DISSERTATION

USING STRUCTURAL EQUATION MODELING TO ASSESS THE RELATIONS BETWEEN EXERCISE, IDENTITY, AND PSYCHOSOCIAL OUTCOMES

Submitted by

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In partial fulfillment of the requirements

For the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer 2025

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ABSTRACT

USING STRUCTURAL EQUATION MODELING TO ASSESS THE RELATIONS BETWEEN EXERCISE, IDENTITY, AND PSYCHOSOCIAL OUTCOMES

Exercise is known to be a healthy behavior, supporting physiological, psychological, and socioemotional health. However, for some individuals, particularly those who strongly identify as "exercisers," exercise may become disordered, motivated by individuals' internalization of sociocultural ideals and perfectionistic tendencies. The goal of this study was to use structural equation modeling to explore the relations between exercise identity, exercise motivation, sociocultural influences on exercise and body image, and psychosocial outcomes. Data were collected from two samples, college students and non-college adults, who engaged in exercise regularly. Several latent variable models were tested to assess the relations between body image, body and exercise-specific co-rumination, perceived sociocultural pressure, exercise identity centrality, intuitive exercise, and social and emotional health. Key findings indicated that exercise that is motivated by diet-culture beliefs is associated with increased experiences of depression, anxiety, and stress. Additionally, intuitive exercise partially mediated the relation between exercise identity and mental wellbeing. Finally, body image distress and body and exercise co-rumination significantly mediated the influence of sociocultural pressure on exercise motivation. Results supported a nuanced perspective of exercise behavior, emphasizing the importance of identity centrality and sociocultural messaging in determining whether exercise contributes to either health or harm. Implications for intervention and future research in clinical, community, and educational settings are discussed.

ACKNOWLEDGEMENTS

I would like to thank my academic advisor Dr. Bradley Conner, and my dissertation committee, Dr. Ernest Chavez, Dr. Meara Faw, and Dr. Gwenith Fisher, for their support in this project. Their patience with me as I learn how to be a better researcher has been tremendous. Brad, thank you for stepping in, first as a mentor and then as my advisor. I deeply appreciate your guidance and willingness to teach me, not only academically but professionally, as well. Ernie, thank you for taking the role as a member of my dissertation committee so close (maybe?) to your retirement. It has been a joy to learn from you, both as a student and as a TA. Meara, your consistent kindness, mentorship, and belief in me has been monumental. I do not know where I would be in my academic journey without you, and I certainly would not have as many publications and presentations! Thank you for including me in your communications world. Gwen, thank you for being an amazing teacher of all things research methods and technology. I have always enjoyed learning from you and hearing updates on all the hockey.

I cannot express enough gratitude to my husband and partner, Mark. Mark, you have been my rock throughout the past five years. You have believed in me, encouraged me, listened to me, and celebrated with me during all the highs and lows of graduate school. You have helped me find the courage to make a huge change in my life (and our life) by leaving behind my career to pursue a different path. Your care, humor, and understanding have meant the world to me.

Finally, my parents, Karen and Ray, and my sister, Shannon, have always cheered me on from afar, even when I take my own path. I have not followed the conventional routes, which is (I'm sure) frightening at times for loved ones to witness, but they have loved, accepted, and

supported me even during the unknowns and risks. Thank you for caring about my dreams and being a part of my journey towards becoming a licensed psychologist.

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Introduction

Decades of research supports the knowledge that exercise is related to positive physiological and psychosocial health outcomes (Mikkelsen et al., 2017). Individuals who engage in consistent exercise behaviors tend to experience decreased psychological symptoms like anxiety and depression as well as increased physical health outcomes such as enhanced immunological functioning (Mikkelsen et al., 2017). Additionally, individuals who do not engage in physical activity are at higher risk of developing adverse health outcomes such as hypertension, diabetes, and osteoporosis (Morrow et al., 2004). However, many people who exercise engage in physical activity in a compulsive or obligatory manner, which can lead to negative outcomes (Lichtenstein et al., 2017).

There are many different reasons why people exercise, including physical health, mental health, enjoyment, social connection, and manipulation or maintenance of body weight, shape, or size (Cash et al., 1994). Additionally, because individuals often have performance outcomes they hope to attain by exercising, some people tend to exercise in prescribed or regimented ways (De Young & Anderson, 2010). When exercise is motivated by preoccupation with body size and shape, rigidity, perfectionism, or is done in efforts to avoid coping with certain feelings, it can become compulsive and preoccupying to an unhealthy degree (Meyer et al., 2011). Given that there are both positive and negative health outcomes related to exercise, it is important to better understand the nuances of exercise and how different factors related to exercise may influence physical and psychosocial outcomes.

One of the considerations that can impact the distinction between healthy exercise behavior and compulsive exercise is the role exercise plays in one's identity (Pike et al., 2022).

The degree to which an individual identifies as an exerciser can lead to both positive and adverse outcomes. While having a higher level of exercise identity can lead to lower body dissatisfaction and increased motivation to engage in physical activity, it can also lead to compulsive exercise, which is associated with disordered eating, increased body dissatisfaction, unhealthy body manipulation strategies, and injury (Lu et al., 2012). Some studies suggest that the internalization of the thin or athletic body ideal may facilitate the relation between exercise identity and compulsive exercise (Karr et al., 2013). Pankratow and colleagues (2013) found that individuals who hold higher levels of exercise identity were more likely to experience attractiveness as a motivation for engaging in exercise behavior. Additionally, for individuals whose identities are strongly rooted in athleticism or who have engaged in exercise in a professional or competitive context, the likelihood of compulsive exercise increases (Turton et al., 2017).

Another important determinant in considering the outcomes of individuals who have high levels of exercise identity is the impact of sociocultural pressure around exercise behavior, body ideals, and the degree to which one's social network is connected to their exercise behaviors (Reynolds et al., 2022; Strachan et al., 2012). This pressure can take the form of individual comments from family or peers, media exposure, and the broader cultural context of idealizing certain behaviors that are believed to lean towards achieving the "ideal" body (Eikey, 2021). Additionally, individuals often seek social support in their relationships by engaging in co-rumination specifically around exercise, food, and bodies (Faw et al., 2021). This experience is paradoxical, in that it often leaves people feeling more connected to their peers but leaves them feeling worse about the problem of focus (Faw et al., 2021).

The purpose of this study was to further explore relations between exercise identity and sociocultural outcomes such as anxiety, depression, perceived social support, and compulsive

exercise behaviors. Data were collected from two samples, college students and non-college students, and structural equation modeling was used to test hypotheses related to exercise identity, exercise motivation, psychosocial health, body image, and disordered exercise behaviors.

Defining Exercise

While the term "exercise" is used frequently in everyday language, it often means different things to different people based on sociocultural context and experiences (Caperchione, 2011). Because this study is meant to better understand the function of exercise in identity development as well as the impact of one's relationship with exercise on mental, physical, and social outcomes, it is important to clearly define physical activity, exercise, and physical fitness.

Physical activity is movement of any form that engages the musculoskeletal system and utilizes energy (Casperson et al., 1985). By this definition, physical activity includes many forms of movement that individuals do in their daily life, such as vacuuming a room, moving or lifting items (i.e., rearranging a bookshelf), and walking to and from their car at the grocery store (Dannenberg, 1989). While physical activity can have intention and structure (i.e., certain number of repetitions weightlifting, certain time spent in a particular exercise, etc.), it does not have to. Physical activity can vary in intensity and duration. However, the Center for Disease Control and Prevention (CDC) recommends that adults engage in at least 150 minutes of moderately intense activity each week in addition to specifically incorporating two activities that work towards strengthening muscles (CDC, 2022).

Exercise involves engaging in physical activity in a way that is planned, practiced, and structured, with the goal of improving or maintaining physical fitness (Caspersen et al., 1985). Thus, a key distinction between physical activity and exercise centers on the person's

intentionality and motive for their movement. Exercise behaviors can be focused on one or many goals, including cardiovascular stamina, musculoskeletal health, or mobility (Crawford & Ecklund, 1994). Examples of exercise that individuals might engage in are intentional walks (i.e., walking for a period of time rather than to get from a car to a destination), swimming, playing a sport, yoga, or weightlifting, among others. Again, the CDC suggests that to maximize benefits from physical activity, adults should engage in moderate-intensity activities and strength-building exercises for at least 150 minutes per week (CDC, 2022)

Physical fitness is a construct which defines the set of skills one develops because of exercise, or the measurable status of various health markers (Casperson et al., 1985). There are many measures of physical fitness, including endurance, strength, body composition, and flexibility (Corbin et al., 2000). For example, physical fitness could describe the amount of weight one is able to lift, how fast they are able to run a mile, or their heart rate. While physical fitness can be a result of exercise and physical activity, it is a distinct construct, as it is not an activity but an outcome. Additionally, although people with high levels of physical fitness also tend to also have good health, physical fitness is not synonymous with health (Haskell et al., 1985).

Exercise and Positive Health Outcomes

Movement in the form of exercise and physical activity can play a significant role in an individual's pursuit of health (Mikkelsen et al., 2017). Dating back to 5th century B.C.E., exercise has been considered medicinal and a way to prevent the physical effects of aging (Apostolopoulos et al., 2014). Countless studies have shown the physiological, psychological, and socioemotional benefits of exercise (Mikkelsen et al., 2017).

It has long been established that physical activity and exercise are associated with positive physiological health outcomes (Penedo & Dahn, 2005). Physical activity has been shown to decrease the risk of many diseases and adverse physical health outcomes, including diabetes, cancer, osteoporosis, cardiovascular disease, and hypertension (Warburton et al., 2006). Additionally, individuals who engage in regular physical activity are more likely to have longer life expectancy and an increased quality of life (Reimers et al., 2012). In their review, Mikkelsen and colleagues (2017) highlight processes by which exercise can reduce inflammation. Because exercise induces a stress response in the body, it initially stimulates inflammation. In response, the body then produces more anti-inflammatory cytokines than it ordinarily would, which can result in long-term decreases in inflammation. Additionally, exercise has been shown to reduce adipose tissue, which is a producer of inflammatory proteins, again leading to a reduction in inflammation. These authors also discuss the immunological benefits of exercise, including protecting the body from infection and disease.

Physical activity is also related to improved health outcomes related to aging, including delaying the onset of neurodegeneration (Deslandes et al., 2009). Additionally, it has been shown to improve blood flow to the brain, facilitating the release of neurotransmitters, and increasing neuron production (Deslandes et al., 2009). Lee (1995) found that, not only does exercise decrease risk for developing cancer, but it also enhances the immune system in individuals without cancer and those who had a cancer diagnosis. In addition to the health benefits of physical activity and exercise, individuals who are physically inactive are at higher risk of developing many of the adverse health outcomes that exercise can prevent, such as cardiovascular diseases, diabetes, cancer, osteoporosis, and stroke (Morrow et al., 2004).

Just as with physical health, research consistently shows that exercise can improve mental health by enhancing mood, self-esteem, and overall quality of life (Wang & Ashokan, 2021). Exercise has also been shown to lead to reduction of suicidal thoughts, improvement of sleep functioning, and increased energy (Apostolopoulos et al., 2014). Additionally, exercise has been integrated into treatment plans for individuals suffering from severe mental illness and is often considered one of the most imperative aspects of treatment (Richardson et al., 2005). In addition to increasing levels of psychological health, physical activity has also been shown to reduce psychological distress related to stress, depression, and anxiety (Mikkelsen et al., 2017). Poirel (2017) suggests that these positive outcomes are, in part, related to the ways in which exercise allows individuals to challenge themselves, realize their abilities, and overcome hardship.

Various types of exercise and physical activity impact psychological health in positive ways (Edwards et al., 2005). While studies show that cardiovascular exercise tends to have more significant effects on decreasing depression, lower-intensity exercise behaviors, such as stretching, also have a positive mental health outcome (Wipfli et al., 2011). In addition, while exercise can be done in many different settings, research increasingly supports the unique benefits of engaging in physical activity outdoors and in nature, suggesting that connection with nature enhances the health outcomes from exercise (Brymer et al., 2014).

Not only does exercise contribute to clear physiological and psychological benefits, it can also support social health. Exercise is often done in social contexts, and social connection can be a significant motivator for and positive outcome of engaging in exercise behaviors (Hwang et al., 2019). Group exercise has been an effective way to support individuals' social connection, which can result in decreased experiences of anxiety and loneliness (Morrey et al., 2020). Some studies

argue that exercising with another person increases exercise performance (perhaps because of competition) while it increases psychological benefits such as stress reduction (Plante et al., 2001).

Exercise and Disorder

While associated with several physiological, psychological, and social benefits, exercise can be associated with negative physiological and psychosocial outcomes. Particularly within eating disorder populations, exercise can be problematic. A recent meta-analysis showed that individuals with eating disorders are almost four times more likely to experience disordered exercise than those without eating disorders (Trott et al., 2021). Among those with eating disorders, almost 50% engage in exercise compulsively, with 80% of individuals who struggle with Anorexia Nervosa exercising in disordered ways (Dalle Grave et al., 2008).

Exercise is considered disordered when it is done with extreme rigidity, or when motivation to exercise is either for the purpose of manipulating one's body size or shape or to compensate for food intake (Lichtenstein et al., 2017). When exercise is used in these ways, it can be connected with issues related to compulsivity, eating disorders, overuse or injury, and social withdrawal (Lichtenstein et al., 2017). Additionally, compulsive exercise can contribute to the development of anemia, anxiety and depression, decreased immune functioning, and menstrual irregularity, all of which result in significant wear and tear on the body (Ahn et al., 2020).

Compulsive Exercise. To understand the ways in which exercise can be disordered, it is important to discuss the nature of the exercise. Compulsive exercise is understood as an excessive and rigid approach to exercise, with the purpose of avoiding perceived negative consequences or unpleasant emotions related to the fear of those specific consequences (Dittmer

et al., 2018). For example, if a person has a weekly running regimen, their relationship with exercise might be considered compulsive if they regularly run when they are injured or ill, or if they are unwilling or unable to rest or engage in a different activity, such as a hike, or a yoga class, without also completing their run. Lichtenstein and colleagues (2017) discuss the difficulty of measuring the prevalence of compulsive or addictive exercise but suggest that 0.5% of the general adult population in the United States experience exercise addiction.

