Weight Stigma and Physical Activity Behaviors Among Adults: Context Matters

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Dedication

This dissertation is dedicated to all those that have ever been at the receiving end of weight stigmatizing experiences and situations. Although this is only a small part of your voices being heard, I will continue to advocate for you to create spaces that are enjoyable for you to engage in physical activity.
Abstract

Physical activity is an important health behavior for adults of all weight statuses to engage in. Many factors have been explored as they relate to adult physical activity behavior, including weight stigma. Weight stigma can take different forms - experienced weight stigma (EWS), internalized weight stigma (IWS), and fitness center stigma – and can result in negative psychosocial and physical health outcomes. However, much of the current literature around the association between weight stigma and physical activity remains mixed, potentially due to the different forms that it can take. Additionally, literature around fitness center stigma and physical activity is sparse, but important to explore given that they are common spaces for engaging in physical activity among adults. Thus, the purpose of this dissertation study was to use a mixed methods approach to explore the associations between all weight stigma types (EWS, IWS, and fitness center stigma) and physical activity behaviors among a weight diverse sample of adults. Participants (n=214) completed self-report survey measures of weight stigma, physical activity, psychosocial factors (self-efficacy for exercise, exercise avoidance motivation, and self-esteem), and sociodemographic information. A subsample of participants (n=8) who reported high levels of EWS and at least some level of fitness center stigma were contacted based on survey responses and completed individual semi-structured virtual interviews to provide more detailed context to their experiences with EWS and fitness center stigma, and how these incidents have had a perceived impact on their physical activity behaviors and feelings toward physical activity and fitness spaces. Regression analyses indicated that EWS was positively associated with physical activity behavior, but neither IWS or fitness center stigma had significant associations. Parallel multiple
mediation analyses indicated that self-efficacy for exercise significantly mediated the relationships between IWS and lower levels of physical activity, and fitness center stigma and lower levels of physical activity. No significant relationships were found between exercise avoidance motivation or self-esteem and any weight stigma variables. Qualitative data analysis revealed that context matters when it comes to specific weight stigma experiences. When participants experienced weight stigma in their lifetime, and from whom, played differential roles in how participants responded to it in relation to physical activity behavior. When participants were younger, they noted they would engage in more extreme behaviors and levels of activity as a result of the stigmatizing experiences. Although fitness center stigma was not perceived to play a major role in participants current engagement in physical activity, it may still have created an additional barrier which drove some participants to choose different fitness settings for physical activity, certain clothing, and reduced their motivation to engage altogether. In sum, the psychological impact or internalization of weight stigma may contribute to negative physical activity behaviors more so than actual experiences themselves. Further, the context in which these experiences occur may be an important consideration for understanding their potential impact on physical activity. Exercise professionals and clinicians of weight management programs should take time to understand and address weight stigma experiences of their patients to better address physical activity. Additionally, fitness centers and spaces should take steps to reduce weight stigma in their spaces in order to reduce the barriers that people may face when looking to engage in physical activity.
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Chapter 1. Introduction

1.1 Background

Physical activity is one of the most influential and adaptable behaviors for people of all sizes and ages, that can help to reduce disease development (i.e., heart disease and type 2 diabetes), improve disease risk factors (i.e., weight status and hypertension), and improve mental and emotional health (i.e., depression and anxiety) (U.S. Department of Health and Human Services [USDHHS], 2018). In addition to general benefits of physical activity for all people, meeting recommended physical activity guidelines may also positively influence a healthy diet and subsequently lead to other health behaviors that may be associated with a healthy weight status (Loprinzi et al., 2014), and be an important component for prevention of- and treatment efforts for high body mass index (BMI) categories (Jakicic et al., 2018). However, according to the Centers for Disease Control and Prevention (CDC, 2021b), only 24% of adults currently meet the physical activity guidelines for both aerobic and muscle strengthening activities which identifies a critical need for improvement.

Recognizing determinants for lack of physical activity engagement among U.S. adults is complex but should be well understood in order to successfully promote physical activity to improve health and weight status across BMI categories. The Social Ecological Model is a framework for understanding that behaviors, such as physical activity, have different levels of personal, social, and environmental influence (Sallis et al., 2008). These include individual, interpersonal, institutional/organizational, community, and structural levels. Experienced weight stigma (presented as negative attitudes and actions toward people based on their weight), and internalized weight...
stigma (attitudes and actions toward oneself), are two factors worth exploring that may have an influence on physical activity behavior from all levels of the Social Ecological Model.

