggested that time spent on social media [t (930) = 1.40, p = .16; β = .03] is not a significant predictor of dysfunctional exercise. However, body image preoccupation was a significant predictor of dysfunctional exercise [t (930) = 17.79, p < .001; β = .35]. The squared semi-part that estimated how much variance in dysfunctional exercise was uniquely predicted from body image preoccupation was sr^2 = .12. Thus, about 12% of the variance in dysfunctional exercise was uniquely predicted from body image preoccupation. Disordered eating also was significantly predictive of dysfunctional exercise [t (930) = 12.01, p < .001; β = .23]. The squared semi-part that estimated how much variance in dysfunctional exercise was uniquely predicted from disordered eating was sr^2= .05. Thus, about 5% of the variance in dysfunctional exercise was uniquely predicted from disordered eating (see Table 2).

Together these findings suggest that social media was not a significant predictor of dysfunctional exercise for this sample, but body image preoccupation and disordered eating are significant and unique predictors. Body image preoccupation uniquely predicted more of the variance in dysfunctional exercise than disordered eating; however, both body image preoccupation and disordered eating contributed useful predictive information about dysfunctional exercise for this sample.

Hypothesis 1c

A regression analysis was used to test the hypothesis that drive for muscularity will be a better predictor of dysfunctional exercise for males than for females. Overall, the regression

model testing the predictor (drive for muscularity) was significant [F (1, 932) = 872.97, p <.001; R = .70; Adjusted R^2 = .48]. About 48% of the variance in dysfunctional exercise was explained by drive for muscularity.

When assessing the data split by gender, drive for muscularity was found to be a significant predictor of dysfunctional exercise for both males [F (1, 440) = 521.98, p <.001; R = .74; Adjusted R^2 = .54] and females [F (1, 471) = 379.15, p <.001; R = .67; Adjusted R^2 = .45]. For males, about 54% of the variance in dysfunctional exercise was explained by drive for muscularity, whereas, for females, about 45% of the variance in dysfunctional exercise was explained by drive for muscularity. As predicted drive for muscularity accounts for more of the variance in dysfunctional exercise for males than for females.

Hypothesis 1d

A regression analysis was used to test the hypothesis that drive for thinness will be a better predictor of dysfunctional exercise for females than for males. Overall, the regression model testing the predictor (drive for thinness) was significant [F (1, 932) = 1599.84, p <.001; R = .80; Adjusted R^2 = .63]. About 63% of the variance in dysfunctional exercise was explained by drive for thinness.

When assessing the data split by gender, drive for thinness was found to be a significant predictor of dysfunctional exercise for both males [F (1, 440) = 642.90, p <.001; R = .77; Adjusted R^2 = .59] and females [F (1, 471) = 865.81, p <.001; R = .81; Adjusted R^2 = .65]. For males, about 59% of the variance in dysfunctional exercise was explained by drive for thinness, whereas, for females, about 65% of the variance in dysfunctional exercise was explained by drive for thinness. As predicted drive for thinness accounts for more of the variance in dysfunctional exercise for females than for males.

Hypothesis 1e

An independent samples *t*-test was performed to assess whether dysfunctional exercise differed significantly for males compared to females. It was hypothesized that males and females would not differ significantly in the measure of dysfunctional exercise. Dysfunctional exercise differed significantly between the groups, $t(913) = 4.27$, $p < .001$. Mean dysfunctional exercise measures for the males ($M = 81.58$, $SD = 17.88$) were higher than mean dysfunctional exercise measures for the females ($M = 75.95$, $SD = 21.95$). These results did not support the hypothesis.

Hypothesis Set 2

Hypothesis 2a

A moderation analysis was performed to assess the prediction of dysfunctional exercise (Y) from disordered eating (X_1) and body image preoccupation (Z; moderator). It was hypothesized that disordered eating would predict dysfunctional exercise when individuals have higher levels of body preoccupation. Disordered eating and body image preoccupation were entered in the first stage of the model and the interaction term was entered in stage two of the model. Overall, the regression model was significant [$F(3, 930) = 578.20$, $p < .001$; $R = .81$; Adjusted $R^2 = .65$]. Together disordered eating and body image preoccupation accounted for approximately 65% of the variance in dysfunctional exercise.

The interaction of disordered eating and body image preoccupation was not significant indicating that moderation did not occur [$t(930) = 1.62$, $p = .105$; $\beta = .034$]. These results indicate that although together disordered eating and body image preoccupation had a significant effect on dysfunctional exercise, there was no significant interaction between body image preoccupation and disordered eating.

Hypothesis 2b

A bivariate correlation was performed to test the hypothesis that time spent on social media and preoccupation with body image are positively related. Results indicated that the correlation between time spent on social media and body image preoccupation was statistically significant, $r(934) = .22$, $p < .001$. Although the correlation is weak, this finding supports the tested hypothesis such that participants who had a high preoccupation with body image also reported more time spent on social media.

Hypothesis 2c

A moderation analysis was performed to assess the prediction of dysfunctional exercise (Y) from disordered eating (X_1) and social media (Z; moderator). It was hypothesized that disordered eating would predict dysfunctional exercise when individuals spend more time on social media. Disordered eating and time spent on social media were entered in the first stage of the model and the interaction term was entered in stage two of the model. Overall, the regression model was significant [F (3, 930) = 352.43, $p < .001$; $R = .73$; Adjusted $R^2 = .53$]. Together disordered eating and social media accounted for approximately 53% of the variance in dysfunctional exercise.

The interaction of disordered eating and time spent on social media was not significant indicating that no moderation occurred [t (930) = -.45, $p = .65$; $\beta = -.01$]. These results indicated that although together disordered eating and time spent on social media have a significant effect on dysfunctional exercise, there was no significant interaction between time spent on social media and disordered eating.

Hypothesis Set 3

Hypothesis 3a

A moderation analysis was performed to assess the prediction of dysfunctional exercise (Y) from body image preoccupation (X_1) and mindfulness during exercise (Z; moderator). It was hypothesized that body image preoccupation would predict dysfunctional exercise when greater levels of mindfulness during exercise are present. Body image preoccupation and mindfulness during exercise were entered in the first stage of the model and the interaction term was entered in stage two of the model. Overall, the regression model was significant [F (3, 885) = 535.69, p < .001; R = .80; Adjusted R^2 = .64]. Together body image preoccupation and mindfulness during exercise accounted for approximately 64% of the variance in dysfunctional exercise.

The interaction of mindfulness during exercise and body image preoccupation was significant indicating that moderation occurred [t (855) = -2.67, p = .008; β = -.05]. These results support the hypothesis that there is a relationship between mindfulness during exercise and dysfunctional exercise with body image preoccupation serving as a moderator.

Hypothesis 3b

A bivariate correlation was performed to test the hypothesis that mindfulness during exercise and dysfunctional exercise were negatively related. Results indicated that the correlation between mindfulness during exercise and dysfunctional exercise was statistically significant, r(934) = -.55, p < .001. This finding supports the tested hypothesis such that participants who had high mindfulness during exercise reported less dysfunctional exercise.