Individuals who hold internalized weight biases, have difficulty regulating emotions, engage in maladaptive coping strategies, are perfectionists, and typically more rigid in their cognitive and behavioral routines and standards for themselves are at higher risk of becoming compulsive exercisers (Meyer et al., 2011). Exercise is often used as an effective coping strategy for emotion regulation (Pike et al., 2022). When individuals do not have additional adaptive strategies to regulate their emotions or cope with distress, they may become compulsive in their exercise routines (McGilley, 2014). Perfectionism and rigidity are also predictors of compulsive exercise, as people who hold themselves to higher standards are more likely to push themselves past their limits, regardless of consequences (Grave, 2009)

Compulsive exercise is commonly associated with addictive or dependent qualities and often results in individuals experiencing obsessive or perseverating thoughts centered around exercise (Bratland-Sanda et al., 2019). Some researchers consider compulsive exercise a behavioral addiction, as it shares many addictive qualities, including a sense of limited control over the behavior, chemical releases which occur with exercise, and withdrawal symptoms when exercisers are forced to disengage from exercise (Ahn et al., 2020; Polivy & Clendenen, 1993). In particular, when exercise is a primary form of one's identity and sense of self-worth, it can become a compulsive behavior rather than a health behavior (Groves et al., 2008). A recent study

showed that compulsive exercise was often exacerbated by sociocultural pressures to achieve a certain body ideal, typically one that is thin and lean (Fan et al., 2021). As such, compulsive exercise can be related to one's efforts to achieve a thin or more muscular body and often accompany disordered eating behaviors (De Young & Anderson, 2010).

Eating disorders are psychological disorders which include anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED; American Psychological Association, 2013). AN is characterized by restrictive eating, preoccupation with body shape or size, and intense fear of weight gain. Individuals with AN may also engage in binge eating or purging behavior over the course of their disorder. Many people with AN also engage in exercise to maintain control over their body shape and size, which can lead to further health concerns and injury due to the impacts of restriction of food (Gaudiani, 2018).

BN is characterized by recurrent episodes of binge eating followed by purging behaviors with the intent to compensate for potential weight gain, as well as preoccupation with body shape or size (American Psychological Association, 2013). Binge eating is defined by eating significantly large amounts of food in a short period of time, while purging is any compensatory behavior, including self-induced vomiting, laxative or diuretic misuse, fasting, or excessive exercise. BED is characterized by recurrent episodes of binge eating without purging. Among individuals with BN, exercise is frequently one method of purging or compensating for past or future binge-eating episodes (Holland & Tiggerman, 2017). Those with BN who use exercise in this way may be at higher risk for health problems such as electrolyte imbalances and cardiac issues (McGilley & Pryor, 1998).

Exercise is consistently a primary compensatory or purging behavior used by individuals suffering from AN and BN (Reynolds et al., 2022). Many studies highlight relations between

body image, disordered eating, and compulsive exercise (Reynolds et al., 2022; Fan et al., 2021; White & Halliwell, 2010). Reynolds et al. (2022) found that compulsive exercise for the purpose of controlling one's body weight, shape, or size was strongly correlated with eating disorder development and maintenance. Additionally, compulsive exercise is likely to increase when individuals experience body image disturbance, as well as when one's disordered eating behaviors are interrupted (i.e., when someone is unable to engage in restrictive eating; Fan et al., 2021). Compulsive exercise not only serves as a function of eating disorder psychopathology, but it can also act as a form of eating disorder maintenance (Grave, 2009). Additionally, within the context of eating disorders, compulsive exercise has been shown to be associated with increased psychological distress and decreased quality of life (Young et al., 2018).

Because exercise is often a positive health behavior, it can be difficult to identify when exercise is done in a compulsive way and, as a result, can often lead individuals to receive positive social feedback for their commitment to exercise, level of fitness, or weight loss achieved as a result of exercise (Peterson et al., 2007). Additionally, exercise is embedded as a highly valued behavior within many cultures and societies (Chalk et al., 2013). Particularly in societies which place significant emphasis on the value of the "ideal" body, compulsive exercise behaviors may appear to be typical and even admirable (Fan et al., 2021).

Exercise compulsions may drive individuals to engage in exercise even when their bodies are overly tired, physically ill, or experiencing pain (McGilley, 2014). Compulsive exercise is associated with overuse injury, anemia, decreased immunity, menstrual irregularities (Ahn et al., 2020) and adverse mental health outcomes like anxiety and depression (Cosh et al., 2023). Particularly when one participates in high intensity or competitive athletic or exercise environments, they are more likely to tolerate injury and engage in exercise which might

exacerbate that injury (Lantz et al., 2004). When exercise or one's status as an athlete is a significant part of their identity, they are more likely to exercise regardless of physical injury, and they are more likely to experience adverse mental health outcomes when they are unable to exercise due to injury (Turton et al., 2017). Individuals who have eating disorders are more likely to engage in excessive exercise and are also at higher risk of developing injuries like stress fractures or other overuse injuries due to low bone density or osteopenia (Currie & Morse, 2005). Additionally, among those with eating disorders, exercise can also lead to cardiac problems and interference with weight-restoration during treatment (El Ghoch et al., 2016).

Exercise Motivation

Because exercise can be both a health behavior and a disordered behavior, it is important to understand one's motivation for engaging in exercise. Self-objectification can be a primary motivator for both men and women to engage in exercise and is negatively associated with mental health outcomes such as self-esteem (Strelan & Hargreaves, 2005). Exercise identity has been shown to be a predictor of appearance-based motivations for exercise (Murray et al., 2013). Tylka & Homan (2015) discuss the impact of exercise motivation on positive health behaviors, finding that exercising with the intention of improving overall health contributes to higher body appreciation compared with individuals who exercise with a motivation to manipulate their body.

A primary reason people engage in exercise is the pressure they perceive from society about body size and shape and the value of engaging in exercise (Reynolds et al., 2022). Sociocultural messaging and peer pressure about gender and the "ideal" body can significantly influence a person's sense of self and worth (Phares et al., 2004). Studies have shown that both women and men are impacted by body dissatisfaction, however, women are disproportionately impacted by negative body image (Brennen et al., 2010). Additionally, for individuals who are

non-binary, transgender, or gender nonconforming, experiences of discrimination, rejection, and other social consequences contribute to negative body image (Heiden-Rootes et al., 2023).

Because sociocultural body ideals vary across the gender spectrum, individuals of all genders are impacted by messaging about what the attractive or ideal body size, shape, or weight is (Sicilia et al., 2022). With the rise of social media, these messages have become even more pervasive and accessible. "Fitspiration" accounts on platforms like Instagram and TikTok and pro-anorexia (pro-ana) sites have been shown to contribute to reinforcing the idea that men must strive for muscularity and women must strive for thinness (Eikey, 2021; Juarez et al., 2012; Peebles et al., 2012). Additionally, recent findings suggest that among transgender and nonbinary individuals, perceived pressure to attain a societally "acceptable" body based on one's gender identity is a primary motivator for engaging in exercise (Oliveira et al., 2022).

When individuals of any gender perceive pressure from external sources to manipulate their bodies, they are more likely to engage in exercise in an obligatory or compulsive way (Reynolds et al., 2022; Chalk et al., 2013). The sociocultural model of excessive exercise (White & Halliwell, 2010) suggests that body image mediates the relation between sociocultural pressures and perceived need for exercise. Additionally, the relation between sociocultural pressure and excessive exercise behavior is mediated by body image (Contractor & Rasquinha, 2021). Their findings indicate that negative body image is the means through which perceived societal pressure about exercise leads individuals to engage in exercise in unhealthy ways. Additionally, sociocultural pressure has been shown to be a mediator between disordered eating attitudes and compulsive exercise (Fan et al., 2021). This suggests that, when individuals hold beliefs about food that are indicative of disorder, internalizing sociocultural messages about "ideal" bodies can lead them to engage in exercise in unhealthy ways.

Shin and colleagues (2017) found that the largest source of pressure towards internalization of the thin body ideal was media, followed by pressure from important others such as parents, peers, or partners. These findings indicate that, while social media is a leading contributor to internalized body image distress, individuals are also highly influenced by the people closest to them. When people are exposed to others who fixate on weight and body size, they are more likely to internalize beliefs about the importance of their own body for acceptance (Shin et al., 2017). As such, environments and cultures with higher focus on thinness, muscularity, or being "fit" can lead to higher risk of engaging in exercise in compulsive ways.

To fully understand the sociocultural influences on exercise motivation, is important to mention the impact of weight stigma and diet culture. Body weight, shape, and size have become embedded in the sociocultural landscape, particularly in Western cultures, with a weight loss industry worth $72 billion in the United States alone (Marketdata LLC., 2019). Children as young as five years old express a desire to lose weight, and more than 68% of Americans have reported engaging in diet and exercise behaviors with the intention of losing weight (NPD Group, 2016; Abramovitz & Birch, 2000). Because dieting and exercise have become such pervasive parts of many societies, the construct of diet culture was developed (Harrison, 2019). Diet culture describes the attribution of better health, higher status, and morality to people in thin bodies or those who are pursuing thinness, while consequently attributing worse health, lower status, and less morality to those who are in larger bodies and are not attempting to change (Harrison, 2019).

Since diet culture associates value with body appearance, it often results in the stigmatization of people in larger bodies, as well as more traditional forms of stigma related to race, ethnicity, gender, and disability (Puhl & Heuer, 2010). As such, individuals in larger bodies

often experience size-based discrimination in domains such as employment, education, and health care, as well as in interpersonal relationships (Tomiyama, 2014). These experiences can lead to severe psychological and physiological outcomes, such as depression, anxiety, and cardiac issues (Major et al., 2012).

Another sociocultural factor in body image and, as a result, exercise motivation, is body co-rumination. Co-rumination is a term developed to describe the act of discussing problems exhaustively with peers in an effort to receive social support (Rose, 2002, 2021). Co-rumination has been shown to have paradoxical effects, resulting in individuals feeling more satisfied in their relationships, but also more strongly internalizing the problems about which they are co-ruminating (Rose, 2002, 2021). Faw and colleagues (2021) explored the effects of body-specific co-rumination. Their findings suggested that when individuals engage in co-rumination specifically related to food behaviors and body image, they also experienced higher levels of body dissatisfaction (Faw et al., 2021).

Exercise and Identity

Because exercise and athleticism are so highly valued in society, they are often ways in which people see themselves (Cashmore, 2008). People often derive both individual and social meaning from being known as a person who exercises (Bruner et al., 2014). Strong levels of exercise and athletic identity predict exercise behavior and, in turn, exercise compulsivity (Turton et al., 2017).

Communication Theory of Identity. Identity can be understood as both the unique qualities which set one apart from others and the ways in which one relates to their broader cultural contexts (Buckingham, 2008). Identity has been defined in countless ways and through many different models and theoretical approaches. Because exercise is not only embedded in an

individual's perception of themselves but is also behavior that is valued within the broader sociocultural context, a theory which integrates not only the ways in which one understands themselves, but also the ways in which they are perceived by others and communicate their identity to others is needed.

The Communication Theory of Identity (CTI) is a multilayered approach to understanding the ways in which individuals experience their "self" in several intersecting and interdependent contexts (Hecht et al., 2005). The CTI posits that there are four layers to one's identity: personal, relational, enacted, and communal. Each of these layers of identity exists in both the individual and communal contexts. The personal layer of identity encompasses how one defines of the self via things like personality, roles, and group identities. The relational layer of identity describes the ways in which identity exists relative to other people; in other words, CTI claims that identities exist through comparison to other people and roles individuals assume in relationships with other people. The enacted layer of identity describes the behaviors individuals use in order to express the way they see themselves. Finally, the communal layer of identity describes the sociocultural definitions of identity. The communal layer includes societal groups like religions, education, and politics.

Exercise is embedded in individual sense of self, community connection, and relationships. The ways in which one identifies as an exerciser is not only a sense of self-concept, but also shaped by relationship and sociocultural contexts and values. Additionally, individuals who identify as exercisers communicate their exercise identity through exercise behaviors, their body image, and language centered around exercise activities. CTI captures these interconnected contexts and allows for a deeper understanding of the relationship between

seeing oneself as an exerciser, engaging in actions to communicate that one is an exerciser, and the broader sociocultural values of exercise.

Identity Centrality. Identity centrality is a construct used to understand the degree to which facets of one's identity are important in their sense of self and social connection (Meca et al., 2015). Identity centrality can help explain one's sense of self related to the strength of various identities one holds (Sellers et al., 1997). While all humans possess a number of intersecting identities, which can include race, ethnicity, gender, age, socioeconomic status, sexual orientation, and religion, some identities impact one's sense of self more significantly than others (Sellers et al., 1997). Identities which are more central to an individual are more likely to hold more significance in their worldviews and behavior, while also contributing to more distress when they are impacted (Settles, 2004).

Exercise Identity. Several researchers have studied the role exercise plays in one's identity. Exercise can be an important part of how individual's view themselves as well as how they view themselves in context of society (Anderson & Cychosz, 1994). Additionally, exercise holds diverse meaning across individuals, and as such, exercise identity varies between individuals and across cultures (Strachan et al., 2014). Because exercise is often used to improve self-esteem, and self-esteem is grounded in the reinforcement of oneself, exercise often becomes integrated into one's identity (Groves et al., 2008). Exercise identity, therefore, can be understood as emphasizing the role of exercise behaviors in one's sense of self (Cook et al., 2015).

Because identity tends to drive behavior, exercise identity is often related to exercise behavior (Reifsteck et al., 2016). Individuals are more likely to engage in behavior when their motivation is related to values or identity rather than external factors (Settles, 2004).

Additionally, since exercise identity tends to be highly valued in society, sociocultural pressures may be even more likely to increase exercise behaviors among those who hold strong levels of exercise identity (Strachan et al., 2017).

While high levels of exercise identity have been shown to lead to several positive outcomes, including lower levels of body dissatisfaction and increased exercise-related physiological health outcomes, it is also associated with compulsive exercise (Karr et al., 2014). Particularly among women who find value in maintaining or achieving a thin, lean body shape, high levels of exercise identity predict vulnerability to compulsive exercise (Karr et al., 2013). Additionally, individuals who value their exercise identity within a competitive or professional athletic environment are more likely to engage in compulsive exercise behavior and experience physical and psychological consequences as a result (Weinstein et al., 2015; Lantz et al., 2004). Pike and colleagues (2022) found that, regardless of whether individuals tend towards adaptive or maladaptive emotion regulation techniques, those who hold high levels of exercise identity are more likely to engage in higher levels of compulsive exercise. This can be particularly problematic when someone with high levels of exercise identity is unable to engage in exercise identity-consistent behavior (i.e., they are unable to exercise in the ways they believe they should), as they are more likely to experience adverse emotions such as shame and guilt (Flora et al., 2012).