With the rise in obesity prevalence, the experience of weight stigma has also increased in prevalence by 66% over a 10-year period (Andreyeva et al., 2008), and can be experienced from different sources (i.e., family members and peers), and settings (i.e., healthcare and school settings) (Pearl, 2018). While weight stigma experiences and internalization can happen to people of all shapes and weight statuses, higher rates seem to be associated with an increase in body mass index (BMI) (Himmelstein et al., 2017). Additionally, weight stigma may also negatively influence mental health, physical activity behaviors, and potentially encourage the perpetuation of obesity outcomes (Brewis, 2014). Therefore, weight stigma should be further explored in association with current weight status across different BMI categories and as a potentially contributing factor to future excess weight gain in adults.

1.2 Rationale

There are many gaps in the current literature related to weight stigma and resulting physical activity outcomes, which this dissertation research will address. Findings from this study may significantly add to the area of research related to weight stigma’s association with health and health behaviors such as physical activity, and may provide rationale for addressing weight stigma as a prevention strategy for or treatment of weight gain and other adverse health outcomes among U.S. adults. Gaps in the literature include the following:
1. Few studies address both forms of weight stigma to explore their similarities and differences among a single sample of adults. Experienced (EWS) and internalized weight stigma (IWS) affect sociodemographic groups to different extents. Experienced weight stigma tends to burden adults of younger ages, women, adults who identify as African American, and those of lower socioeconomic status (Himmelstein et al., 2017; Jackson & Steptoe, 2017; Puhl et al., 2008). IWS tends to more commonly impact women and adults who identify as White (Pearl et al., 2019; Puhl et al., 2018). These differences warrant the exploration of sociodemographic disparities in weight stigma experiences. Furthermore, the association with physical, emotional, and mental health behaviors vary as a result of the type of stigma. IWS results in greater levels of negative mental health outcomes (Emmer et al., 2020), while EWS may result in higher levels of exercise avoidance motivation, identifying that weight stigma and physical and mental health outcomes should be further explored within one sample.

2. The association between EWS and IWS on health behaviors such as physical activity, may potentially be influenced by other means, especially psychosocial factors. However, there is a lack of consensus on the mediating roles of some psychosocial factors (i.e., self-esteem, self-efficacy for exercise, and exercise avoidance motivation) in the association between both forms of weight stigma and physical activity behavior outcomes (Pearl et al., 2015; Schmalz, 2010; Vartanian & Novak, 2011; Vartanian & Shaprow, 2008).

3. Although weight stigma may be associated with physical activity, there is an overall lack of exploration of weight stigma within physical activity spaces,
particularly fitness settings, even though these are common spaces in which adults engage (Holliday et al., 2017). One quantitative study explored EWS and IWS among gym members, but only included adults with overweight and obesity (Schvey et al., 2017). Since weight stigma can occur among people of all weights and sizes, more research targeting a weight diverse sample is needed for a greater understanding of stigma experiences in a fitness setting and their overall association with physical activity behaviors. There is also a scarcity of qualitative research around weight stigma in fitness settings, in which the addition will help to gain a richer and more detailed insight into these associations than otherwise would be gained in a solely quantitative analysis.

1.3 Specific Aims and Hypotheses

To address the aforementioned gaps in the literature, the purpose of this cross-sectional, sequential mixed-methods study is three-fold. First, the study will explore overall prevalence of EWS, IWS, and fitness center stigma in a sample of adults, sociodemographic differences of participants by all types of weight stigma, and their overall association with physical activity behavior. The second purpose is to explore the role that different psychosocial factors play in the relationship between weight stigma and physical activity behaviors. The third and final purpose is to qualitatively explore weight stigma experiences within fitness settings to gain a deeper understanding of those experiences based on the Social Ecological Model, and perceived impacts they have on physical activity behaviors. The following specific aims and associated hypotheses are proposed:
**Aim 1:** To describe the sample by examining a) the overall prevalence of EWS and IWS in a sample of adults, b) the prevalence of fitness center stigma, c) differences in weight stigma by sociodemographic characteristics (i.e., SES, race/ethnicity, gender, and weight status), and d) the association of EWS, IWS, and fitness center weight stigma with physical activity behaviors.

**Hypothesis:** The overall prevalence of EWS and IWS as well as differences by sociodemographic groups, will be comparable to previously reported findings where weight stigma is common and differently impacts people of different weight status and genders. Additionally, greater levels of EWS, IWS, and fitness center weight stigma will be associated with lower physical activity levels compared to those that do not experience and/or internalize weight stigma.