Hypothesis 3c

An independent samples t-test was performed to assess whether dysfunctional exercise measures differed significantly for a group of 575 participants who primarily practice sedentary

mindfulness compared to a group of 260 participants who primarily practice mindfulness involving bodily movement. It was hypothesized that those who practice mindfulness with bodily movement would report higher dysfunctional exercise than those who practice sedentary mindfulness. Dysfunctional exercise measures differed significantly between the groups, $t(833) = 9.32$, $p < .001$. Mean dysfunctional exercise for the sedentary mindfulness group ($M = 84.95$, $SD = 17.09$) were higher than mean dysfunctional exercise for the mindfulness with movement group ($M = 70.96$, $SD = 21.30$). These results did not support of the hypothesis.

Hypothesis 3d

A regression analysis was used to test the hypothesis that state mindfulness during exercise will be a better predictor of dysfunctional exercise for those who practice sedentary mindfulness than those who practice mindfulness involving movement. Overall, the regression model testing the predictor (state mindfulness during exercise) was significant [F (1, 887) = 383.39, p <.001; R = .55; Adjusted R^2 = .30]. About 30% of the variance in dysfunctional exercise was explained by state mindfulness during exercise.

When assessing the data split by mindfulness type, state mindfulness during exercise was found to be a significant predictor of dysfunctional exercise for both sedentary forms of mindfulness [F (1, 547) = 233.36, p <.001; R = .55; Adjusted R^2 = .30] and movement forms of mindfulness [F (1, 245) = 91.56, p <.001; R = .52; Adjusted R^2 = .27]. For sedentary forms of mindfulness, about 30% of the variance in dysfunctional exercise can be explained by state mindfulness during exercise, whereas, for movement forms of mindfulness, about 27% of the variance in dysfunctional exercise can be explained by state mindfulness during exercise. As predicted state mindfulness during exercise accounts for more of the variance in dysfunctional exercise for sedentary mindfulness than mindfulness involving movement.

Exploratory Hypotheses

Age as a Predictor

Regression analyses were used to analyze age as a predictor of time spent in mindfulness, time spent on social media, body image preoccupation, drive for muscularity, drive for thinness, and disordered eating. Overall, analyses of age as a predictor indicated that there was one significant model, the relationship between age and drive for thinness (see Table 3).

Gender

An insufficient number of participants who identify outside of the traditional gender binary were recruited to conduct analyses.

DISCUSSION

Based on previous research discussed in the literature review, it is evident there are some gaps in the existing literature pertaining to factors that influence the incorporation of exercise into treatment for disordered eating. While the effects of exercise on mental health have been studied extensively, factors related to disordered eating, such as body image preoccupation (drive for thinness and drive for muscularity), are more limited with respect to empirical evidence when considered alongside exercise. In addition, factors that may contribute to the dysfunction of exercise, such as social media or the inclusion of mindfulness, should be examined.

In the exercise and disordered eating literature, there is little previous research bridging the gap between empirical studies and the clinical application of exercise with this population. The current study explored the factors that are the strongest contributors to dysfunctional exercise, as well as the practices that may contribute to greater or lesser levels of dysfunctional exercise. As a result, this study serves as a support to prior literature, as well as expands on the existing concepts of dysfunctional exercise while also exploring new avenues of potential influence. Below, findings in relation to our original hypothesis sets and how the current findings align with previous research are reviewed.

Hypothesis Set 1: Predictors of Dysfunctional Exercise

With respect to hypothesis 1a regarding preoccupation with body image, time spent on social media, and disordered eating as predictors of dysfunctional exercise, support showed that these three variables significantly predict dysfunctional exercise for this particular sample. This finding indicates that preoccupation with body image, time spent on social media, and disordered eating may influence dysfunctional exercise.

In connection with previous literature, excessive thoughts about body image were connected to both disordered eating and dysfunctional exercise. As previously discussed, body image preoccupation often incites psychological distress for individuals that may result in the need to manipulate body shape or size through diet, exercise, or both (Landolfi, 2012). Use of social media was previously found to increase body image preoccupation, disordered eating, and dysfunctional exercise. The results of H1b supported the hypothesis, as well as previous findings related to body image in that preoccupation with body image was found to be the best predictor of dysfunctional exercise. In addition, disordered eating was found to be a significant predictor of dysfunctional exercise. However, contrary to previous research, time spent on social media was not found to be a significant predictor of dysfunctional exercise. This inconsistent result could in part be attributed the way time spent on social media was assessed in the survey and participant error in estimating their time spent on social media.

Previous research has also placed a heavy emphasis on the gender differences in body image preoccupation. Where women experience more body image preoccupation related to a desire to be thin, men experience more body image preoccupation related to a desire to be muscular (Lichtenstein et al., 2017). Although previous research has established a connection between women's drive for thinness and men's drive for muscularity, little research has been conducted on how these differences in drives further impact dysfunctional exercise.

In line with previous research, the results of H1c support the hypothesis in that drive for muscularity is a better predictor of dysfunctional exercise for men than for women. Likewise, in support of H1d, it was found that drive for thinness is a better predictor of dysfunctional exercise for women than for men. While there is support for a difference in the body-focused drives of men and women, it was hypothesized that both men and women experience dysfunctional

exercise. The findings did not support this hypothesis. Rather, it was found that men experience greater levels of dysfunctional exercise than women. Given that much of the previous literature centers on the dysfunctional exercise, disordered eating, and body image preoccupation of women, this is an important finding pointing to the need for more research on how males are impacted by these variables of interest.

The results of hypothesis set 1 for the current study are important because they infer that preoccupation with body image, whether it be a drive for muscularity or a drive for thinness, plays a large role in dysfunctional exercise for the participants in this sample. The current study's findings could be used for future studies to further analyze the role that body image preoccupation plays in the formation and maintenance of dysfunctional exercise behaviors. Moreover, it would be beneficial to assess how individuals identifying as men experience body image preoccupation and how this impacts their eating and exercise behaviors.

Hypothesis Set 2: Social Media

Results showed that disordered eating and body image preoccupation independently predicted dysfunctional exercise. However, it was found that there was no significant interaction between different levels of body image preoccupation. In other words, for this sample, although there was a relationship established between disordered eating and body image preoccupation, body image preoccupation does not help to explain when disordered eating predicts dysfunctional exercise. While this finding does not fully support the original prediction that body image preoccupation would serve as a moderator for disordered eating and dysfunctional exercise, these findings are in line with previous research.

It has been established that both disordered eating and body image concerns are strong predictors for participants' dysfunctional exercise (Adkins & Keel, 2005; Calogero et al., 2009).

The current study came to the same conclusion, while further identifying that disordered eating predicts dysfunctional exercise whether levels of body image preoccupation are low, high, or average. The current study's findings suggest that individuals who report disordered eating and body image preoccupation of any amount possess a greater propensity for dysfunctional exercise.

Knowing the significant role body image preoccupation plays in disordered eating, in hypothesis set two, the current study analyzed the relationship between body image preoccupation and disordered eating that has been established by previous research (Holland & Tiggemann, 2017). Our analyses found a weak correlation between time spent on social media and preoccupation with body image. This correlation was found to be markedly weaker than previous findings. This may be in part to inconsistencies in the self-reporting of participants' time on social media, which is further discussed in the limitations portion of the current study.