Intuitive Exercise

With the multitude of pressures and identity-related motivators that drive exercise behavior, it can be difficult to engage in exercise in a holistically healthy way. Intuitive Exercise (IEX) is a way of engaging in exercise during which one is aware of and attends to their bodily needs when they exercise (Reel et al., 2016). Similar to the Intuitive Eating (IE) philosophy

developed by Tribole and Resch (2012), IEX suggests that one engages in exercise in a mindful way, with body awareness and a positive mindset (Yon et al., 2022). Individuals who use IEX to inform their exercise behaviors tend to make exercise choices based upon what they recognize their bodies need, including what type of exercise, duration of exercise, and intensity of exercise (Reel et al., 2016).

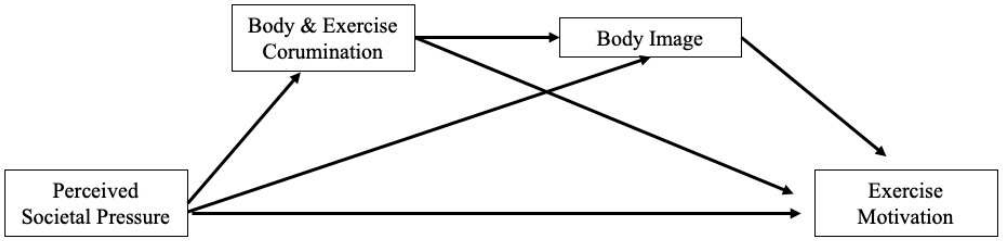
Intuitive exercise has been shown to have a positive correlation with motivation for exercise, exercise behaviors and habits, self-concept (including self-esteem and body image), and quality of life (Bacevičienė et al., 2021). In contrast to other forms of exercise which might be shame-based or more regimented, IEX offers individuals increased flexibility and autonomy in their exercise behaviors, while also shifting the goal of exercise away from body manipulation or punishment and towards body respect (Yon et al., 2022). As such, people who exercise intuitively are more likely to associate positive emotional and physiological feelings with exercise, thus increasing their motivation to continue exercising (Bacevičienė et al., 2021).

Hypotheses

The goal of the current study was to explore the relations between exercise, identity, relationships, and mental health. Because exercise motivation, preferences, and behavior changes across the lifespan, data were collected from two samples, college students and non-college adults (Gavin et al., 2015). The following relations were hypothesized:

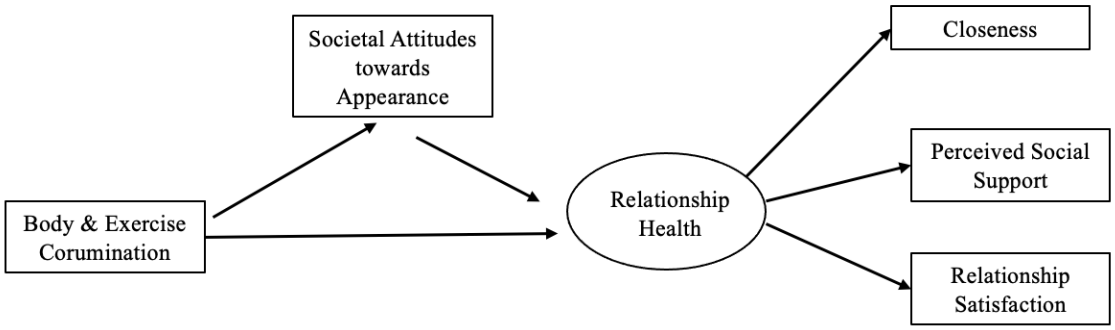
H1: Social. Social Influence. Hypothesis one (H1) was that the relation between perceived social pressure to be thin and exercise that was motivated by diet-culture would be mediated by both body and exercise co-rumination and body image (Figure 1).

Figure 1



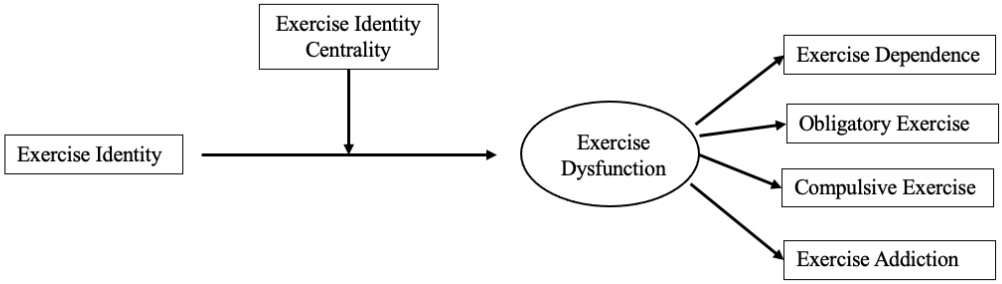
H2: Social Outcomes. Hypothesis two (H2) included H2a and H2b. H2a was that there would be a latent variable of relationship health which could be measured by closeness, desired and experienced social support, and relationship satisfaction (Figure 2). H2b was that the internalization of sociocultural appearance ideals would mediate the relationship between body and exercise co-rumination and relationship health.

Figure 2



H3: Identity. Hypothesis three (H3) included H3a and H3b. H3a was that exercise dysfunction would be a latent variable which comprised observed variables of compulsive exercise, obligatory exercise, excessive exercise, and exercise dependence. H3b was that the relationship between exercise identity and exercise dysfunction would be moderated by exercise identity centrality (Figure 3).

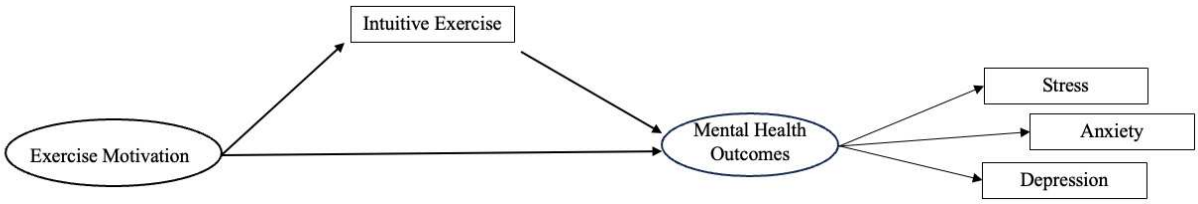
Figure 3



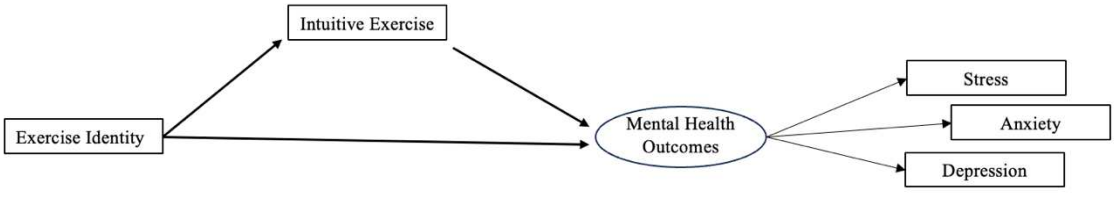
H4: Mental Health and Intuitive Exercise. Hypothesis four (H4) included H4a and H4b. H4a was that the degree to which individuals exercise intuitively would mediate the relationship between diet-culture motivated exercise and mental health outcomes (Figure 4). H4b was that intuitive exercise would mediate the relationship between exercise identity and mental health outcomes.

Figure 4

H4a



H4b



Methods

Participants

Quantitative data were collected via the Colorado State University research pool (Sample A) and a broader community sample (Sample B). Sample A consisted of 182 participants (76% White, 85% cisgender, mean age 19.7 years, standard deviation 3.1). Sample B was collected usinga snowball sampling techniqueand the online data collection platform Prolific (Prolific, 2024). Sample B consisted of 125 participants (76% White, 79% cisgender, mean age 35.3 years, standard deviation 10.9). Complete demographic information can be found in Table 1. For the snowball sample, the survey link was be shared via word of mouth, social media, and flyers posted in various gyms and athletic stores around Fort Collins, Colorado. For the Prolific sample, a screening questionnaire was posted and participants who met inclusion criteria were invited to complete the full study survey. Inclusion criteria for this study were that participants were at least 18 years of age and engaged in consistent exercise. For the purpose of this study, consistent exercise was defined as engaging in intentional physical activity at least four times per week on average, or at least 150 minutes per week.

Table 1

Demographic Information

	Sample A		Sample B	
	n=182		*n*=125	
	M(SD)	**%**	*M(SD)*	**%**
Age	19.7(3.1)		35.3(10.9)	

Race	**%**	**%**
American Indian or Alaska Native	<1	0
Asian, Indian, or Asian-American	<1	1
Black or African American	1	1
Multiracial or Biracial	<1	<1
Native Hawaiian or Pacific Islander	<1	0
White	76	85
Other	<1	<1
Prefer not to Answer	21	13
Ethnicity		
Hispanic or Latinx	23	8
Not Hispanic or Latinx	63	77
Prefer not to Answer	14	15
Gender		
Cisgender	85	79
Nonbinary	<1	<1
Other	2	<1
Prefer not to Answer	13	20

Surveys were administered through Qualtrics and included basic demographic information (see Appendix A), as well as several measures of exercise behavior, social connection, and sociocultural pressure. Attention checks were included sporadically throughout the survey. Participants were recruited with the approval of the Colorado State University Institutional Review Board and were provided informed consent prior to participation. Participants from Sample A received compensation in the form of one hour of research credit. Participants from Sample B's snowball sample had the opportunity to provide a valid form of contact to be entered into a drawing for one of four $25 electronic gift cards. Participants from Sample B's Prolific were compensated $0.20 for completing the screener and $9 for completing the survey.

Measures

Demographic Survey. All participants were asked to complete a demographic questionnaire at the beginning of the survey (see Appendix A). Participants were asked to identify their age, gender, racial and ethnic identity, ability status, and whether they were a part of the LGBTQIA+ community. Participants were offered the option "do not wish to respond" for all questions other than age and gender, since age was an eligibility requirement for participation.

Exercise Intensity/Frequency Questionnaire. Participants completed a brief, self-report measure of their exercise behaviors at the time of survey (see Appendix B). They reported the average amount of time per week they spent engaging in exercise (i.e., less than 2.5 hours, 2.5 hours or more to 4 hours, 4 hours or more to 5.5 hours, or 5.5 hours or more), as well as the type(s) of activities they did and the intensity with which they exercised. Intensity was measured by asking about the amount of time (0-30 min, 31-60 min, etc.) participants spent in each level of

intensity (light, moderate, vigorous) of exercise. Examples were provided to standardize definitions of intensity (i.e., light intensity - slow walking or yoga, moderate intensity – brisk walking, cycling < 10 mph, vigorous intensity – running, cycling at least 10 mph, team sports). Questions were developed by the researcher to screen participants for study participation based on amount of time spent exercising per week, as well as to explore differences among participants across type, intensity, and frequency/duration of exercise.

Obligatory Exercise Questionnaire. The Obligatory Exercise Questionnaire (OEQ) is a three-factor, 20-item scale to measure the degree to which individuals engage in exercise in an obligatory way (see Appendix C; Pasman & Thompson, 1988). The factors are emotional element of exercise, exercise frequency and intensity, and exercise preoccupation. Items include statements such as "When I miss an exercise session, I feel concerned about my body possibly getting out of shape" and I keep a record of my exercise performance, such as how long I work out, how far or fast I run." Participants respond on a four-point Likert-type frequency scale from "never" to "always." The OEQ is scored by taking the sum of all items. In the past, this measure has shown high levels of internal consistency ($\alpha = 0.96$) and test-retest reliability ($r = 0.96$; Thompson & Pasman, 1988). In this study, the OEQ showed acceptable levels of internal consistency (Sample A $\alpha = 0.85$, Sample B $\alpha = 0.80$).

Compulsive Exercise Test. The Compulsive Exercise Test (CET) is a five-factor, 24-item scale developed to assess excessive exercise and its relationship with eating disorder pathology (see Appendix D; Taranis et al., 2011). Factors include avoidance and rule-driven behavior, exercise for weight control, exercise for mood improvement, lack of exercise enjoyment, and exercise rigidity. Items include statements such as "If I feel I have eaten too much, I will do more exercise" and "I feel extremely guilty if I miss an exercise session."

Participants respond to items on a five-point Likert-type scale from "never true" to "always true." The CET is scored by finding the mean of all items. The CET has shown good internal consistency in the past, with a Chronbach's alpha of 0.85 (Taranis et al., 2011). In this study, the CET showed acceptable levels of internal consistency (Sample A $\alpha = 0.86$, Sample B $\alpha = 0.80$).

Exercise Dependence Scale. The Exercise Dependence Scale (EDS) was initially developed to measure maladaptive patterns of exercise which were associated with impairment or distress (see Appendix E; Hausenblas & Symons Downs, 2002). As such, it measures constructs of substance dependence like exercise tolerance, withdrawal, lack of control, and interference in other life activities. The EDS is a 21-item self-report questionnaire of which participants respond to items on a six-point Likert-type frequency scale from "never" to "always." Items on the EDS include statements like "I continually increase my exercise intensity to achieve the desired effects/benefits" and "I think about exercise when I should be concentrating on school/work." The EDS is scored by finding the total sum of all items. The EDS has shown excellent internal consistency reliability ($\alpha = 0.92$; Hausenblas & Symons Downs, 2002). In this study, the EDS showed excellent internal consistency (Sample A $\alpha = 0.94$, Sample B $\alpha = 0.93$).

Exercise Addiction Inventory. The Exercise Addiction Inventory (EAI) is a six-item self-report questionnaire which measures one's level of risk of engaging in exercise in an addictive way (see Appendix F; Terry et al., 2004). Participants respond to items on a five-point, Likert-type agreement scale from "strongly disagree" to "strongly agree." Items on the EAI include statements such as "Conflicts have arisen between me and my family and/or my partner about the amount of exercise I do" and "If I have to miss an exercise session, I feel moody and

irritable." The EAI is scored by finding the sum of all items. The EAI has shown good internal consistency reliability (α=0.84; Terry et al., 2003) among an adult sample of exercisers of various levels. In this study, the EAI showed acceptable levels of internal consistency (Sample A $\alpha = 0.81$, Sample B $\alpha = 0.78$).