**Aim 2:** To determine if psychosocial characteristics (self-esteem, self-efficacy for exercise, and exercise avoidance motivation) differ based on level of EWS, IWS, or fitness center weight stigma. Further, to examine the mediating effect of self-efficacy for exercise, self-esteem, and exercise avoidance motivation, between all weight stigma variables and physical activity levels.

**Hypothesis:** All three psychosocial characteristics will differ by level of EWS, IWS, and fitness center weight stigma. Self-efficacy for exercise, self-esteem, and exercise avoidance motivation will have a mediating effect on physical activity outcomes for adults that are subject to weight stigma.

**Aim 3:** To utilize semi-structured interviews to explore the perceived impact of weight stigma experienced within fitness settings on physical activity behaviors among participants who have previously reported high levels of EWS and at least
some level of fitness center stigma. Interview questions explored all levels of the Social Ecological Model (individual, interpersonal, institutional/organizational, community, and structural). Quantitative survey data was utilized to describe the sample.

**Hypothesis:** Common themes will emerge within all levels of the Social Ecological Model as to reasons why and how different forms of weight stigma experienced in and out of specific fitness settings play a role in physical activity behaviors among those that have experienced weight stigma in a fitness setting.
Chapter 2. Literature Review

This literature review will examine the prevalence of physical activity behaviors, obesity, and weight stigma to identify a critical need in addressing these three major public health problems in the U.S. today. The definition of and health impacts driven by two different classifications of weight stigma (experienced and internalized) will be explored and further linked to behaviors that closely impact weight status, such as physical activity. The potential role that weight stigma can play on physical activity outcomes will be examined to identify a need for addressing weight stigma to improve health and health behaviors across different BMI weight categories. This chapter will conclude with the presentation of a theoretical framework driving the specific aims and hypotheses of the proposed study.

2.1 Physical Activity

Engaging in regular physical activity can improve overall health for people of all ages, related to disease risk, physical function, cognitive function, and weight control (USDHHS, 2018). As a result, physical activity has been included as one of the main objectives of Healthy People 2030 (USDHHS, 2020). To obtain the many benefits associated with engaging in physical activity, it is recommended that adults achieve 150 – 300 minutes of moderate intensity activity, or 75 – 150 minutes of vigorous intensity activity, or a combination of both every week (USDHHS, 2018). Additionally, adults should complete muscle-strengthening activities for all major muscle groups at least two days per week. Unfortunately, only about one in four adults meet the weekly physical activity recommendations (CDC, 2021b). The negative implications of lack of physical
activity in addition to the low prevalence of engagement, suggest the importance of encouraging physical activity for everybody.

Despite the many benefits of physical activity related to physical and mental health, it can be both positively and negatively influenced by many determinants and environmental factors represented by the Social Ecological Model (CDC, 2012). Examples include individual determinants (i.e., personal knowledge and attitudes toward physical activity), interpersonal determinants (i.e., family and peer influence), and community determinants (i.e., neighborhood environment such as proximity and access to spaces to engage in physical activity) (CDC, 2012). The abundance of circumstances that can play a role in the initiation and maintenance of physical activity make it a complex behavior to modify and a behavior which has gained attention in recent literature.

2.2 Definition, Prevalence, and Impact of Obesity

Benefits of physical activity can be especially apparent among those with obesity as it not only helps to reduce weight status, but also reduce the risk of diseases associated with higher weight status. Obesity is defined by the CDC as having a weight that is higher than what is considered healthy for a given height based on body mass index (BMI) (CDC, 2021a). BMI is calculated by dividing a person’s height in kilograms (kg) by the square of their height in meters (m). Weight status categories for adults over the age of 20 years include: underweight (BMI<18.5 kg/m²), normal weight (BMI of 18.5 to <25 kg/m²), overweight (BMI of 25.0 to <30 kg/m²), or obese (BMI of 30.0 kg/m² or greater). The obese classification can be broken down further into three classes: class I obesity (BMI of 30.0 to <35 kg/m²), class II obesity (BMI of 35.0 to <40 kg/m²), or class
III, which is also considered extreme or severe obesity (BMI of 40.0 kg/m² or higher). Generally, a BMI of 25.0 kg/m² and over is considered an unhealthy weight status for adults (CDC, 2020).