Similarly, results showed that together, disordered eating and time spent on social media were significant predictors of dysfunctional exercise. However, it was found that there was no significant difference in dysfunctional exercise between different amounts of time spent on social media. For this sample, although there was a relationship established between disordered eating and time spent on social media, time spent on social media does not help to explain when disordered eating predicts dysfunctional exercise. This finding does not fully support our original prediction that time spent on social media would serve as a moderator for the relationship between disordered eating and dysfunctional exercise. The current study's findings suggest that individuals who report disordered eating and time on social media of any amount may possess a greater propensity for dysfunctional exercise.

Taken together, these findings might be used by clinicians and/or professionals in the field of mental health to signify the impact that social media can have on their clients'

relationship to exercise, especially if their clients experience disordered eating tendencies. As social media continues to grow in size and scope, the connection between social media and body image preoccupation established by the current study further supports the necessity that clinicians stay cognizant of how social media influences their clients.

Hypothesis Set 3: Mindfulness and Dysfunctional Exercise

The results of hypothesis set three analyze how mindfulness influences the variables of interest (i.e., body image preoccupation, dysfunctional exercise, disordered eating). Previous research, as well as antidotal evidence from clinicians in the field, has suggested mindfulness as a possible step to remedying disordered eating and dysfunctional exercise (Ostermann et al., 2019). Our results supported these findings in that mindfulness during exercise was found to be a moderator between body image preoccupation and dysfunctional exercise. This indicates that for this sample, when mindfulness during exercise is high, body image preoccupation has less of an effect of dysfunctional exercise.

These findings support previous research suggesting the beneficial role mindfulness may play in incorporating exercise into treatment for disordered eating (Calogero & Pedrotty-Stump, 2010; Carei et al., 2010). This connection is further supported by the findings of H3b suggesting that there is a significant negative correlation between mindfulness during exercise and dysfunctional exercise such that greater levels of mindfulness during exercise lead to less dysfunctional exercise.

Further testing of hypothesis set three analyzed differences between those mindfulness practices that involve bodily movement (i.e., yoga, tai chi) and those mindfulness practices that are sedentary (i.e., seated meditation, journaling). Previous research has found evidence for the tendency of mindfulness practices incorporating movement to become dysfunctional when

utilized by individuals with disordered eating (Daubenmier, 2005). Findings of the current research support previous research in that state mindfulness during exercise was found to play a larger role in the lessening of dysfunctional exercise for sedentary mindfulness practices than for mindfulness practices involving movement. Although these analyses were found to be significant, they should be interpreted with caution due to unequal groups. This is further discussed in the limitations section of the current study.

While additional research should be conducted to further examine the relationship between mindfulness during exercise, disordered eating, and dysfunctional exercise, the findings of the current study still offer insight into the role of mindfulness in the treatment of disordered eating and dysfunctional exercise. Support for a mindful approach to eating (i.e., intuitive eating) has already been widely accepted by clinicians as the goal for individuals with disordered eating (Van Dyke & Drinkwater, 2014). The findings of the current study offer support for a similar approach to be taken with exercise. Those clinicians responsible for developing exercise protocols for individuals with disordered relationships with food and exercise should keep in mind the role that mindfulness has been found to play in reducing exercise dysfunctionality.

Exploratory Hypotheses: Age and Gender

While more research needs to be conducted prior to drawing conclusions regarding the impact of age on body image preoccupation and mindfulness, from this study, it can be inferred that individuals of all ages can be impacted by the variables of interest (See Table 3). Age was not found to be related to body image preoccupation nor time spent in mindfulness. In other words, regardless of age, individuals can experience significant distress due to body image concerns, disordered eating, and dysfunctional exercise. Likewise, regardless of age, individuals participate in mindfulness practices.

Although the researchers aimed to perform statistical analyses including individuals who identify outside of the traditional gender binary, not enough participants who identified outside of the gender binary completed the survey. Further discussion of the primarily cisgender approach to this research and the need for further research examining those individuals who identify outside of the gender binary is presented in the limitations section. Given the overall findings of the current study, continued research on these variables and the pathways used to predict dysfunctional exercise are warranted.

Limitations and Future Directions

The current study's findings have the potential to contribute to future research and practice; however, as with any empirical research, there are limitations present. First, the sample of participants with respect to type of mindfulness practice was skewed in group size. As previously discussed, we were only able to recruit 260 participants for the mindfulness practices involving movement group, whereas we were able to recruit 575 participants from the sedentary mindfulness group. Knowing this, findings from hypothesis set three analyzing differences between these groups must be interpreted with caution. Differences between the groups were found when conducting a simultaneous regression, therefore this finding may support the predicted pattern; however, further research needs to be conducted on more equal group sizes.

An additional limitation of this study was its inability to recruit participants who identify outside of the traditional gender binary. Of the sample, 3 participants identified as transgender women, one participant identified as a transgender man, and 3 participants identified as non-binary/gender queer. These group sizes were not large enough to conduct statistical analyses. There is a tremendous gap in the literature in regard to how individuals in the LGBTQ+ community are impacted by disordered eating, dysfunctional exercise, body image

preoccupation, and mindfulness. Knowing this, additional research needs to be conducted prior to applying the findings of this study in a clinical realm for individuals in the LGBTQ+ population.

As previously mentioned, it is important to note that the variables of time spent in mindfulness and time spent in social media were largely skewed. Although the researchers attempted to correct the distributions of these variables, the original data set was utilized for analyses. Therefore, the analyses examining these variables should be interpreted with caution. The irregular distributions of these variables may be due in part to the self-report aspect of the data collection for these variables. As with any psychological research utilizing self-report, participants may either under-report or over-report the time they spend engaging in certain activities. Although the findings of this research can provide insight into the role these variables play in relation to eating and exercise, future researchers should consider alternative methods of gathering data regarding participant time spent on social media and time spent in mindfulness.

An additional observation regarding participant characteristics that should be noted is the ratio between participants who identified as elite athletes and participants who did not identify as elite athletes. While the group size for elite athletes (N=549) and non-elite athletes (N=489) was fairly equal, statistical analyses examining how these groups differ with regard to disordered eating, dysfunctional exercise, body image preoccupation, and mindfulness were not conducted. Future research should examine the differences, if any, in the variables of interest that result from being an elite athlete or not.

The same is true for participants who identified as having a medically necessary restricted diet and those who do not have a medically necessary restricted diet. Again, while distributions are relatively equal between those participants on medically necessary restricted

diets (N=549) and those participants not on medically necessary restricted diets (N=490), no analyses examining how these groups differ were conducted. Future research should examine the differences, if any, in disordered eating, dysfunctional exercise, body image preoccupation, and mindfulness that result from being on a medically necessary restricted diet or not.