Exercise Identity Scale. The Exercise Identity Scale (EIS) is a nine-item measure which assesses the degree to which one's identity as an exerciser is integral to their sense of self (see Appendix G; Anderson & Cychosz, 1994). Items include statements such as "When I describe myself to others, I usually include my involvement in exercise" and "Physical exercise is a central factor to my self-concept. Participants respond to items on a five-point Likert-type agreement scale from "strongly disagree" to "strongly agree." The EIS is scored by finding the sum of all items. The EIS shows strong internal consistency (α = 0.94; Anderson & Cychosz). In this study, the EIS showed strong internal consistency (Sample A: *M* = , *SD* =, $\alpha = 0.92$; Sample B $\alpha = 0.90$).

Centrality Scale for Exercise Identity. The Centrality Scale for Exercise Identity (CSEI) was adapted from the identity centrality subscale of the Sellers et al. (1997) Multidimensional Inventory of Black Identity (see Appendix H). The CSEI is composed of eight items which participants are asked to respond to on a seven-point Likert-type agreement scale from "strongly disagree" to "strongly agree." Items include statements like "Being an exerciser is an important reflection of who I am" and "I have a strong sense of belonging to the exercise community." The original centrality subscale of the Multidimensional Inventory of Black Identity had adequate internal consistency, with a Cronbach's alpha of 0.77 (Sellers et al., 1997). The adapted CSEI is scored by finding the mean of all items. In this study, the CSEI showed acceptable levels of internal consistency (Sample A $\alpha = 0.77$, Sample B $\alpha = 0.82$).

Sociocultural Attitudes Towards Appearance Questionnaire-4R. The Sociocultural Attitudes Towards Appearance Questionnaire-4-Revised (see Appendix I; SATAQ-4R) is a 31-item, seven-factor measure of internalization of appearance-related ideals and pressures (Schaefer et al., 2017). The factors of the SATAQ-4R include three internalization factors (being thin, being muscular, and being generally attractive) and four pressure factors (from family, peers, significant others, and social media). Participants respond to items on a five-point, Likert-type agreement scale from "definitely disagree" to "definitely agree." Items include statements such as "I think a lot about my appearance" and "I feel pressure from the media to look thinner." The SATAQ-4R has been shown to have acceptable to excellent internal consistency in studies of college women and men (women: $0.82 \leq \alpha < 0.96$; men: $0.75 \leq \alpha < 0.96$; Schaefer et al., 2017). Existing data exclude gender nonconforming individuals; therefore, internal consistency measures are currently unavailable for these populations. The SATAQ-4R is scored by finding the mean of all items. In this study, the SATAQ-4R showed excellent levels of internal consistency (Sample A $\alpha = 0.94$, Sample B $\alpha = 0.98$).

Perceived Sociocultural Pressure Scale. The Perceived Sociocultural Pressure Scale (PSPS) is an eight-item scale assessing the degree to which individuals feel pressure from different groups to achieve or maintain a thin body (see Appendix L; Stice et al., 2008). Participants respond to items on a five-point Likert-type frequency scale from "never" to "always." Items include statements such as "I've felt pressure from my friends to lose weight" and "I've noticed a strong message from the media to have a thin body." The PSPS is scored by finding the sum of all items. The PSPS shows adequate internal consistency reliability, with Chronbach's alpha values for factors between 0.69 to 0.82 (Blowers et al., 2003). In this study,

the PSPS showed excellent levels of internal consistency (Sample A $\alpha = 0.95$, Sample B $\alpha = 0.96$).

Depression Anxiety and Stress Scale – 21 Item. The Depression, Anxiety, and Stress Scale-21 Item (DASS-21) is a 21 item, three factor self-report scale designed to assess adverse mental health symptoms related to depression, anxiety, and stress (see Appendix O; Lovibond & Lovibond, 1995). Participants respond to questions on a four-point Likert-type scale from "did not apply at all" to "applied to me very much or most of the time." Items include statements such as "Over the past week, I felt that I was using a lot of nervous energy" and "Over the past week, I felt downhearted and blue." Scores on each factor indicate the severity of individuals experiences of depression, anxiety, and stress, from "normal" to "extremely severe." The DASS-21 is scored by finding the sum of all items and multiplying by two. The DASS-21 shows good reliability across factors, with all values of Chronbach's alpha above 0.80 (Osman et al., 2012). In this study, the DASS-21 showed excellent levels of internal consistency (Sample A $\alpha = 0.97$, Sample B $\alpha = 0.98$).

Exercise Motivation Inventory-2. The Exercise Motivation Inventory (EMI-2) is a 51-item, 14-factor scale designed to assess the function of individuals' exercise motivation and how motivation impacts the relationship between exercise motives and behavior (Appendix P; Markland & Ingledew, 1997). For the purpose of this study, only factors of stress management, enjoyment, social recognition, affiliation, health pressures, positive health, weight management, appearance, and strength and endurance will be assessed. Items on the EMI include statements such as "Personally, I exercise to show my worth to others" and "Personally, I exercise to stay slim." The EMI was designed as a multidimensional scale and was not intended as a

comprehensive measure of exercise motivation. Therefore, a CFA was conducted to determine how factors related to one another and could measure differend facets of exercise motivation.

The EMI is scored by finding the subscale means of all items. Internal consistency among subscales ranges from 0.69 on the health pressures subscale to 0.92 on the stress management subscale, showing acceptable to good internal consistency across subscales (Markland & Ingledew, 1997).In this study, the subscales showed high levels of internal consistency (Sample A: $0.87 < \alpha < 1$, Sample B: $0.60 < \alpha < 0.94$).

Body Image Disturbance Questionnaire. The Body Image Disturbance Questionnaire (BIDQ) is a seven-item self-report measure designed to assess the degree to which one's perception of their body in a negative way impacts their life (Appendix Q; Cash et al., 2004). Participants respond to questions with five-point Likert-type scales, with follow-up open-ended questions of which they respond with their own experiences. Items include questions such as "Has your body image often caused you a lot of distress, torment, or pain? How much?" and "How has your body image interfered with your social life?" The BDIQ is scored by finding the mean of all quantitative items. In past studies, the BIDQ has shown good internal consistency for both men and women, with Cronbach's alpha values of 0.89 for both (Cash et al., 2004). However, data does not exist yet among gender nonconforming populations. In this study, the BDIQ showed high levels of internal consistency (Sample A $\alpha = 0.84$, Sample B $\alpha = 0.94$).

Intuitive Exercise Scale. The Intuitive Exercise Scale (IES) is a 14-item, four-factor scale adapted from the Intuitive Eating Questionnaire to assess the degree to which individuals experience exercise in a mindful way (see Appendix M; Reel et al., 2016). Items on the IEXS include statements such as "I trust my body to tell me how much exercise to do" and "I use exercise to distract myself from or avoid negative emotions." Participants respond to items on a

five-point Likert-type agreement scale from “strongly disagree” to “strongly agree.” The IES is scored by finding the mean of all items. In past studies, the IES shows acceptable to good reliability, with Raykov’s composite reliability values for each factor falling between 0.74-0.88 (Reel et al., 2016). In this study, the IES showed acceptable levels of internal consistency (Sample A $\alpha = 0.878$, Sample B $\alpha = 0.78$).

Body and Exercise Co-rumination Scale. The Body and Exercise Co-rumination Scale (BECS) is a 27-item scale developed to measure the extent to which individuals engage in body image and/or exercise specific co-rumination with friends. This scale was adapted from an original co-rumination scale developed by Rose (2002). Rudiger and Winstead (2013) adapted this scale to specifically inform researchers about the extent to which individuals participated in body-image specific co-rumination. The body-specific co-rumination scale showed acceptable internal consistency (α=0.87; Faw et al., 2021). For the purpose of this study, the body-specific co-rumination scale was further adapted to include items which assess the degree to which individuals engage in exercise-related co-rumination with their peers (see Appendix N). Researchers adapted questions to address exercise-specific co-rumination by identifying factors which theoretically seemed to be related to exercise beliefs and behaviors (frequency, discussing problem repeatedly, problem causes, problem consequences, and negative affect).

In order to avoid survey fatigue, researchers selected factors which more closely related to food and body-image to gather data related to body-specific co-rumination (frequency, discussing problem instead of engaging in other activities, encouragement of problem discussion, friend encouraging problem discussion, problem causes, and negative affect). This scale prompts participants to first think of a close friend before responding to items on a five-point Likert-type agreement scale from “strongly disagree” to “strongly agree.” Items include statements such as

"When one of us has a problem related to our bodies, we talk about it for a long time" and "We try to figure out all of the bad things that might happen because of our inadequate exercise behaviors." The BECS is scored by finding the total of all items. In this study, the BECS showed excellent levels of internal consistency (Sample A $\alpha = 0.99$, Sample B $\alpha = 0.99$).

Desired and Experienced Support Scale. The Desired and Experienced Support Scale (DESS) is a 35-item scale designed to assess the degree to which individuals desire social support from another individual compared to the degree to which they experience support from that individual (Xu & Burleson, 2001). This scale was originally developed to measure spousal support, but for the purpose of this study, will be to assess the social support experienced in relationships between the participant and the close friend they were asked to consider for the body and exercise co-rumination section. The DESS measures five unique aspects of social support, including emotional, esteem, tangible, network, and informational. For the purpose of this study, select items from each subscale will be given to participants to reduce participant burnout. The DESS has shown good internal consistency reliability, with Chronbach's alpha values ranging from 0.83-0.86 (Xu & Burleson, 2001). Items on the DESS prompt participants to consider a close friend and respond to statements like "Expressing sorrow or regret for your situation or distress" and "Giving you advice about what to do" on a five-point Likert-type scale with responses ranging from "don't receive at all" to "receive a great deal." The DESS is scored by finding the total sum of all items. In this study, the DESS showed excellent levels of internal consistency (Sample A $\alpha = 0.98$, Sample B $\alpha = 0.98$).

Relationship Satisfaction Scale. The Relationship Satisfaction Scale (RSS) is a seven-item self-report measure adapted from Hendrick's (1988) Relationship Assessment Scale (Appendix R). The RSS measures the degree to which individuals experience satisfaction in their

relationships with peers. Participants respond to items with a five-point Likert-type agreement scale from “strongly disagree” to “strongly agree.” The scale first prompts participants to think about the same close friend from the previous relationship scales and then use that relationship to respond to statements such as “These friends meet my needs” and “There are problems with my relationships with these friends.” The RSS is scored by finding the sum of all items. The original Relationship Assessment Scale showed good internal consistency ($\alpha = 0.86$; Hendrick, 1988). In this study, the RSS showed high levels of internal consistency (Sample A $\alpha = 0.92$, Sample B $\alpha = 0.93$).

Inclusion of Others and the Self Scale. The Inclusion of Other in the Self Scale (IOS) is a single item measure which uses pictures to represent respondent’s feelings of closeness towards another person (Appendix S; Aron et al., 1992). Participants were asked to consider the same person they had in mind for the co-rumination questions and RSS questions and select the image which best represents how close they felt to that person. Response choices include seven Venn-diagrams, with one circle representing the participant and the other circle representing the person they were considering in previous questions. Images with more of an overlap indicate stronger feelings of closeness.

Analyses

Data were cleaned in Microsoft Excel (Microsoft Corporation, 2024). Missing data were removed and item totals were calculated using Microsoft Excel functions. Quantitative data were analyzed using structural equation modeling (SEM) and the PROCESS mediation and moderation macros in MPlus version 8.0 (Muthén & Muthén, 2017; Hayes, 2013). The PROCESS macro accounts for bootstrapping confidence intervals, allowing for a more accurate reflection of potential moderation.

As suggested by Hu and Bentler (1999), I assessed model fit by looking for the following statistics: Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), and Chi Square (χ^2). χ^2 values that are not significant indicate good model fit; however, in large samples, it can be challenging to obtain a non-significant χ^2 due to small, insignificant discrepancies between the tested and proposed models (Smith & McMillan, 2001). Therefore, as suggested by Kline (2015), I used the χ^2 to degrees of freedom ratio (*df*) to determine goodness of fit, with ratios less than three suggesting adequate fit. CFI and TLI values greater than 0.95 suggest excellent model fit, while values greater than 0.90 are considered adequate. Values below 0.90 indicate poor model fit. RMSEA values less than 0.01 suggest excellent fit, while values less than 0.05 suggest good fit and values less than 0.08 suggest mediocre fit (Kenny, 2015). SRMR values less than 0.08 suggest good model fit (Hu & Bentler, 2999). Hu and Bentler (1999) suggest that two fit indices, SRMR combined with either CFI, TLI, or RMSEA, can be used to determine model fit.

In addition to examining model fit criteria, I also examined the factor loadings to determine whether latent variables would appropriately represent the observed variables hypothesized. Factor loadings greater than or equal to 0.30 indicated good model fit (Rakov & Marcoulides, 2011).

Hypothesis 1. H1 was that the relation between perceived societal pressure and exercise motivation would be mediated by both body and exercise co-rumination and body image. Because the EMI, which was used to measure exercise motivation, measured different types of exercise motivation (i.e., weight loss, enjoyment, or positive health), I first ran an Exploratory

Factor Analysis (EFA) to determine a second order latent variable representing diet-culture motivation for exercise.

I then used the PROCESS macro in MPlus version 8.0 to test the hypothesized multiple mediation model. Statistically significant relations were visualized to aid in interpretation and understanding of those results.

Hypothesis 2. H2a was that there would be second order latent variable of exercise dysfunction which would represent exercise dependence, exercise addiction, compulsive exercise, and obligatory exercise. Additionally, H2b was that the relation between exercise identity and exercise dysfunction would be moderated by exercise identity centrality. Because the observed variables used in the latent variable model for exercise dysfunction have strong theoretical ties to the latent variable, I used a Confirmatory Factor Analysis (CFA) to test the model fit of the latent variable in H2a.