The prevalence of obesity in the United States has risen over the past 20 years and reached an alarming rate of 42.4% in 2017-2018 (Hales et al., 2020). It is well known that obesity disproportionately affects different racial and ethnic groups, genders, and ages in various ways. In the most recent obesity data reported in 2017-2018 from the National Health and Nutrition Examination Survey (NHANES), non-Hispanic Black adults had the highest rate of obesity (49.6%), followed by Hispanics/Latinx respondents (44.8%), non-Hispanic White respondents (42.2%), and lastly non-Hispanic Asian respondents (17.4%). Further, although not significantly different, young adults (aged 20-39) had the lowest rates of obesity (40.0%) while middle-aged adults (40-59 years) had the highest frequency (44.8%). There was no major difference in prevalence between men and women (43% and 42.1%, respectively) (Hales et al., 2020).

The multitude of negative physical and mental health risks associated with obesity (e.g., type 2 diabetes, cardiovascular disease, hypertension, mood disorders, impaired quality of life and increased risk of morbidity and mortality) (Djalalinia et al., 2015), has made it one of the leading public health concerns. The root of obesity is excessive weight gain which is often contributed to by a positive energy balance (Romieu et al., 2017). Although energy balance and weight gain are influenced by both modifiable and non-modifiable factors, physical activity is one behavior that can be used to improve weight status or prevent weight gain, often in conjunction with dietary intervention (Donnelly et al., 2009). Improving physical activity behaviors, independent of weight loss, can also
play an important role in reducing some of the comorbidities associated with obesity (Swift et al., 2014). As a result of the aforementioned benefits, physical activity is often recommended for regulating body weight and improving health among people of varying weight statuses—especially people with overweight and obesity (Jakicic et al., 2018). One specific factor that may negatively influence physical activity behavior within multiple levels of the Social Ecological Model is weight stigma, which has recently gained momentum in research especially among populations with overweight or obesity. However, its impact is still not yet fully understood.

2.3 Weight Stigma

Stigma is described as “an attribute that is deeply discrediting”, and is associated with a negative stereotype in which others may see a person as less than human or even see the person as shameful (Goffman, 2006). As stigma became more prevalent in research and literature, the definition evolved to include five components: the act of putting labels and characteristics on human differences and devaluing those differences, stereotyping, separating those with differences from those without, the act of discrimination toward a stigmatized person, and lastly, the exercise of power (Link & Phelan, 2006; R. M. Puhl & K. D. Brownell, 2003). Eventually, it was well understood that different types of stigma exist, including but not limited to racial, gender, and weight stigma.

Weight stigma, which is a field recently dominated by researchers Puhl and Pearl since the early 2000’s, occurs when a person is socially rejected or seen as less of a person due to their weight (Tomiyama et al., 2018). It is exacerbated if a person’s weight does not match current social norms of weight and body shape, and commonly occurs
toward those with overweight or obesity (Brewis, 2014; Pont et al., 2017; Tomiyama et al., 2018). Stigmatizing these individuals often begins with negative beliefs and stereotyping that they are lazy, lack willpower and self-control, and are unmotivated (Brewis, 2014; Pont et al., 2017). These stereotypes often lead to negative treatment of the stigmatized individual through discrimination. Weight stigma commonly presents as experienced (i.e., public or structural forms of discrimination) or internalized (i.e., self-stigma) (Emmer et al., 2020). Public experienced stigma (EWS) can occur through experiences within interpersonal interactions such as teasing and lack of respect, and structural experiences of weight stigma often stem from policies and messaging that may lead to outcomes like the inability to fit into a seat, being denied employment, or poor treatment in healthcare settings (Brewis, 2014; Emmer et al., 2020; Palad et al., 2019; Pearl, 2018). Internalized weight stigma (IWS) can occur as internalized beliefs and agreement about weight stigma stereotypes directed toward the individual (Emmer et al., 2020).

The reporting of weight stigma prevalence by type is inconsistent in the literature. Some studies examine the prevalence of both EWS and IWS (Himmelstein et al., 2017), while others report EWS only, or IWS only (Andreyeva et al., 2008; Puhl et al., 2018; Spahlholz et al., 2016). Nonetheless, the consensus is that overall prevalence of weight stigma is common. In 2017, the overall prevalence of weight stigma (the percent of people who reported EWS and/or IWS) was 40.7% among a diverse and nationally representative sample of U.S. adults (Himmelstein et al., 2017). A comprehensive meta-analysis revealed that of those who reported only on EWS, the pooled prevalence increased with BMI – from 5.7% of adults that have normal weight to 19.2% among
those with a BMI of 30 – 34.9 kg/m² to 41.8% among adults with a BMI above 35 kg/m² (Spahlholz et al., 2016). The association between EWS and BMI continues to be prevalent in more recent literature (Puhl et al., 2018). Additionally, the overall prevalence of EWS increased by 66% (reaching 12.2%) between two waves of data from 1995-1996 to 2004-2006 from a sample of nationally representative adults aged 35-74 and has reached rates similar to those of race and age discrimination (11% and 14% respectively) (Andreyeva et al., 2008).