An additional limitation for the current study may be that the data were collected during the global pandemic of the novel coronavirus of SARS-CoV-2 or COVID-19. This unprecedented time led to complications in terms of collecting empirical data and also may have influenced results given the unordinary disruption of daily life caused by the global pandemic. As previously discussed, we only collected data using online formats which may also be added as a limitation for the current study. By only using online formats we could not ensure that all participants read through the materials thoroughly and fully understood the study/survey questions. Additionally, given the complex nature of the COVID-19 pandemic, future research might benefit from replicating the findings of this work when the world resumes normal (or close to normal) functioning; at this time, it could be helpful to revisit this study and/or attempt replicate these findings in the future.

CONCLUSION

Overall, the results and implications of this study have the potential for adaptation and future directions. The impact of this study's findings supports current empirical as well as poses new insights and questions for future research. For instance, considering males as a vulnerable population in regard to body image preoccupation, disordered eating, and dysfunctional exercise. Similarly, it would be beneficial to explore differences in the variables of interest between individuals who are on medically necessary diets and those not on medically necessary diets, as well as differences in these variables for those who are elite athletes and those who are not.

Further, when looking to incorporate exercise into the treatment of disordered eating, these results can serve as support for the clinicians who have anecdotally found the incorporation of mindfulness as a beneficial way of reducing exercise dysfunctionality. In addition, while the findings of the current study did not yield adequate information on how age impacts the variables of interest, it serves as a source of preliminary data showing that body image preoccupation and time spent in mindfulness may not differ based on age, suggesting people may struggle with body image concerns across the lifespan and that mindfulness practices could be utilized at all stages of life.

In sum, these findings support aspects of prior literature. This current study also helps to connect existing gaps in literature and explore areas that have not yet been examined together. Although not all of the hypotheses were supported, the findings regarding the multiple variables that may impact dysfunctional exercise warrant further investigation. From an applied perspective, the findings of the current work may help to better inform how we understand and treat individuals who experience excessive preoccupation with body image, disordered eating, and dysfunctional exercise.

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Table 1

Identifying and operationalizing the variables of interest.

Variable	Description
Disordered Eating (Pereria & Alvarenga, 2007)	Includes a variety of troublesome eating behaviors such as purgative practices, bingeing, food restriction, and other methods of controlling weight. Disordered eating behaviors occur less frequently or are less severe than full criteria eating disorders.
Dysfunctional Exercise (Calogero & Pedrotty-Stump, 2010)	A weight and shape control behavior characterized by self-harm, identity maintenance, bodily disconnection, rigid isolation, dread, an all-or-nothing mindset, the compromise of health, and a focus on external outcomes.
Body Image Preoccupation (Daubenmier, 2005)	Excessive concern about physical appearance and a viewing of the body from an outside perspective.
State Mindfulness during Exercise (Baer, 2011)	Attention given to physical exertion, muscular engagement, and bodily movements during exercise activity.

Table 2

Summary of Simple Regression Analyses for Variables Predicting Dysfunctional Exercise[a]

Variable	*B*	*SE B*	*β*
Body Image Preoccupation	**.472**	**.027**	**.512***
Disordered Eating	**4.747**	**.395**	**.344***
Time Spent on Social Media	.002	.001	.028

R^2= .651
F= 577.56
*p<.05

Table 3

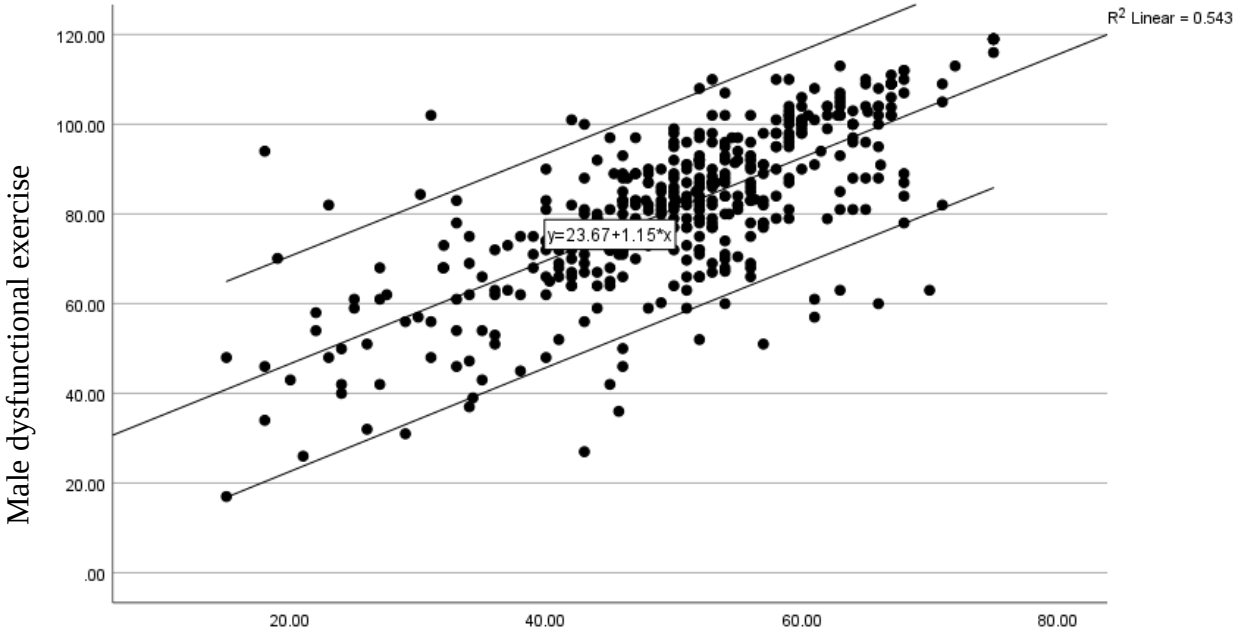
Regression Analyses using Age as the Predictor[a]

Outcome Variable	Model Sig.	Adj. R^2	β
Time Spent in Mindfulness	F = .952	.000	.032
Time Spent on Social Media	F = 2.137	.001	-.048
Body Image Preoccupation	F = .118	.001	-.011
Drive for Muscularity	F = .000	-.001	.001
Drive for Thinness	***F* = 4.349***	**.004**	**.068**
Disordered Eating	F = 1.186	.000	.036