Once the latent variable model was supported, I conducted a SEM moderation analysis using the PROCESS macro in MPlus to determine whether the relation between exercise identity and exercise dysfunction was moderated by exercise identity centrality. Because of the multicollinearity between the predictor and the moderator variables, model fit could not be assessed for this hypothesis.

Hypothesis 3. H3a was that there would be a second order latent variable of relationship health which would represent both perceived social support and relationship satisfaction. Additionally, H3b was that the relationship between body and exercise co-rumination and relationship health would be mediated by internalization of societal body-image ideals. I assessed model fit using the previously mentioned criteria suggested by Hu & Bentler (1999) and Rakov & Marcoulides (2011) and a CFA to determine whether the latent variable of relationship

health represented the first order variables of relationship satisfaction, closeness, and perceived social support.

Once the latent variable model was supported, I tested a SEM using the PROCESS macro in MPlus to determine whether the relation between body and exercise co-rumination and relationship health was mediated by internalization of societal body image ideals. I again checked for model fit, examined the pathway coefficients to identify any significant relationships in the mediation model, and visualized statistically significant relationships to aid in interpretation and understanding of those results.

Hypothesis 4: H4a was that the relation between exercise motivation and mental health would be mediated by intuitive exercise. Mental health outcomes were modeled as a second order latent variable representing depression, anxiety, and stress. I used the latent variable found in H2 for diet-culture motivated exercise as the predictor variable. H4b was that the relation between exercise identity and mental health would also be mediated by intuitive exercise. To test these hypotheses, I ran PROCESS mediation models in MPlus version 8.0 (Muthén & Muthén, 2017). Model fit criteria were evaluated, and significant pathway coefficients indicated support for these hypotheses. Statistically significant relationships were visualized to aid in interpretation and understanding of those results.

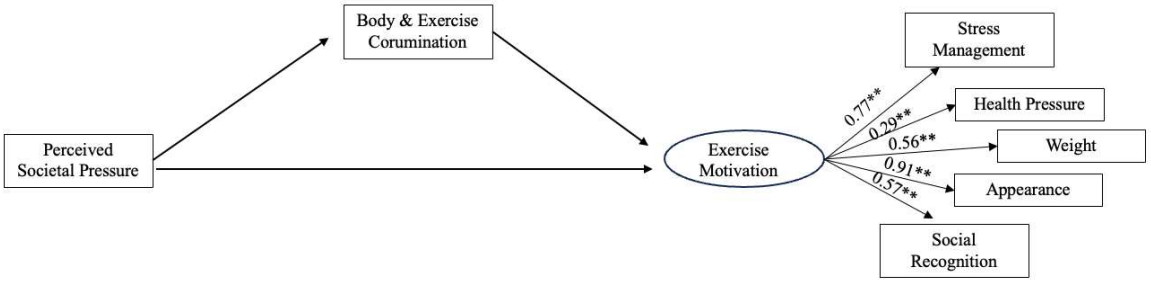
Results

Hypothesis 1. H1 was that the relation between perceived societal pressure and exercise motivation would be mediated by both body and exercise co-rumination and body image.

Sample A. The EFA for Sample A yielded excellent model fit ($\chi^2 = 6.77$ *df* = 5, *p* = 0.24, RMSEA = 0.04 [0.00, 0.12], CFI = 0.99, TLI = 0.99, SRMR = 0.03). Factor loadings were significant for indicators of stress management ($p < 0.001$), health pressure ($p < 0.001$), weight ($p < 0.001$) appearance ($p < 0.001$) social recognition ($p < 0.001$). Correlation coefficients between measures for Sample A can be seen in Table 2. Means, standard deviations, and factor loadings can be seen in Table 3. See Figure 5 for complete model information.

The body image variable had a skewness of 2.83 and kurtosis of 163.76, indicating that its distribution violated assumptions of multivariate normality and was, therefore, removed from the mediation model. When the mediation model was run with body and exercise co-rumination as a single mediator between perceived societal pressure and exercise motivation, model fit was poor ($\chi^2 = 66.45$, *df* = 20, *p* = 0.00, RMSEA = 0.12 [0.09, 0.15], CFI = 0.85, TLI = 0.79, SRMR = 0.07). As such, the path coefficients were not interpreted.

Figure 5



Note: Model fit for the latent variable of diet-culture motivated exercise was excellent ($\chi^2/df = 1.35$, RMSEA = 0.04 [0.00, 0.12], CFI = 0.99, TLI = 0.99, SRMR = 0.03. Statistically significant factor loadings are visualized. All factor loadings were statistically significant at the $p < 0.001$ level. The mediation model had poor fit and, therefore, path coefficients were not analyzed.

Sample B. The EFA for Sample B yielded excellent model fit ($\chi^2 = 0.42$, df = 2, p = 0.81, RMSEA = 0.00 [0.00, 0.11], CFI = 1.00, TLI = 1.00, SRMR = 0.01). Factor loadings were significant for indicators health pressure (< 0.001), weight (< 0.001) appearance (p < 0.001) social recognition (p < 0.001). The factor loading for the stress management indicator was not significant in this sample (p = 0.10). See Figure 6 for complete model information.

Table 2

Correlations between all measures used in the current study for Sample A.

	OEQ	CET	EDS	EAI	EIS	CSEI	SATAQ-4R	PSPS	DASS-21	BDIQ
OEQ	1.00									
CET	0.55	1.00								
EDS	0.63	0.55	1.00							
EAI	0.57	0.61	0.77	1.00						
EIS	0.58	0.53	0.67	0.61	1.00					
CSEI	0.41	0.29	0.52	0.44	0.73	1.00				
SATAQ-4R	-0.07	-0.12	-0.08	-0.16	-0.17	-0.04	1.00			
PSPS	-0.26	0.42	0.33	0.31	0.12	0.14	0.04	1.00		
DASS-21	0.15	0.24	0.26	0.23	0.06	0.06	-0.06	0.53	1.00	
BDIQ	-0.42	0.07	0.04	0.08	0.07	0.07	-0.02	-0.05	-0.05	1.00
IES	0.37	0.30	0.41	0.39	0.46	0.31	-0.01	0.39	0.02	0.01
BECS	0.24	0.18	0.29	0.22	0.09	0.19	0.61	0.34	0.19	-0.02
DESS	0.00	0.09	-0.17	-0.17	-0.02	-0.11	-0.22	-0.19	-0.07	-0.05
RSS	0.15	-0.04	0.21	0.12	0.11	0.05	0.00	0.10	0.21	-0.02
IOS	-0.02	-0.04	-0.15	-0.17	0.01	0.11	-0.09	-0.20	-0.08	-0.08
EMI-Stress Management	0.28	0.38	0.24	0.27	0.37	0.16	-0.09	0.14	0.07	0.08
EMI-Social Recognition	0.35	0.45	0.51	0.45	0.46	0.36	-0.11	0.36	0.35	0.06
EMI-Health Pressure	0.06	0.12	0.21	0.05	-0.05	-0.02	0.17	0.26	0.18	-0.02
EMI-Weight	0.14	0.50	0.09	0.25	0.10	0.01	-0.08	0.43	0.21	0.00
EMI-Appearance	0.30	0.39	0.26	0.29	0.25	0.11	-0.08	0.26	0.21	-0.08

Table 2 (continued)

	IES	BECS	DESS	RSS	IOS	EMI-Stress Management	EMI-Social Recognition	EMI-Health Pressure	EMI-Weight	EMI-Appearance
OEQ										
CET										
EDS										
EAI										
EIS										
CSEI										
SATAQ-4R										
PSPS										
DASS-21										
BDIQ										
IES	1.00									
BECS	0.03	1.00								
DESS	0.16	-0.29	1.00							
RSS	0.18	-0.05	-0.10	1.00						
IOS	-0.04	-0.12	0.40	-0.14	1.00					
EMI-Stress Management	0.42	-0.03	0.14	0.11	-0.02	1.00				
EMI-Social Recognition	0.21	0.15	-0.11	0.07	-0.12	0.48	1.00			
EMI-Health Pressure	0.12	0.21	-0.10	0.11	-0.08	0.10	0.19	1.00		
EMI-Weight	0.15	0.06	0.13	0.11	0.01	0.40	0.32	0.12	1.00	
EMI-Appearance	0.30	0.08	0.10	0.09	0.03	0.69	0.50	0.24	0.52	1.00

Table 3

Means, Standard Deviations, and Factor Loadings for Samples A and B.

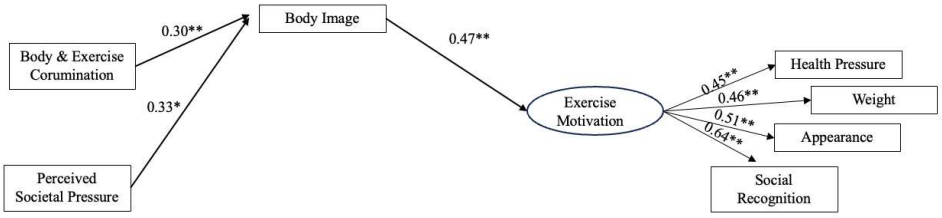
	Sample A (n = 182)			
	M(SD)	Factor Loading	M(SD)	Factor Loading
Diet-Culture Motivated Exercise				
Stress Management	3.45(0.93)	0.77	3.76(0.84)	-
Social Recognition	3.00(0.98)	0.57	2.00(0.89)	0.64
Health pressure	2.10(1.18)	0.29	2.34(0.92)	0.45
Weight	3.10(1.32)	0.56	3.72(1.15)	0.46
Appearance	2.96(1.07)	0.88	3.88(0.77)	0.51
Relationship Health				
DESS		0.78	73.92(11.69)	-
RSS	70.76(15.55)	1.00	31.60(3.76)	-
IOS	34.98(74.85)	0.65	4.64(1.62)	-
Exercise Dysfunction	4.87(1.65)			
OEQ		0.81	46.54(7.27)	0.78
	49.25(8.7)			

CET	15.68(2.36)	0.71	76.23(9.77)	0.63
EDS	59.35(18.30)	0.88	51.43(14.72)	0.87
EAI	28.94(7.55)	0.86	15.51(3.68)	0.81
EIS	30.07(7.32)	-	29.10(7.48)	-
CSEI	30.65(7.75)	-	27.59(9.06)	-
SATAQ-4R	2.58(0.54)	-	2.74(1.64)	-
PSPS	2.03(0.93)	-	1.86(0.65)	-
DASS-21	31.81(27.37)	-	26.23(21.10)	-
BDIQ	2.86(10.84)	-	1.98(0.75)	-
BECS	71.12(27.45)	-	57.28(22.25)	-

The multiple mediation model resulted in adequate model fit ($\chi^2 = 26.54$, *df* = 17, *p* = 0.07, RMSEA = 0.07 [0.00, 0.12], CFI = 0.94, TLI = 0.90, SRMR = 0.06). Path coefficients between perceived societal pressure and body image was positive and significant ($p < 0.05$). The path coefficient between body image and diet-culture motivated exercise were significant ($p < 0.001$) and positive. Finally, the path coefficient between body image and co-rumination was significant and positive ($p < 0.001$). These results partially support H1, indicating that increased body image distress mediates the relation between perceived societal pressure and body-image

related exercise motivation as well as the relationship between body and exercise co-rumination and diet-culture motivated exercise. Correlations between all measures can be seen in Table 3. Means, standard deviations, and factor loadings can be seen in Table 4.

Figure 6



Note: Model fit for the latent variable of diet-culture motivated exercise was excellent ($\chi^2/df =$ 0.21, RMSEA = 0.00 [0.00, 0.11], CFI = 1.00, TLI = 1.00, SRMR = 0.01). Statistically significant factor loadings are visualized. Factor loadings were statistically significant at the $p < 0.001$ level (**). The mediation model had adequate fit ($\chi^2/df =$ 1.56, RMSEA = 0.07 [0.00, 0.12], CFI = 0.94, TLI = 0.90, SRMR = 0.06). Only statistically significant pathway coefficients are visualized. All visualized path coefficients were statistically significant at the $p < 0.05$ level (*) and the $p < 0.001$ level (**)

Hypothesis 2. H2a was that there would be a latent variable representing relationship health which was indicated by both perceived social support and relationship satisfaction. Additionally, H2b was that the relation between body and exercise co-rumination and relationship health would be mediated by internalization of societal body-image ideals.

Sample A. In the undergraduate sample, H2a was supported as a latent variable of relationship health was indicated by variables of desired and experienced social support, inclusion of other with the self, and relationship satisfaction. The latent variable model had adequate fit ($\chi^2 = 699.78$, $df = 292$, $p < 0.001$, RMSEA = 0.09 [0.08, 0.10], CFI = 0.91, TLI = 0.90, SRMR = 0.04). Factor loadings for desired and experienced social support, relationship health, and inclusion of other with the self were significant at $p < 0.001$. These results can be seen in the final model (figure 7).

Table 4

Correlations between all measures used in the current study for Sample B.