Prevalence rates of IWS have been reported by Puhl et al. (2018) based on mean levels derived from their nationally representative sample. Low levels of internalization were 1 standard deviation below the mean (scores ≤1.85), high levels of internalization were 1 standard deviation above the mean (scores ≥4.88), and mean levels were at the mean of internalization scores (scores between 1.85 and 4.88). Over 44% of adults of varying weight status reported mean levels of IWS, while up to 52% of adults that were classified as having obesity indicated high levels (Puhl et al., 2018). Of note, both EWS and IWS has been increasing over past decades and may be more prevalent among adults with obesity than those categorized as normal weight.

As a result of the high prevalence rates of weight stigma, and because EWS and IWS are distinctly different constructs, it is important to understand them independently. From there, their association with weight status and subsequently, physical activity behaviors, can be compared and explored.

2.4 Experienced Weight Stigma

While EWS can occur at nearly all ages, from childhood into adulthood, the most common sources of EWS differ throughout a life course. Children can develop negative
prejudices against those with overweight and obesity beginning as young as three years of age which can continue through adolescence (Cramer & Steinwert, 1998; Pont et al., 2017), and result in peer-to-peer weight stigmatization (Puhl & Lessard, 2020). This type of stigma among children and adolescents, often termed weight-based victimization (Pearl, 2018; Pont et al., 2017; Puhl & Suh, 2015), can include teasing, social exclusion, and physical aggression (Pearl, 2018).

The presentation of EWS among youth manifests most commonly as teasing and bullying by peers (Puhl & Lessard, 2020; Puhl et al., 2011), and is a frequent form of bullying in schools (Himmelstein et al., 2019; Pearl, 2018; Puhl & Suh, 2015; Puhl et al., 2011). Peers at school are not the only source of EWS for youth; teachers and educators have also been shown to express both implicit bias (i.e., assigning a lower grade) and explicit bias (i.e., inappropriate comments about appearance) toward students with overweight and obesity (Pearl, 2018; Puhl & Lessard, 2020). Similar to weight stigma in the school setting, youth can also experience weight stigma at home, most commonly in the form of weight teasing from parents and other family members (Puhl & Suh, 2015; Puhl & Lessard, 2020).

Peers and family members are some of the most common sources of EWS among adolescents and youth. In a cohort of adolescents and young adults, Haines et al. (2013) analyzed longitudinal trends in eating behaviors, physical activity patterns, and weight-related outcomes. Weight-related teasing was assessed at baseline and at a 10-year follow-up, and the prevalence did not significantly change from baseline for either males or females. These data suggest that although weight-related teasing does not necessarily
increase or decrease with age, it can occur in either childhood or adolescence and may remain prevalent throughout a life course (Haines et al., 2013).

Unfortunately, for children and adolescents, weight teasing specifically from peers or family members can result in a higher risk of emotional health problems (such as low body satisfaction, low self-esteem, high depressive symptoms, and suicidal ideation), than those that do not experience this (Eisenberg et al., 2003). Youth that experienced teasing from both peers and family members reported even higher risk of poor mental health outcomes (Eisenberg et al., 2003). Experiencing weight stigma at a young age may also result in some negative weight-related behaviors such as a reduction in physical activity and engagement in disordered eating behaviors (Puhl & King, 2013). These adverse behaviors may ultimately perpetuate a cycle of engaging in unhealthy weight control behaviors and weight gain as youth transition into adulthood, which makes childhood EWS an important psychosocial factor to address. Although there is a generous amount of current literature around the topic in children (Haines et al., 2013; Pont et al., 2017; Puhl & King, 2013; Puhl & Lessard, 2020), understanding if these experiences continue into adulthood and their potentially lasting effects are imperative to understanding long-term consequences of experiencing weight stigma.