[a]df(1.932)
*p<.05

Figure 1

Male and female drive for muscularity as a predictor of dysfunctional exercise



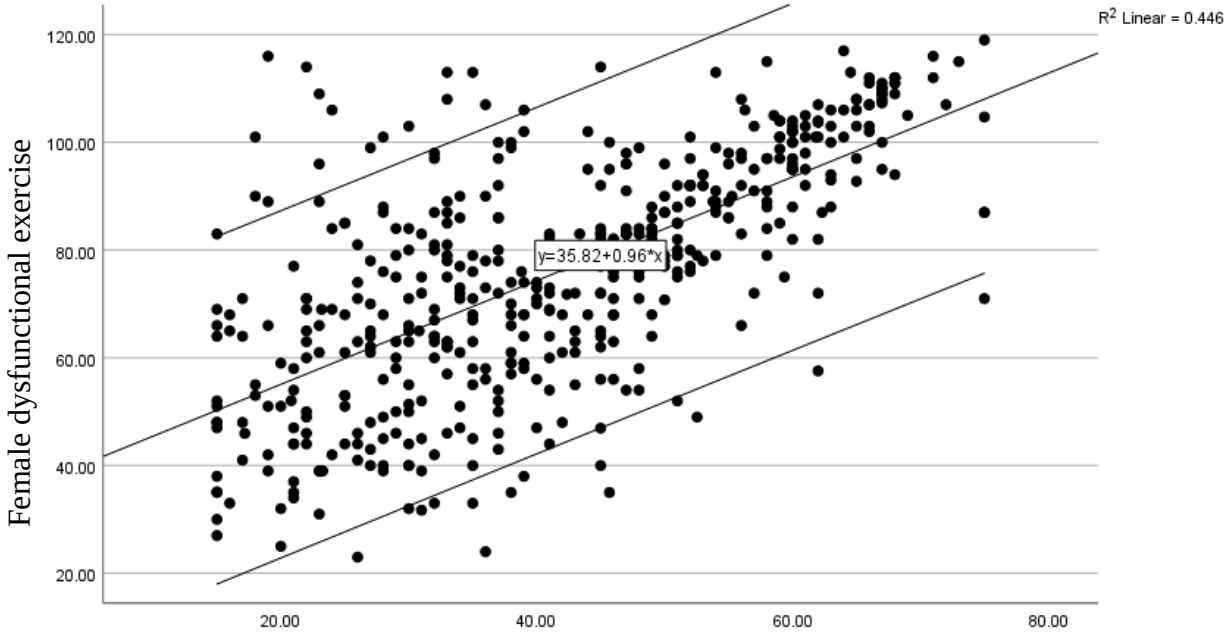
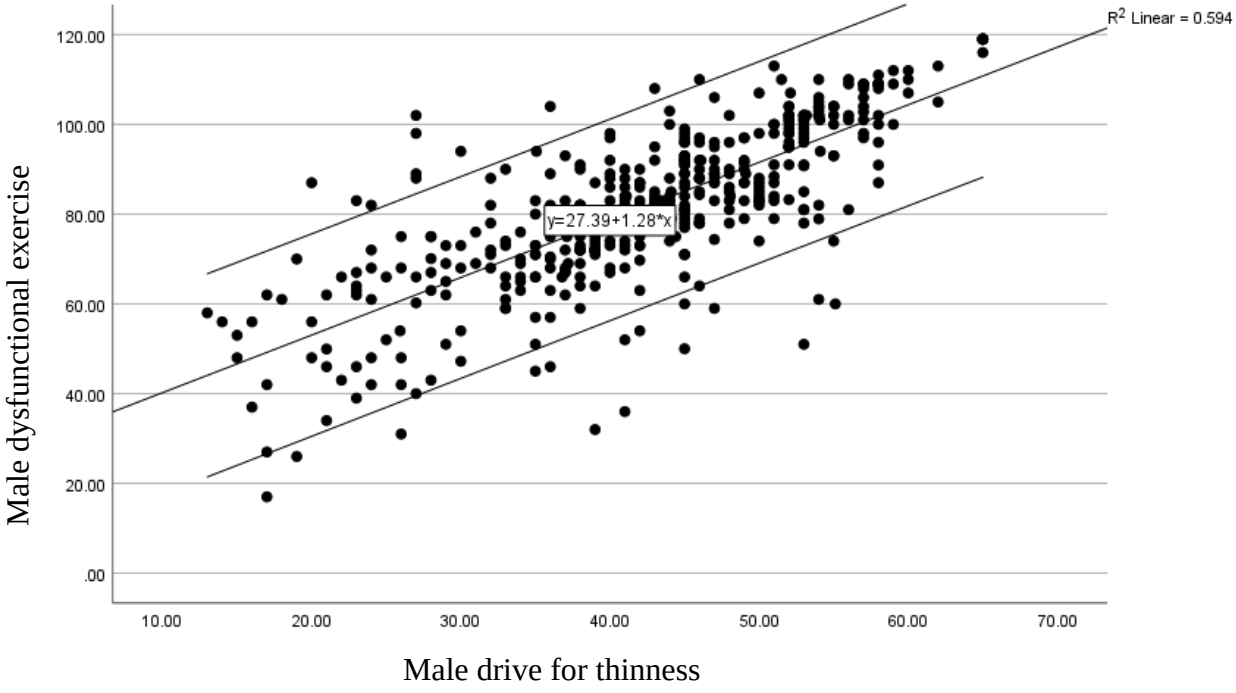