	OEQ	CET	EDS	EAI	EIS	CSEI	SATAQ-4R	PSPS	DASS-21	BDIQ
OEQ	1.00									
CET	0.71	1.00								
EDS	0.69	0.52	1.00							
EAI	0.62	0.55	0.70	1.00						
EIS	0.73	0.52	0.69	0.69	1.00					
CSEI	0.59	0.42	0.64	0.61	0.81	1.00				
SATAQ-4R	0.30	0.47	0.37	0.30	0.28	0.30	1.00			
PSPS	-0.15	0.09	0.10	-0.02	-0.07	-0.05	0.49	1.00		
DASS-21	0.15	0.28	0.25	0.11	0.07	0.03	0.37	0.36	1.00	
BDIQ	0.33	0.53	0.29	0.26	0.19	0.13	0.56	0.39	0.55	1.00
IES	0.26	0.11	0.22	0.36	0.33	0.27	0.09	-0.05	0.13	-0.06
BECS	0.11	0.27	0.13	0.17	0.06	0.17	0.39	0.19	0.18	0.37
DESS	0.05	0.16	-0.01	-0.01	-0.10	0.00	-0.02	-0.13	-0.20	-0.02
RSS	-0.01	-0.02	-0.04	-0.06	0.02	0.05	-0.16	-0.19	-0.31	-0.15
IOS	0.08	0.13	0.07	0.02	-0.06	-0.03	0.07	-0.10	-0.06	-0.03
EMI-Stress Management	0.25	0.17	0.19	0.45	0.36	0.39	0.04	0.03	0.00	-0.11
EMI-Social Recognition	0.56	0.45	0.68	0.55	0.56	0.60	0.45	0.08	0.23	0.31
EMI-Health Pressure	0.22	0.26	0.31	0.16	0.16	0.31	0.16	0.11	0.00	0.05
EMI-Weight	0.43	0.64	0.24	0.28	0.28	0.25	0.48	0.18	0.14	0.45
EMI-Appearance	0.48	0.61	0.28	0.32	0.39	0.32	0.54	0.05	0.10	0.38

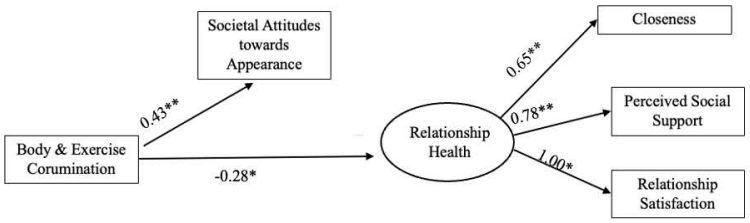
Table 4 (continued)

IES	BECS	DESS	RSS	IOS	EMI-Stress Management	EMI-Social Recognition	EMI-Health Pressure	EMI-Weight	EMI-Appearance
1.00									
0.20	1.00								
-0.07	0.10	1.00							
-0.14	-0.11	0.69	1.00						
-0.08	0.09	0.43	0.44	1.00					
0.47	0.01	0.02	0.03	-0.14	1.00				
0.17	0.11	-0.04	-0.07	-0.01	0.19	1.00			
0.14	0.18	0.21	-0.03	-0.12	0.13	0.29	1.00		
-0.03	0.25	0.19	-0.04	0.02	0.07	0.30	0.32	1.00	
0.11	0.28	0.19	0.07	0.12	0.11	0.33	0.30	0.68	1.00

`

The mediation model proposed in H2b indicated adequate model fit ($\chi^2 = 782.56$, *df* = 342, $p < 0.001$, RMSEA = 0.09 [0.08, 0.10], CFI = 0.90, TLI = 0.89, SRMR = 0.05). The path coefficient between internalized body-image ideals and relationship health was not statistically significant ($p = 0.12$). The path coefficient between internalized body ideals and co-rumination was positive and significant ($p < 0.001$), and the relation between co-rumination and relationship health was negative and significant ($p = 0.001$). Correlation coefficients between measures for Sample A can be seen in Table 2. Means, standard deviations, and factor loadings can be seen in Table 3.

Figure 7



Note: Model fit for the latent variable of relationship health was excellent ($\chi^2/df = 2.40$, RMSEA = 0.09 [0.08, 0.10], CFI = 0.91, TLI = 0.90, SRMR = 0.04). Statistically significant factor loadings are visualized. Factor loadings were statistically significant at the p < 0.001 level (**). The mediation model had adequate fit ($\chi^2/df = 2.30$, RMSEA = 0.09 [0.08, 0.10], CFI = 0.90, TLI = 0.89, SRMR = 0.05). Only statistically significant pathway coefficients are visualized. All visualized path coefficients were statistically significant at the p < 0.05 level (*) and the p < 0.001 level (**)

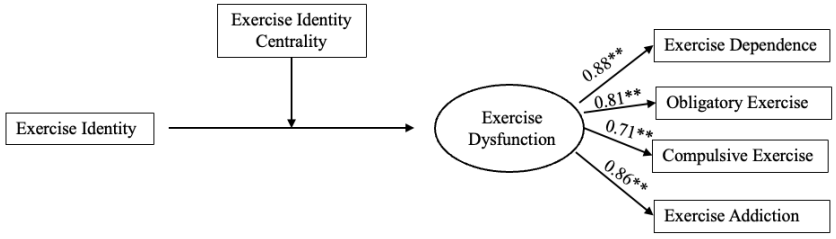
Sample B. In the community sample, item 4 on the RSS had a skewness of -3.53 and kurtosis of 13.45, indicating that its distribution violated assumptions of multivariate normality. This item was, therefore, removed from the latent variable model. Even after item 4 was removed from the RSS, H2a was not supported, as I could not detect a latent variable of relationship health in this sample with variables of desired and experienced social support, inclusion of other with the self, and relationship satisfaction. The latent variable model had poor fit ($\chi^2 = 518.58$, *df* = 261, $p = 0.10$, RMSEA = 0.096 [0.084, 0.11], CFI = 0.87, TLI = 0.85,

SRMR = 0.07). Because the latent variable model did not fit, the hypothesized mediation model (H2b) could not be interpreted.

Hypothesis 3. H3a was that there would be a latent variable of exercise dysfunction indicated by the observed variables assessing exercise dependence, exercise addiction, compulsive exercise, and obligatory exercise. Additionally, H3b was that the relation between exercise identity and exercise dysfunction would be moderated by exercise identity centrality.

Sample A. The CFA for the exercise dysfunction latent variable in Sample A was supported and showed adequate model fit ($\chi^2 = 11.69$, $df = 2$, $p < 0.05$, RMSEA = 0.16 [0.08, 0.26], CFI = .98, TLI = 0.92, SRMR = 0.05). All factor loadings were significant at the $p < 0.001$ level and can be seen in Figure 8. Correlations between all measures can be seen in Table 3. Means, standard deviations, and factor loadings can be seen in Table 4. Because of the multicollinearity between the moderator and the predictor, the moderation model fit could not be calculated.

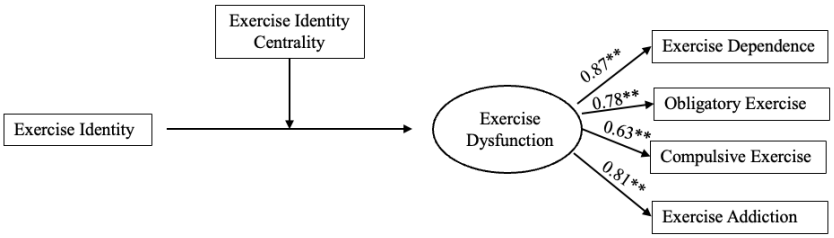
Figure 8



Note: Model fit for the latent variable of exercise dysfunction was adequate ($\chi^2/df = 5.84$, RMSEA = 0.16 [0.08, 0.26], CFI = 0.98, TLI = 0.92, SRMR = 0.05). Statistically significant factor loadings are visualized. Factor loadings were statistically significant at the $p < 0.001$ level (**). The moderation model had issues with multicollinearity and, therefore, model fit could not be determined.

Sample B. The CFA for the exercise dysfunction latent variable in Sample B showed excellent fit ($\chi^2 = 1.62$, *df* = 1, *p* = 0.20, RMSEA = 0.07 [0.00, 0.26], CFI = 1.00, TLI = 1.00, SRMR = 0.01). All factor loadings were significant at the $p < 0.001$ level and can be seen in Figure 9. Correlations between all measures can be seen in Table 3. Means, standard deviations, and factor loadings can be seen in Table 4. Because of the multicollinearity between the moderator and predictor variables, the model fit information was unable to be calculated.

Figure 9



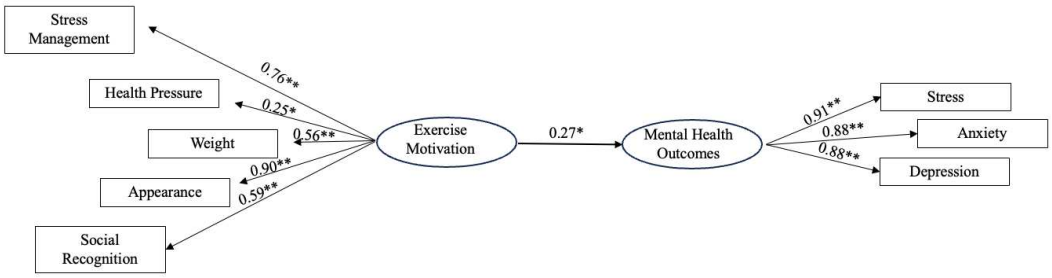
Note: Model fit for the latent variable of exercise dysfunction was excellent ($\chi^2/df = 1.62$, RMSEA = 0.07 [0.00, 0.26], CFI = 1.00, TLI = 1.00, SRMR = 0.01). Statistically significant factor loadings are visualized. Factor loadings were statistically significant at the p < 0.001 level (**). The moderation model had issues with multicollinearity and, therefore, model fit could not be determined.

Hypothesis 4. H4a was that the relation between exercise motivation and mental health would be mediated by intuitive exercise. H4b was that the relation between exercise identity and mental health would also mediated by intuitive exercise.

Sample A. H4a showed excellent model fit in Sample A ($\chi^2 = 44.11$, *df* = 25, $p < 0.05$, RMSEA = 0.07 [0.03. 0.10], CFI = 0.97, TLI = 0.96, SRMR = 0.06). The relation between mental health outcomes and diet-culture motivated exercise was positive and significant (*p* = 0.01). The relation between intuitive exercise and diet-culture motivated exercise was not significant (p = 0.99). Finally, the relation between mental health outcomes and intuitive exercise

was not significant (p = .31). Significant pathways are visualized in Figure 10, and correlations between all measures can be seen in Table 3. Means, standard deviations, and factor loadings can be seen in Table 4.

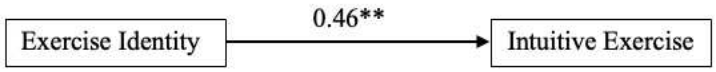
Figure 10



Note: Model fit for the latent variables of diet-culture motivated exercise and mental health outcomes was excellent, and factor loadings were statistically significant. The mediation model had excellent fit (χ^2/df = 1.76, RMSEA = 0.07 [0.03, 0.10], CFI = 0.97, TLI = 0.96, SRMR = 0.06). Only statistically significant pathway coefficients are visualized. All visualized path coefficients were statistically significant at the p < 0.05 level (*) and the p < 0.001 level (**)

H4b yielded excellent model fit in Sample A after adjusting the model based on suggested modification indices ($\chi^2 = 3.62$, df = 4, p >0.05, RMSEA = 0.00 [0.00, 0.11], CFI = 1.00, TLI = 1.00, SRMR = 0.01). The relation between intuitive exercise and exercise identity was both positive and significant (p =0.00). Neither the relation between mental health outcomes and intuitive exercise nor the relation between mental health outcomes and exercise identity were significant (p = 1.00, p = 0.26 respectively). Significant pathways are visualized in Figure 11, correlations can be seen in Table 3, and means, standard deviations, and factor loadings can be seen in Table 4.

Figure 11

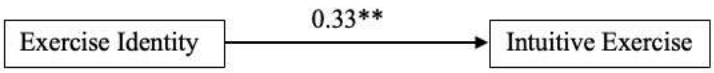


Note: Model fit for the latent variable of mental health outcomes was excellent and factor loadings were statistically significant. The mediation model had excellent fit ($\chi^2/df = 0.91$, RMSEA = 0.00 [0.00, 0.11], CFI = 1.00 TLI = 1.00, SRMR = 0.01). Only statistically significant pathway coefficients are visualized. All visualized path coefficients were statistically significant at the $p < 0.05$ level (*) and the $p < 0.001$ level (**)

Sample B. H4a showed excellent model fit in Sample B ($\chi^2 = 29.93$, $df = 18$, $p > 0.05$, RMSEA = 0.07 [0.00, 0.11], CFI = 0.97, TLI = 0.95, SRMR = 0.06). The relation between diet-culture motivated exercise and mental health outcomes was not significant ($p = 0.18$). The relation between intuitive exercise and diet-culture motivated exercise not significant ($p = 0.63$). Finally, the relation between mental health outcomes and intuitive exercise was not significant ($p = 0.25$). Because there were no significant pathways, this model was not visualized.

H4b showed excellent model fit in Sample B ($\chi^2 = 0.92$, $df = 4$, $p > 0.05$, RMSEA = 0.00 [0.00, 0.05], CFI = 1.00, TLI = 1.00, SRMR = 0.02). The relation between intuitive exercise and exercise identity was both positive and significant ($p = 0.00$). The relation between mental health outcomes and intuitive exercise was not significant ($p = 0.18$), nor was the relation between mental health outcomes and exercise identity ($p = 0.79$). Significant pathways are visualized in Figure 12, correlations between all measures can be seen in Table 3, and means, standard deviations, and factor loadings can be seen in Table 4.

Figure 12



Note: Model fit for the latent variable of mental health outcomes was excellent, and factor loadings were statistically significant. The mediation model had adequate fit (χ^2/df = 1.23, RMSEA = 0.00 [0.00, 0.05], CFI = 1.00, TLI = 1.00, SRMR = 0.02). Only statistically significant pathway coefficients are visualized. All visualized path coefficients were statistically significant at the $p < 0.05$ level (*) and the $p < 0.001$ level (**)

Discussion

Summary

The purpose of this study was to use structural equation modeling to understand the relations between exercise identity, exercise motivation, body image concerns, and psychosocial outcomes. While some of the findings in this study supported my hypotheses, many findings were unexpected. A primary finding was that there was a latent variable of diet-culture motivation for exercise which represented exercising for social recognition, appearance, health pressure, weight management, and stress management among the undergraduate sample. In the sample of non-undergraduate adults, the latent variable also existed, however did not include stress management. This finding suggests that diet-culture motivation for exercise is a broader construct than indicators of weight management, health pressure, appearance, social recognition, and stress management alone. Rather, these indicators are connected to one another in their influence on one's motivation to engage in exercise behaviors.

Additionally, while the proposed multiple mediation model in H1 was not supported in Sample A, there was partial mediation in this model in Sample B. This indicated that, for non-undergraduate adults, body image distress mediated the relationships between perceived societal pressure to be thin and diet-culture motivation for exercise and body as well as body and exercise co-rumination and diet-culture motivation for exercise. The implications of this finding will be further discussed in Clinical Implications. The differences between Sample A and Sample B may indicate that undergraduate and non-undergraduate populations experience societal and relational pressures related to body image and exercise in different ways, however, invariance testing was not conducted to assess these differences.

Another primary finding was that, in Sample A, there was a latent variable for relationship health which represented closeness, desired and experienced social support, and relationship satisfaction. The importance of this finding is that, for undergraduate students, relationship health is a broader construct than the individual measures of how one experiences closeness, social support, and satisfaction in relationships. Additionally, while the mediation model H2b was not supported in this sample, there were some important, statistically significant relationships found. Body and exercise co-rumination was associated with adverse individual and relational outcomes. Body and exercise co-rumination not only predicted decreased relationship health, but it was also associated with increased internalization of body image ideals. These findings are important, as they may help us understand the complexities of relationships during undergraduate experiences and the ways in which certain attempts at connecting with peers and seeking support (i.e., co-rumination) may lead to negative individual and interpersonal health outcomes. While existing research suggests that higher levels of internalized body image ideals can lead to disordered eating and exercise behavior, these findings add to the body of literature by addressing the role of relationship dynamics in one's development of internalized body image ideals (Burke & Rains, 2019; Blowers et al., 2003). The implications of this path relationship will be discussed in Clinical Implications.

An interesting finding in H3 was that there was multicollinearity between exercise identity and exercise identity centrality. The original identity centrality measure was developed to measure the importance of one's racial and ethnic identities and was found to be a distinct construct from identity itself (Sellers et al., 1997). The adaptation of this measure to determine the importance of one's identity as an exerciser appeared to lack distinction from the identity as an exerciser. This finding may be due to the difference between identities individuals are born

with (i.e., ethnicity) and those which are chosen (i.e., exerciser). It is possible that, because exercise is a chosen identity, it is inherently central to an individual's sense of self. Additionally, because exercise is a socially accepted, encouraged, and rewarded behavior, it is likely that when an individual chooses to identify with exercise, the identity is positively reinforced (Zanker & Gard, 2008).

Finally, while the hypothesized mediation models in H4 were not fully supported, some statistically significant pathways were identified. In the undergraduate, diet-culture motivated exercise predicted both increased engagement in intuitive exercise and increased experiences of depression, anxiety, and stress. In the non-undergraduate sample, diet-culture motivated exercise predicted increased engagement in intuitive exercise, but did not predict increased experiences of depression, anxiety, and stress. These findings were surprising in that even when motivation for exercise was diet-culture, participants still seemed to engage in exercise behaviors intuitively. However, the undergraduate participants also experienced increased psychological distress when exercise was motivated by diet-culture. These findings highlight the complexity of one's relationship with their body and exercise, suggesting that it is possible to exercise for the purpose of body manipulation while also engaging in exercise behaviors in a healthy, intuitive manner. Additionally, these findings suggest that, particularly for undergraduate students, diet-culture motivated exercise may simultaneously predict intuitive exercise and increased psychological distress, further indicating that one's relationship with exercise and their body is dynamic and complex. The differences between samples suggest that there may be a difference in the psychological experiences of undergraduate and non-undergraduate individuals when their motivation for exercise is diet-culture. However, invariance testing was not conducted, therefore, the significance of these differences was not assessed.

Limitations and Directions for Future Research

There were several limitations in the current study. First, the methodology used to recruit participants, while convenient, may have lacked strength. Sample A was recruited from the undergraduate research pool at Colorado State University, limiting the sample to a predominantly White, educated, English-speaking sample. Because the sample was lacking in diversity, results are not generalizable to the larger population of Colorado or the United States. Sample B, recruited via snowball sampling, had similar limitations in diversity. Although participants in Sample B were diverse in some ways (i.e., age, geographic location), this method of sampling is subject to bias, as recruiters sought participants with whom they had relationships and, as a result, may have had shared characteristics (Parker et al., 2019).

Another limitation in this study is the cross-sectional nature of the data collection. Hayes (2013) argues that, while longitudinal data are ideal, mediation models of cross-sectional data can be informative. However, other scholars suggest that results are likely to be biased and cannot be used to infer causal relationships (Shrout, 2011). Future studies should collect longitudinal data from a broader, representative random sample, allowing findings to not only be more generalizable but also to determine whether or not predictors, mediators, and outcomes have a directional and causal relationship.

The current study also lacked invariance testing to assess for differences between the two samples as well as between other identities, such as gender. Results from the current study suggested that there may be differences in the ways in which individuals experience their relationship with exercise in different stages of life (i.e., emerging adults/undergraduate college students versus non-undergraduate adults). Future research should include invariance testing to assess whether or not these differences are significant, as significant differences could suggest

different approaches to support individuals towards improving their relationship with exercise, body image, and peer relationships.

An additional limitation to this study was the adaptation of the CSEI, the measure used to assess exercise identity centrality. This scale was adapted from a measure used to assess racial identity centrality (Sellers et al., 1998). The adapted measure for exercise identity centrality appeared to measure a construct which was not distinct from exercise identity itself, resulting in multicollinearity between the two variables. Because of this, the hypothesized moderation model was unable to be interpreted. Exercise is a complex behavior with both beneficial and adverse consequences (). In future studies, it could be useful to obtain a more thorough understanding of ways in which individuals relate to and identify with exercise across the lifespan by using qualitative data to help explain some of the quantitative relationships found in the current study.

Finally, in order to obtain responses to all measures used in my hypotheses, the survey I administered was longer than recommended. Revilla & Ochoa (2017) suggest a maximum survey time of 20 minutes to prevent participant burnout, however, the average time to complete my survey in both samples exceeded this length. Although I used attention checks throughout the surveys, it is possible that participants lost interest as the survey progressed, which could have resulted in less accurate responses.

Clinical Implications

Exercise is often a health behavior prescribed by both medical and mental health professionals as a tool for individuals to increase mood, improve overall physical health, and cope with stress (Reugsegger & Booth, 2018). However, exercise can also be associated with negative body image, disordered eating, and internalized pressures to obtain a socioculturally accepted body (Holland et al., 2014). As such, many individuals' relationship to exercise is

complex and, at times, confusing. When clients are seeking support with their relationship with exercise and body image, it is important for mental health providers to support clients in examining which parts of their exercise behaviors are motivated by diet-culture and which are motivated by other factors like enjoyment or positive health outcomes.

Much of the existing research on adverse exercise behaviors, such as compulsive exercise, focuses on the interaction between exercise, restrictive eating, and body image (Dittmer et al., 2018; Meyer et al., 2011; Mond & Calogero, 2009). The findings in this study suggest that, in addition to body image, sociocultural and relational factors such as co-rumination and societal pressure to be thin impact one's motivation for exercise and psychological outcomes associated with exercise. Additionally, the impact of these sociocultural factors may differ among emerging adults compared to their older peers. As such, individuals working towards improving their relationship with exercise may need different approaches to treatment based on age demographics. Particularly among emerging adults, it may be important for clinicians to support clients in understanding their relationship patterns and how clients' relationships are impacted by body and exercise specific co-rumination.

Conclusion

Exercising is a complex behavior associated with both beneficial and adverse physical, psychological, and social outcomes. Sociocultural messaging about the type of body one should strive for to be "acceptable" can adversely impact individuals' body image and sense of worth, and exercise is often a method by which individuals attempt to manipulate their body size, shape, or weight. Particularly among women, co-rumination about body, food, and exercise can be a way that people attempt to feel connected with peers and seek solutions to their perceived "problems" with their bodies. This study revealed that one's motivation for exercise may be

impacted by these sociocultural and relationship factors in the form of diet-culture motivation for exercise. Additionally, especially among emerging adults, diet-culture motivated exercise may be associated with increased levels of psychological distress, even one is able to engage in exercise behavior in an intuitive way. Scholars and practitioners alike should continue to seek more understanding of the complex nature of exercise and the ways exercise impacts one's sense of self, relationships, and mental health.

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APPENDICES

Appendix A

Demographic Survey

1. How old are you? ____
2. What is your gender identity?
    a. Cisgender
    b. Transgender
    c. Nonbinary
    d. Gender-fluid
    e. Other
    f. Do not wish to respond
3. How do you define your racial identity?
    a. American Indian or Alaska Native
    b. Asian or Asian American
    c. Black or African American
    d. Native Hawaiian or Other Pacific Islander
    e. White
    f. Other _____
    g. Do not wish to respond
4. How do you define your ethnicity?
    a. Hispanic/Latinx
    b. Not Hispanic/Latinx
    c. Other _____
    d. Do not wish to respond

5. Do you identify as someone who has a disability?
    a. Yes
    b. No
    c. Do not wish to respond
6. Do you identify as a member of the LGBTQIA+ community?
    a. Yes
    b. No
    c. Do not wish to respond

Appendix B

Exercise Intensity/Frequency Screen

1. On average, how many days do you engage in exercise each week?

   1 day
   2 days
   3 days
   4 days
   5 days
   6 days
   7 days

2. What type(s) of exercise do you do? Select all that apply:

   Walking
   Jogging/Running
   Yoga
   Swimming
   Team sports (softball, hockey, soccer, basketball, volleyball, football)
   Tennis/Pickleball/Racketball
   Pilates
   Bicycling
   Group fitness (spin, aerobic, HIIT)
   Hiking
   Skiing/Snowboarding
   Snowshoeing/Cross-country skiing
   Dancing
   Skating (Rollerskating, ice-skating, rollerblading, skateboarding)
   Weight Lifting
   Rowing
   Other: _____

3. On average, how much time do you spend exercising each week?

   Less than 2.5 hours
   2.5 hours or more to 4 hours
   4 hours or more to 5.5 hours
   More than 5.5 hours

4. On average, how much time do you spend engaging in light-intensity exercise (slow walking, restorative yoga) each week?

   0 to 30 min
   31 min to 60 min
   1 or more to 2 hours
   2 or more to 3 hours
   More than 3 hours

5. On average, how much time do you spend engaging in moderate-intensity exercise (brisk walking, bicycling slower than 10mph, yoga/pilates) each week?

   0 to 30 min
   31 min to 60 min
   1 or more to 2 hours
   2 or more to 3 hours
   More than 3 hours

6. On average, how much time do you spend engaging in vigorous-intensity exercise (running, cycling, team sports, hiking, swimming laps) each week?

   0 to 30 min
   31 min to 60 min
   1 or more to 2 hours
   2 or more to 3 hours
   More than 3 hours

Appendix C

Obligatory Exercise Questionnaire

Listed below are a series of statements about people's exercise habits. Please circle the number that reflects how often you could make the following statements:

1 – NEVER 2 – SOMETIMES 3 – USUALLY 4 – ALWAYS

1. I engage in physical exercise on a daily basis.
2. I engage in one/more of the following forms of exercise: walking, jogging/running or weightlifting.
3. I exercise more than three days per week
4. When I don't exercise I feel guilty.
5. I sometimes feel like I don't want to exercise, but I go ahead and push myself anyway.
6. My best friend likes to exercise.
7. When I miss an exercise session, I feel concerned about my body possibly getting out of shape.
8. If I have planned to exercise at a particular time and something unexpected comes up (like an old friend comes to visit or I have some work to do that needs immediate attention) I will usually skip my exercise for that day.
9. If I miss a planned workout, I attempt to make up for it the next day.
10. I may miss a day of exercise for no good reason.
11. Sometimes, I feel a need to exercise twice in one day, even though I may feel a little tired.
12. If I feel I have overeaten, I will try to make up for it by increasing the amount I exercise.
13. When I miss a scheduled exercise session I may feel tense, irritable or depressed

14. Sometimes, I find that my mind wanders to thoughts about exercising.
15. I have had daydreams about exercising.
16. I keep a record of my exercise performance, such as how long I work out, how far or fast I run.
17. I have experienced a feeling of euphoria or a "high" during or after an exercise session.
18. I frequently "push myself to the limits."
19. I have exercised when advised against such activity (i.e. by a doctor, friend, etc.)
20. I will engage in other forms of exercise if I am unable to engage in my usual form of exercise.

*Items 8 and 10 are reverse-keyed.

Appendix D

Compulsive Exercise Test

1	2	3	4	5
Never true	Rarely True	Sometimes True	Often True	Always true

1. I feel happier and/or more positive after I exercise.
2. I exercise to improve my appearance
3. I like my days to be organized and structured of which exercise is just one part
4. I feel less anxious after I exercise
5. I find exercise a chore
6. If I feel I have eaten too much, I will do more exercise.
7. My weekly pattern of exercise is repetitive
8. I do not exercise to be slim *
9. If I cannot exercise I feel low or depressed
10. I feel extremely guilty if I miss an exercise session
11. I usually continue to exercise despite injury
12. I enjoy exercising *
13. I exercise to burn calories and lose weight
14. I feel less stressed and/or tense after I exercise
15. If I miss an exercise session, I will try and make up for it when I next exercise
16. If I cannot exercise I feel agitated and/or irritable
17. Exercise improves my mood
18. If I cannot exercise, I worry that I will gain weight

19. I follow a set routine for my exercise sessions e.g. walk or run on the same route, particular exercises, same amount of time, and so on
20. If I cannot exercise I feel angry and/or frustrated
21. I do not enjoy exercising
22. I feel like I've let myself down if I miss an exercise session
23. If I cannot exercise I feel anxious
24. I feel less depressed or low after I exercise

*Items reversed scored

Factor 1: Avoidance and rule-driven behavior (items 9, 10, 11, 15, 16, 20, 22)
Factor 2: Weight control exercise (items 2, 6, 8, 13, 18)
Factor 3: Mood Improvement (Items 1, 4, 14, 17, 24)
Factor 4: Lack of exercise enjoyment (items 5, 12, 21)
Factor 5: Exercise rigidity (items 3, 7, 19)

Appendix E

Exercise Dependence Scale

1	2	3	4	5	6
Never	Rarely	Sometimes	Often	Mostly	Always

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

20. A great deal of my time is spent exercising

21. I exercise longer than I plan

Appendix F

Exercise Addiction Inventory

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

1. Exercise is the most important thing in my life
2. Conflicts have arisen between me and my family and/or my partner about the amount of exercise I do
3. I use exercise as a way of changing my mood
4. Over time, I have increased the amount of exercise I do in a day
5. If I have to miss an exercise session, I feel moody and irritable
6. If I cut down the amount of exercise I do, and then start again, I always end up exercising as often as I did before

Appendix G

Exercise Identity Scale

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

1. I consider myself an exerciser
2. When I describe myself to others, I usually include my involvement in exercise
3. I have numerous goals related to exercise
4. Physical exercise is a central factor to my self-concept
5. I need to exercise to feel good about myself
6. Others see me as someone who exercises regularly
7. For me, being an exerciser means more than just exercising
8. I would feel a real loss if I were forced to give up exercising
9. Exercising is something I think about often.