Figure 2

Male and female drive for thinness as a predictor of dysfunctional exercise



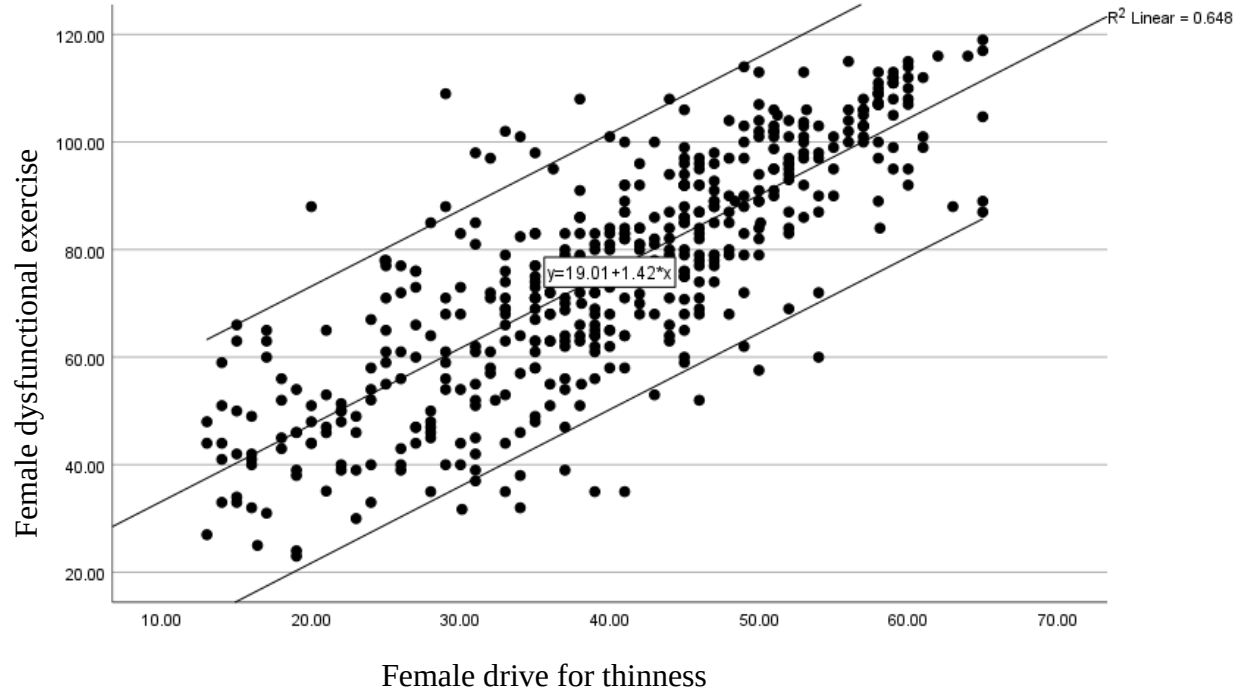
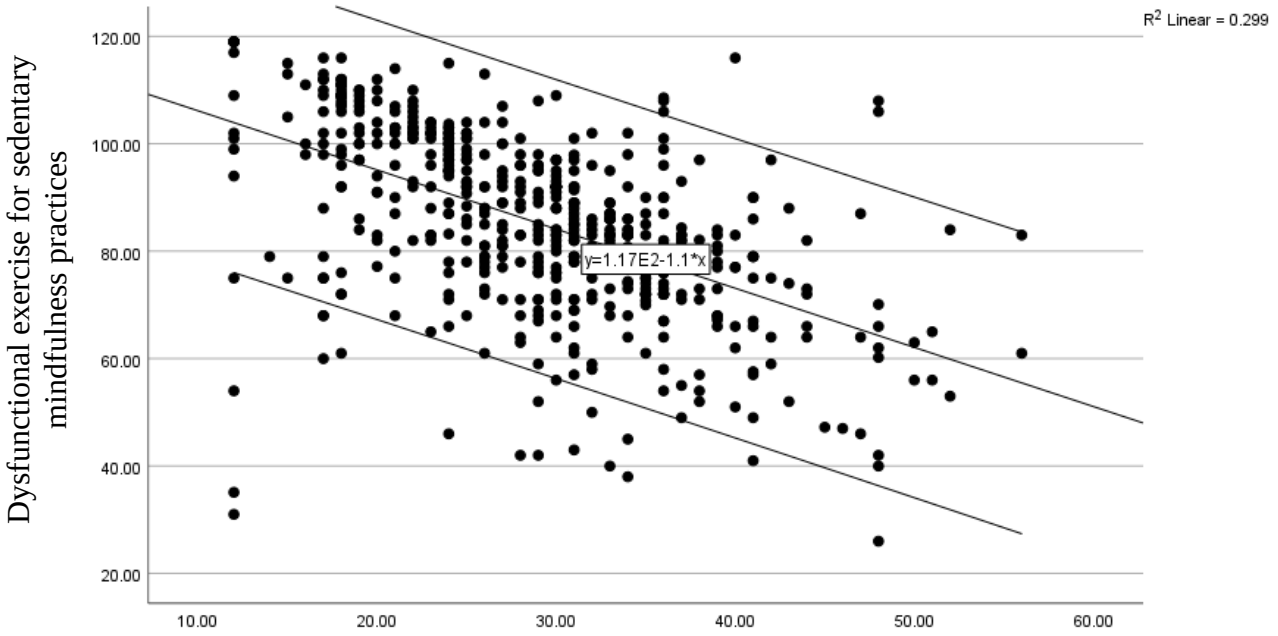
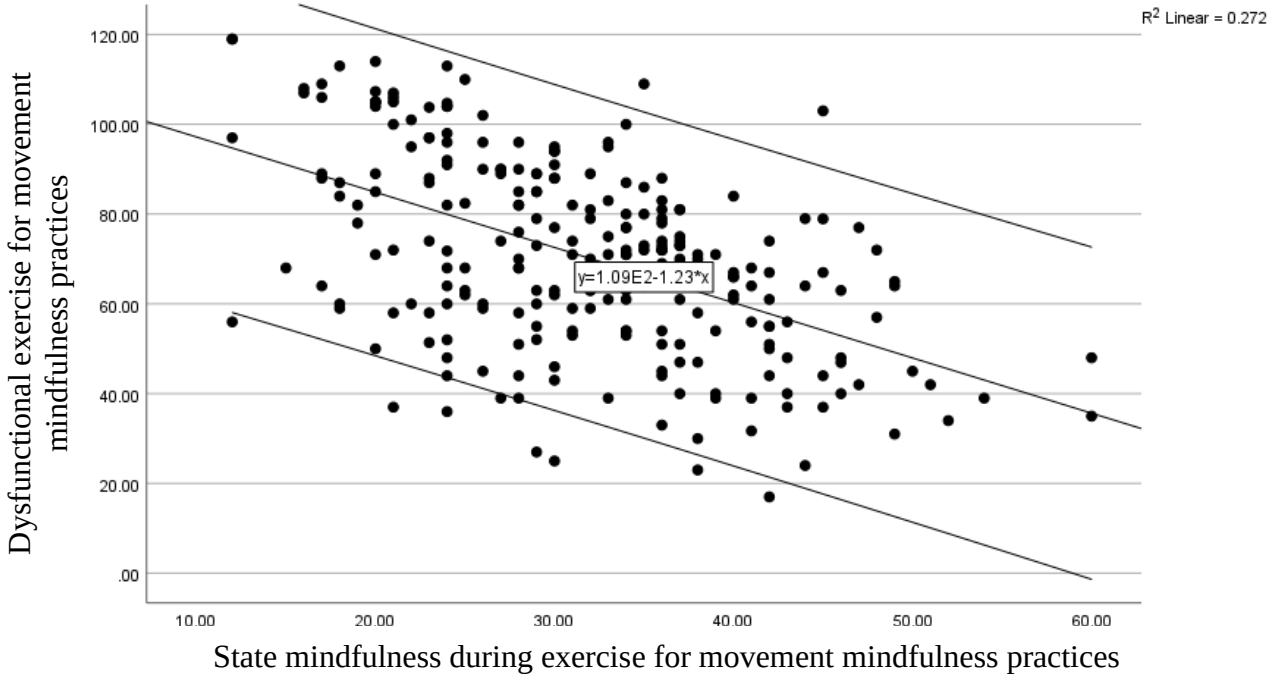


Figure 3

State mindfulness during exercise as a predictor of dysfunctional exercise for sedentary mindfulness practices and mindfulness practices involving movement





Appendix A: Recruiting Script

"The limits of healthy habits: Exploring the relationship between disordered eating, body image, mindfulness, social media, and dysfunctional exercise"

Hello,

I am Taylor Dinkel, a graduate student in the Psychology Department at Fort Hays State University. I would like to invite you to participate in a study. The purpose of my research is to explore the relationship between dysfunctional exercise, mindfulness, body image, and social media usage, as well as the wide spectrum of disordered eating presentations. If you choose to participate, you may click on the following link to be directed to the online survey: INSERT LINK HERE

The questions on the survey are related to your thoughts, behaviors, and routines surrounding diet and exercise and how they impact your daily life. The questions also pertain to your body image and health- and fitness-related goals. Participating might help you to learn something new about yourself. (Your professor may also be offering extra credit for your participation. / Completion of this survey will also automatically enter you into a gift card drawing). I would appreciate your help with this research project. The survey link will direct you to an informed consent document that includes more information about the study. Contact information for the researcher is included on the informed consent. Should questions arise at any time before, during, or after completing the study, please do not hesitate to email me and/or my faculty supervisor, Dr. Janett Naylor-Tincknell.

Thank you,
Taylor Dinkel
(tdinkel_3@mail.fhsu.edu)

Faculty Supervisor
Dr. Janett Naylor-Tincknell
(jmnaylor@fhsu.edu)

Appendix B: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Department of Psychology, Fort Hays State University

Study Title: "The limits of healthy habits: Exploring the relationship between disordered eating, body image, mindfulness, social media, and dysfunctional exercise"

Name of Researcher: Taylor Dinkel

Contact Information: t_dinkel3@mail.fhsu.edu

Name of Faculty Supervisor & Contact Information: Dr. Janett Naylor-Tincknell (jmnaylor@fhsu.edu)

You are being asked to participate in a research study. It is your choice whether or not to participate. You will receive a copy of this informed consent for your records.

What is the purpose of this study?

The current study aims to investigate the relationships between disordered eating, dysfunctional exercise, and several other variables including gender, social media usage, and mindfulness practices. The researchers will examine whether disordered eating influences an individual's relationship with exercise. The data gathered from this survey will serve as data for a master's thesis.

What does this study involve?

This study will involve participants taking an online survey which will be provided to voluntary participants. The survey should take no more than 30 minutes to complete.

Are there any benefits from participating in this study?

Along with providing individuals with an opportunity to reflect on their own relationship with food and exercise, participants may also be able to (obtain extra credit depending on the instructor's jurisdiction / be entered into a gift card drawing).

Will you be paid or receive anything to participate in this study?

No monetary compensation will be given out for participating in the study. However, (the instructor may give out extra and/or course credit points for the course / completion of the survey will automatically enter participants in a gift card drawing).

What about the costs of this study?

There are no anticipated major costs to partaking in the study, aside from spending a trivial amount of time to complete the survey.

What are the risks involved with being enrolled in this study?

There are no anticipated major risks for partaking in the study. It should be noted that participants are free to withdraw from the study at any time should they need to.

Additionally, contact information for the faculty sponsor, FHSU counseling center, and the National Eating Disorder Association Helpline will be included at the end of the study.

How will your privacy be protected?

All data collected from the survey will be anonymous. There is no need to denote name or any other personal information in the survey. Additionally, only the researchers and the faculty sponsors will have access to the anonymous data.

Other important items you should know:

• **Withdrawal from the study**: Participation in the study is completely voluntary. As such, participants are free to drop out of the study at any time should they feel the need to. There is no penalty for dropping out of the study.

• **Alternative options**: Participants wanting to participate in the study but cannot access the survey should speak to their instructor about participation, especially if the concern is for extra credit in class. Alternative methods will be available for students who may not want to participate in the study.

Whom should you call with questions about this study?

Participants with questions regarding any aspect of the study can speak to the faculty advisor, Dr. Janett Naylor-Tincknell by email at (jmnaylor@fhsu.edu). Additionally, any questions can also be sent to the email address of the researcher: Taylor Dinkel (t_dinkel3@mail.fhsu.edu).

CONSENT

I have read the above information about this study, and I agree to participate in this study. I understand that I can change my mind and withdraw my consent at any time. By continuing, I understand that I am not giving up any legal rights and I am between the ages of 18 and 65.

Appendix C: Debriefing Form

"The limits of healthy habits: Exploring the relationship between disordered eating, body image, mindfulness, social media, and dysfunctional exercise"

Debriefing Form

You have just completed a study titled "When exercise is taken to the extreme: Relationships among disordered eating, body image, mindfulness, and dysfunctional exercise." The purpose of this study was to explore the relationship between disordered eating and exercise patterns. You were asked to fill out a survey with questions regarding your thoughts and behaviors related to eating, mindfulness practices, and exercise patterns. The information provided will help researchers understand how dysfunctional exercise relates to disordered eating and various other variables.

The researchers greatly appreciate your help with this project. If you feel distressed after your participation in this project, you can contact the Health and Wellness Services—Counseling (free to students) at (785) 628-4401 to schedule an appointment to talk with someone about how the project impacted you. If you have general questions about the research process you can contact the Office of Scholarship and Sponsored Projects at (785) 625-4349. For further eating disorder specific support, the National Eating Disorder Association Helpline can be reached at (800) 931-2237 and more information about eating disorder resources can be found on the National Eating Disorder Association website, www.nationaleatingdisorders.org. For more information about this research project, you can contact the researcher listed below. You may also contact the faculty supervisor of this project for any questions or comments.

Sincerely,

Taylor Dinkel
(t_dinkel3@mail.fhsu.edu)

Faculty Supervisors
Dr. Janett Naylor-Tincknell
(jmnaylor@fhsu.edu)

Appendix D: Demographic Questions

What is your age?

What is your race/ethnicity?

-White
-Hispanic/Latinx/Spanish Origin
-Black/African American
-Asian, Hawaiian Native/other Pacific Islander

Which term best describes your gender identity?

-Woman
-Man
-Transgender woman
-Transgender man
-Non-binary or Gender queer
-Prefer not to say

Do you identify as an elite athlete (i.e. college, semi-professional, professional)?

-Yes
-No

Are you currently on a doctor's ordered, medically necessary restricted diet (i.e. lactose intolerance, low-sodium for blood pressure)?

-Yes
-No

Appendix E: Drive for Muscularity

The Drive for Muscularity Scale
(McCreary & Sasse, 2000)

Please respond to each statement using the following scale:
1 – Never, 2 – Rarely, 3 – Sometimes, 4 – Often, 5 – Almost Always

I wish that I were more muscular.
I lift weights to build up muscle.
I use protein or energy supplements.
I drink weight gain or protein shakes.
I try to consume as many calories as I can in a day.
I feel guilty if I miss a weight training session.
I think I would feel more confident if I had more muscle mass.
Other people think I work out with weights too often.
I think that I would look better if I gained ten pounds in bulk.
I think about taking anabolic steroids.
I think that I would feel stronger if I gained a little more muscle mass.
I think that my weight training schedule interferes with other aspects off my life.
I think that my arms are not muscular enough.
I think that my chest is not muscular enough.
I think that my legs are not muscular enough.

Appendix F: Drive for Thinness

The Eating Attitudes Test—Dieting Subscale
(Garner et al., 1982)

Please respond to each statement using the following scale:
1 – Never, 2 – Rarely, 3 – Sometimes, 4 – Often, 5 – Almost Always

I am terrified about being overweight.
I am aware of the calorie content of the foods I eat.
I particularly avoid food with high carbohydrate content (bread, pasta, etc.).
I feel extremely guilty after eating.
I am preoccupied with a desire to be thinner.
I think about burning up calories when I exercise.
I am preoccupied with the thought of having fat on my body.
I avoid foods with sugar in them.
I eat diet foods.
I feel uncomfortable after eating sweets.
I engage in dieting behavior.
I like my stomach to be empty.
I have the impulse to vomit after meals.

Appendix G: Body Preoccupation

The Objectified Body Consciousness Scale—Body Surveillance Subscale
(McKinley & Hyde, 1996)

Please respond to each statement using the following scale:
1 – Strongly disagree, 2 – Disagree, 3 – Somewhat disagree, 4 – Neither agree or disagree, 5 – Somewhat agree, 6 – Agree, 7 – Strongly agree

I rarely think about how I look.
I think it is more important that my clothes are comfortable than whether they look good on me.
I think more about how my body feels than how my body looks.
I rarely compare how I look with how other people look.
During the day, I think about how I look many times.
I often worry about whether the clothes I am wearing make me look good.
I rarely worry about how I look to other people.
I am more concerned with what my body can do than how it looks.