Appendix H

Centrality Scale for Exercise Identity

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

1. Overall, being an exerciser has very little to do with how I feel about myself *
2. In general, being an exerciser is an important part of my self-image
3. My destiny is tied to the destiny of other exercisers
4. Being an exerciser is unimportant to my sense of what kind of person I am *
5. I have a strong sense of belonging to the exercise community
6. I have a strong attachment to other exercisers
7. Being an exerciser is an important reflection of who I am
8. Being an exerciser is not a major factor in my social relationships *

*Reverse scored

Appendix I

Sociocultural Attitudes Towards Appearance Questionnaire-4

Please read each of the following items carefully and indicate the number that best reflects your agreement with the statement.

Definitely Disagree Mostly Disagree Neither Agree Nor Disagree Mostly Agree Definitely Agree

1 2 3 4 5

1. It is important for me to look muscular.
2. It is important for me to look good in the clothes I wear.
3. I want my body to look very thin.
4. I think a lot about looking muscular.
5. I think a lot about my appearance.
6. I think a lot about looking thin.
7. I want to be good looking.
8. I want my body to look muscular.
9. I don't really think about my appearance.*
10. I don't want my body to look muscular.*
11. I want my body to look very lean.
12. It is important for me to be attractive.
13. I think a lot about having very little body fat.
14. I don't think much about how I look.*
15. I would like to have a body that looks very muscular.
16. I feel pressure from family members to look thinner.

17. I feel pressure from family members to improve my appearance.

18. Family members encourage me to decrease my level of body fat.

19. Family members encourage me to get in better shape.

20. My peers encourage me to get thinner.

21. I feel pressure from peers to improve my appearance.

22. I feel pressure from peers to look in better shape.

23. I feel pressure from peers to decrease my level of body fat.

24. Significant others encourage me to get thinner.

25. I feel pressure from significant others to improve my appearance.

26. I feel pressure from significant others to look in better shape.

27. I feel pressure from significant others to decrease my level of body fat.

28. I feel pressure from the media to look in better shape.

29. I feel pressure from the media to look thinner.

30. I feel pressure from the media to improve my appearance.

31. I feel pressure from the media to decrease my level of body fat.

*Reverse scored

Factors:

Internalization-Thin/Low body fat: Items 3, 6, 11, 13
Internalization-Muscular: Items 1, 4, 8, 10, 15
Internalization-General Attractiveness: Items 2, 5, 7, 9, 12, 14
Pressures-Family: Items 16, 17, 18, 19
Pressures-Peers: Items 20, 21, 22, 23
Pressures-Significant Others: Items 24, 25, 26, 27
Pressures-Media: Items 28, 29, 30, 31

Appendix J

Perceived Sociocultural Pressure Scale

Subscales: friends, media, dating partner, family

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

1. I've felt pressure from my friends to lose weight.
2. I've noticed a strong message from my friends to have a thin body.
3. I've felt pressure from my family to lose weight.
4. I've noticed a strong message from my family to have a thin body.
5. I've felt pressure from people I've dated to lose weight.
6. I've noticed a strong message from people I've dated to have a thin body.
7. I've felt pressure from the media (e.g., TV, magazines, social media) to lose weight.
8. I've noticed a strong message from the media to have a thin body.

Appendix K

Depression, Anxiety, and Stress Scale-21 Item

Please read over each statement and circle a number 0, 1, 2, or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

0-Did not apply to me at all

1-Applied to me to some degree, or some of the time

2-Applied to me a considerable degree or a good part of the time

3-Applied to me very much or most of the time

1. I found it hard to wind down
2. I was aware of the dryness of my mouth
3. I couldn't seem to experience any positive feeling at all
4. I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)
5. I found it difficult to work up the initiative to do things
6. I tended to over-react to situations
7. I experienced trembling (e.g. in the hands)
8. I felt that I was using a lot of nervous energy
9. I was worried about situations in which I might panic and make a fool of myself
10. I felt that I had nothing to look forward to
11. I found myself getting agitated
12. I found it difficult to relax
13. I felt down-hearted and blue
14. I was intolerant of anything that kept me from getting on with what I was doing

15. I felt I was close to panic
16. I was unable to become enthusiastic about anything
17. I felt I wasn't worth much as a person
18. I felt that I was rather touchy
19. I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)
20. I felt scared without any good reason
21. I felt that life was meaningless

Scoring: Multiply total scores by 2

	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

Appendix L

Exercise Motivation Inventory

1-Never true for me
2-Rarely true for me
3-Sometimes true for me
4-Often true for me
5-Always true for me

Personally, I exercise (or might exercise)...

1. To stay slim
2. To avoid ill health
3. Because it makes me feel good
4. To help me look younger
5. To show my worth to others
6. To give me space to think
7. To have a healthy body
8. To build up my strength
9. Because I enjoy the feeling of exerting myself
10. To spend time with friends
11. Because my doctor advised me to exercise
12. Because I like trying to win in physical activities
13. To stay/become more agile
14. To give me goals to work towards
15. To lose weight
16. To prevent health problems
17. Because I find exercise invigorating
18. To have a good body

19. To compare my abilities with other peoples'

20. Because it helps to reduce tension

21. Because I want to maintain good health

22. To increase my endurance

23. Because I find exercise satisfying in and of itself

24. To enjoy the social aspects of exercising

25. To help prevent an illness that runs in my family

26. Because I enjoy competing

27. To maintain flexibility

28. To give me personal challenges to face

29. To help control my weight

30. To avoid heart disease

31. To recharge my batteries

32. To improve my appearance

33. To gain recognition for my accomplishments

34. To help manage stress

35. To feel more healthy

36. To get stronger

37. For enjoyment of the experience of exercising

38. To have fun being active with other people

39. To help recover from an illness or injury

40. Because I enjoy physical competition

41. To stay/become flexible

42. To develop personal skills

43. Because exercise helps me to burn calories

44. To look more attractive

45. To accomplish things that others are incapable of

46. To release tension

47. To develop my muscles

48. Because I feel at my best when exercising

49. To make new friends

50. Because I find physical activities fun, especially when competition is involved

51. To measure myself against personal standards

Appendix M

Body Image Disturbance Questionnaire

1. Are you concerned about the appearance of some part(s) of your body, which you consider especially unattractive?

   1-Not at all concerned
   2-somehat concerned
   3-Moderately Concerned
   4-Very concerned
   5-Extremely concerned

   1b. What are these concerns? What specifically bothers you about the appearance of these body parts? _____

2. If you are at least somewhat concerned, do these concerns preoccupy you? That is, do you think about them a lot and they're hard to stop thinking about?

   1-Not at all preoccupied
   2-Somewhat preoccupied
   3-Moderately preoccupied
   4-Very preoccupied
   5-Extremely preoccupied

   2b. What effect has your preoccupation with your appearance had on your life? (Please describe) _____

3. Has your body image often caused you a lot of distress, torment, or pain? How much?

   1-No distress
   2-Mild, and not too disturbing
   3-Moderate and disturbing, but still manageable
   4-Severe, and very disturbing
   5-Extreme, and disabling

4. Has your body image caused you impairment in social, occupational, or other important areas of functioning? How much?

1-No limitation
2-Mild interference, but overall performance not impaired
3-Moderate, definite interference, but still manageable
4-Severe, causes substantial impairment
5-Extreme, incapacitating

5. Has your body image significantly interfered with your social life? How much?

   1-Never
   2-Occasionally
   3-Moderately Often
   4-Often
   5-Very often

   5b. If so, how? _____

6. Has your body image significantly interfered with your school work, job, or your ability to function in your role? How much?

   1-Never
   2-Occasionally
   3-Moderately Often
   4-Often
   5-Very often

   6b. If so, how? _____

7. Do you ever avoid things because of your body image? How often?

   1-Never
   2-Occasionally
   3-Moderately Often
   4-Often
   5-Very often

   7b. If so, what do you avoid? _____

Appendix N

Intuitive Exercise Scale

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

Factor 1 – emotional exercise

1. I find myself exercising when I'm feeling negative emotions (for example, anxious, depressed, or sad) even when I don't feel like exercising.
2. I find myself exercising when I am lonely, even when I do not feel like exercising.
3. I use exercise to help soothe my negative emotions.
4. I find myself exercising when I'm stressed out, even when I've already exercised.
5. I use exercise to distract myself from or avoid negative emotions.

Factor 2 – body trust

6. I trust my body to tell me when to exercise.
7. I trust my body to tell me what type of exercise to do.
8. I trust my body to tell me how much exercise to do.

Factor 3 – exercise rigidity

9. I incorporate a variety of physical activities into my exercise plan
10. I enjoy different types of physical activities when I exercise.
11. I engage in a variety of different types of exercise.

Factor 4 – mindful exercise

12. I stop exercising when I feel pain.

13. I stop exercising when I am fatigued.

14. When my body feels tired, I stop exercising

Appendix O

Body, Food, & Exercise Co-rumination Scale

Think of a close friend or best friend.

What is their first initial? ____
How old is this friend in years? ____
How long have you known this friend (in years)? _____

About how often do you talk to this friend?

a few times a year
once a month
a few times a month
once a week
a few times a week
once a day
a few times a day

Please keep this friend in mind when responding to the following statements. Indicate how much you agree or disagree with the following according to the following scale:

Strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
1	2	3	4	5

Exercise Co-rumination

Factors: Frequency, Discussing problem repeatedly, problem causes, problem consequences, negative affect

1. When we hang out, we spend most of our time together talking about problems that my friend or I have with exercise.
2. We will keep talking about struggling to change our exercise routines even after we both know all of the details about each others' exercise habits.
3. We talk for a long time trying to figure out all the different reasons why one of us might not have exercised as planned.
4. When one of us has a problem with exercise, we talk about it for a long time.

5. We talk a lot about how bad or guilty one of us feels when we miss a workout.
6. We spend a lot of time discussing the things we dislike about our exercise routines.
7. We talk about problems with exercise that my friend or I are having almost every time we see each other.
8. We talk about all of the reasons why we might have the struggles with exercise we have.
9. We'll talk about our exercise issues over and over.
10. We talk for a long time about how upset issues with our exercise routine has made one of us.
11. We try to figure out every one of the bad things that might happen because of exercise choices we make.
12. We usually talk about trying to change our exercise routines every day even if nothing new has happened.
13. We talk for a long time about how sad, mad, or guilty the person who made an exercise choice they regret feels.
14. We talk a lot about all of the different bad things that might happen because of exercise choices we make.

Food/Body Co-rumination

Factors: Frequency, discussing problem instead of engaging in other activities, encouragement of problem discussion, friend encouraging problem discussion, problem causes, problem understanding, negative affect

1. When we hang out, we spend most of our time together talking about problems that my friend or I have with food or our bodies.
2. If one of us has problem with their body shape, we will talk about the problem rather than talking about something else.

3. After my friend tells me about a problem related to their eating behaviors or body shape/size, I always try to get my friend to talk more about it later.
4. When I have a problem with my weight or my food choices, my friend always trires really hard to keep me talking about it.
5. When one of us has a problem with food or our body, we talk about it for a long time.
6. When we see each other, if one of us is struggling with our weight, body shape, or food choices, we will talk about that struggle even if we had planned to do something else all together.
7. When my friend has a problem with their food choices or body shape/size, I always try to get my friend to tell me every detail about what happened.
8. After I've told my friend about a problem I'm having with my weight or food choices, my friend always tries to get me to talk more about it later.
9. We talk about problems with our body shape or food choices that my friend or I are having almost every time we see each other.
10. If one of us has a problem with losing weight or our food choices, we will spend our time together talking about it, no matter what else we could be doing instead.
11. When my friend has a problem with their food choices or body shape/size, I always try really hard to keep my friend talking about it.
12. When I have a problem with changing my body shape or my food choices, my friend always tries to get me to tell every detail about my problem.
13. We talk for a long time trying to figure out all the different reasons why one of us might have engaged in food behaviors we regret.

14. We talk a lot about a problem we have with food and changing our bodies in order to understand why it happened.
15. We talk a lot about how bad or guilty one of us feels when they make food choices they regret.
16. We talk a lot about trying to change parts of our bodies that we don't like.
17. We talk for a long time about how upset issues with our body shape has made us.
18. We talk about all the reasons why we might have the body shape we have.
19. We try to figure out everything about how to change our bodies, even if there are parts we may never understand.
20. We spend a long time talking about how sad, mad, or guilty the person who made a food choice they regret feels.

Appendix P

Desired and Experienced Support Scale

Keeping in mind the same friend from the last section, please rate the following statements using the scale:

1-Don't receive at all
2-Receive rarely
3-Receive occasionally
4-Receive regularly
5-Receive a great deal

Emotional Support

1. Expressing understanding of a situation that is bothering you, or disclosing a similar situation that they experienced before.
2. Promising to keep problems you discuss in confidence.
3. Providing you with hope or confidence.
4. Offering attentive comments when you speak.

Esteem Support

1. Telling you that you are still a good person even when you have a problem.
2. Trying to reduce your feelings of guilt about a problem situation.
3. Expressing agreement with your perspective on various situations.
4. Assuring you that you are a worthwhile person.

Network Support

1. Offering to do things with you and have a good time together.
2. Offering to spend time with you to get your mind off something (chatting, having dinner together, going to a concert, etc.)
3. Helping you find the people who can assist you with things.

Information Support

1. Giving you advice about what to do.
2. Analyzing a situation with you and telling you about available choices and options.
3. Helping you understand why you did not do something well.
4. Giving you reasons why you should or should not do something.

Tangible Support

1. Joining you in some activity in order to alleviate stress.
2. Expressing willingness to help you when you are in need of help.
3. Offering to help you do something that needs to be done.

Appendix Q

Relationship Satisfaction Scale

For the following statements, think about the same friend you have thought of for the previous two sections. Select your level of agreement for each statement.

1 – Strongly disagree
2 – Disagree
3 – Neither agree nor disagree
4 - Agree
5 – Strongly agree

1. These friends meet my needs.
2. I am satisfied in my relationships with my friends.
3. Compared to others' relationships, my relationships with my friends are good.
4. I often wish I had not gotten into relationships with these friends.*
5. My relationships with these friends meet my original expectations.
6. I love my friends.
7. There are problems with my relationships with these friends.*

*Reverse Scored

Appendix R

Inclusion of Others and the Self Scale

Think of the same friend you have considered in the previous sections. Which picture best describes your relationship with this person?