Appendix H: Time Spent on Social Media

Please select from the drop down your best estimate for each of the following questions.

How many minutes per day do you spend on social media platforms?
How many days per week do you use social media platforms?

Appendix I: Disordered Eating

Eating Disorder Examination-Questionnaire
(Fairburn & Beglin, 1994)

The following questions are concerned with the past four weeks (28 days) only. Please select the appropriate rating for each item. Remember that the questions refer to the past four weeks (28 days) only.
0 – No Days, 1 – 1-5 Days, 2 – 6-12 Days, 3 – 13-15 Days, 4 – 16-22 Days, 5 – 23-27 Days, 6 – Every Day

On how many of the past 28 days…
Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?
Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?
Have you tried to exclude from you diet any foods that you like in order to influence you shape or weight (whether or not you have succeeded)?
Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?
Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?
Have you had a definite desire to have a totally flat stomach?
Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?
Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?
Have you had a definite fear of losing control over-eating?
Have you had a definite fear that you might gain weight?
Have you felt fat?
Have you had a strong desire to lose weight?

Please select the appropriate number of days from the drop down. Remember that the questions only refer to the past four weeks (28 days).

Over the past 28 days…
How many time have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?
How many of these times did you have a sense of having lost control over your eating (at the time you were eating)?
How many days have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?
How many times have you made yourself sick (vomit) as a means of controlling your shape or weight?
How many times have you taken laxatives as a means of controlling your shape or weight?

How many times have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape, or amount of fat, or to burn off calories?

Please select the appropriate rating for each item. Please note that for these questions the term "binge eating" means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control overeating.
0 – No Days, 1 – 1-5 Days, 2 – 6-12 Days, 3 – 13-15 Days, 4 – 16-22 Days, 5 – 23-27 Days, 6 – Every Day

Over the past 28 days…
How many days have you eaten in secret (i.e., furtively)?...Do not count episodes of binge eating.
How many times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?...Do not count episodes of binge eating.
How concerned have you been about other people seeing you eat?...Do not count episodes of binge eating.

Please select the appropriate rating for each item. Remember that the questions only refer to the past four weeks (28 days).
0 – Never, 1 – Very Rarely, 2 – Rarely, 3 – Occasionally, 4 – Frequently, 5 – Very Frequently, 6 – Always

On how many of the past 28 days…
Has your weight influenced how you think about (judge) yourself as a person?
Has your shape influenced how you think about (judge) yourself as a person?
How much would it have upset you if you had been asked to weight yourself once a week (no more, or less) for the next four weeks?
How dissatisfied have you been with your weight?
How dissatisfied have you been with your shape?
How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?
How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?

Appendix J: Mindfulness during Exercise

State Mindfulness Scale for Physical Activity
(Cox et al., 2016)

Rate each statement based on your most recent experience of exercise. Please indicate how much you experienced each of the following statements using the following rating scale.
0 – Not at all, 1 – A little, 2 – Moderately, 3 – Quite a bit, 4 – Very much

I was aware of different emotions that arose in me.
I noticed pleasant and unpleasant emotions.
I noticed pleasant and unpleasant thoughts.
I noticed emotions come and go.
I noticed thoughts come and go.
It was interesting to see the patterns of my thinking.
I focused on the movement of my body.
I felt present in my body.
I listened to what my body was telling me.
I was aware of how my body felt.
I noticed the sensations in my body.
I was in tune with how hard my muscles were working.

Appendix K: Primary Mindfulness Practice

Please select your primary practice for the following question.

Does your mindfulness practice primarily involve movement (e.g., running, yoga, tai chi) or is your mindfulness practice primarily sedentary (e.g., meditation, seating breathing, journaling, art)?

-Movement -Sedentary

-Do not practice mindfulness

Please select from the drop down your best estimate for each of the following questions.

How many days per week do you spend performing this primary mindfulness activity?

How many minutes per day do you spend performing this primary mindfulness activity?

Appendix L: Dysfunctional Exercise

Compulsive Exercise Test
(Taranis et al., 2011)

Please select the appropriate rating for each item.
0 – Never, 1 – Very Rarely, 2 – Rarely, 3 – Occasionally, 4 – Frequently, 5 – Very Frequently, 6 – Always

I exercise to improve my appearance.
I like my days to be organized and structured of which exercise is just one part.
I find exercise a chore.
If I feel I have eaten too much, I will do more exercise.
My weekly pattern of exercise is repetitive.
I do not exercise to be slim.
If I cannot exercise, I feel low or depressed.
I feel extremely guilty if I miss an exercise session.
I usually continue to exercise despite injury or illness unless I am very ill or too injured.
I enjoy exercising.
I exercise to burn calories and lose weight.
If I miss an exercise session, I will try and make up for it when I next exercise.
If I cannot exercise, I feel agitated and/or irritable.
If I cannot exercise, I worry that I will gain weight.
I follow a set routine more my exercise sessions (e.g. walk or run the same route, particular exercises, same amount of time).
If I cannot exercise, I feel angry and/or frustrated.
I do not enjoy exercising.
I feel like I've let myself down if I miss an exercise session.
If I cannot exercise, I feel anxious.

Appendix H: Letter of Approval from the Institutional Review Board (IRB)

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OFFICE OF SCHOLARSHIP AND SPONSORED PROJECTS

DATE:	November 22, 2021
TO:	Taylor Dinkel, B.S.
FROM:	Fort Hays State University IRB
STUDY TITLE:	[1840764-1] The limits of healthy habits: Exploring the relationship between disordered eating, body image, mindfulness, social media, and dysfunctional exercise
IRB REFERENCE #:	22_0045
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	November 22, 2021
REVIEW CATEGORY:	Exemption category # *2*

Thank you for your submission of New Project materials for this research study. The departmental human subjects research committee and/or the Fort Hays State University IRB/IRB Administrator has determined that this project is EXEMPT FROM IRB REVIEW according to federal regulations.

For any research that will be conducted face-to-face, the FHSU IRB strongly recommends that the PI and research team adhere to CDC guidelines regarding COVID-19. Please note that neither FHSU nor the FHSU IRB are responsible in the event that a participant and/or member of the research team is exposed to risks related to COVID-19.

Please note that any changes to this study may result in a change in exempt status. Any changes must be submitted to the IRB for review prior to implementation. In the event of a change, please follow the Instructions for Revisions at http://www.fhsu.edu/academic/gradschl/irb/.

The IRB administrator should be notified of adverse events or circumstances that meet the definition of unanticipated problems involving risks to subjects. See http://www.hhs.gov/ohrp/policy/AdvEvntGuid.htm.

We will put a copy of this correspondence on file in our office. Exempt studies are not subject to continuing review.

If you have any questions, please contact Whitney Whitaker at IRB@fhsu.edu. Please include your project title and reference number in all correspondence with this committee.

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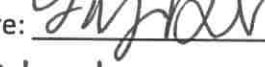
Author: Taylor Dinkel

Signature: 

Date: 4/27/22