For adults, EWS through interpersonal interactions, such as strangers, acquaintances, friends, and family, are among the most prevalent sources of weight stigma (Pearl et al., 2018; Sutin & Terracciano, 2017). In addition to interpersonal relationships, adults may also experience weight stigma in structural settings such as employment, education, media, and healthcare (Puhl & Heuer, 2009; Spahlholz et al., 2016; Sutin & Terracciano, 2017). In employment settings, individuals with overweight
or obesity may be subject to inappropriate comments, lack of hiring opportunities and promotions, and even loss of jobs due to weight status (Puhl & Heuer, 2009). EWS can occur within higher education settings, where adults might have a more difficult time getting accepted into schools, or experience mistreatment by teachers and professors (R. M. Puhl & K. D. Brownell, 2003). EWS in the media occurs through entertainment media (i.e., lack of portrayal of overweight characters), advertising (i.e., presentation of weight loss products and that weight loss is easily achievable), and news media (i.e., often with a focus on personal blame, responsibility, and solutions rather than larger-scale causes of obesity) (R. M. Puhl & K. D. Brownell, 2003; Puhl & Heuer, 2009).

Healthcare settings are some of the most prevalent settings for EWS (Pearl, 2018). It is common for physicians, nurses, psychologists, and even fitness professionals to possess negative views of patients with overweight and obesity (i.e., laziness and noncompliance to recommended intervention strategies) (Puhl & Heuer, 2009). Discriminatory views and attitudes toward these patients may result in inappropriate comments, and a general lack of respect and understanding noticed by the patient. Unfortunately, when patients encounter these discriminatory experiences, they may ultimately delay or avoid seeking preventive care (R. M. Puhl & K. D. Brownell, 2003; Puhl & Heuer, 2009), which can worsen the health outcomes that may result from their weight status.

Although the previously mentioned sources of EWS have been overwhelmingly prevalent in the literature and described as some of the most frequent sources (e.g., family, healthcare settings, school settings, and media outlets), there are other locations in which the experiencing of weight stigma should be further explored. In particular, fitness
settings should gain more research attention as a place in which EWS may be prevalent from interpersonal to structural experiences. Physical activity is important for all adults to promote health, a healthy weight status, and reduce the risk of weight-related conditions and fitness settings are a common space in which adults engage in activity (Holliday et al., 2017), so examining EWS in fitness settings may help to explain specific physical activity behaviors, or lack thereof. However, very few studies have assessed this association in the current literature (Pickett & Cunnhingham, 2018; Schvey et al., 2017). One of the few existing studies that included a diverse sample of U.S. adults with overweight and obesity suggests that EWS exists in gym settings, although overall prevalence was not reported (Schvey et al., 2017). Since the benefits of engaging in physical activity are clear, further understanding of the perceived impact of weight stigma experiences in a fitness setting are imperative to understanding its association with physical activity behaviors.

As shown above, EWS affects people of all ages and can occur in a variety of settings. Some settings have been overwhelmingly supported in the literature such as healthcare settings, while others such as within a fitness setting, still need to be further understood. Additionally, the high prevalence of EWS in the U.S. necessitates the understanding of how it is associated with health outcomes, both physically and mentally.

2.4.1. EWS, Diet, and Physical Activity Behaviors

EWS has the potential to influence physical and weight-related health outcomes such as diet and physical activity behaviors. Changes in dietary behaviors associated with EWS have been consistently supported in the literature. A qualitative analysis conducted by Lewis et al. (2011) revealed that participants who reported EWS also experienced
negative eating behaviors, such as emotional and secretive eating (Lewis et al., 2011). More recent literature further supports these dietary findings; adults affected by EWS engaged in disruptive eating patterns, such as emotional and binge eating and increased food consumption (Himmelstein et al., 2017; Puhl & Suh, 2015; Wu & Berry, 2018).

In contrast, evidence related to the association between EWS and physical activity is less consistent. Some research argues that physical activity levels may be negatively impacted among adults who report EWS (Himmelstein et al., 2017; Lewis et al., 2011). Jackson et al. (2017) found that in a group of older adults over the age of 50 years of varying weight status, perceived EWS (measured by ever having experienced a discriminatory action related to weight), was associated with a nearly 60% higher odd of being inactive, and a 30% lower odd of engaging in regular moderate-to-vigorous physical activity (MVPA) (Jackson & Steptoe, 2017). Conversely, Pearl et al. (2015) reported that EWS actually predicted greater physical activity behavior among a group of overweight and obese adult women, potentially to counteract the stereotypes that people experience (Pearl et al., 2015).

Alternatively, some studies found no direct association between EWS and physical activity behaviors, but instead found significant associations with a form of motivation, exercise avoidance motivation (a reflection of someone’s reactions to weight stigma experiences with respect to exercise) (Han et al., 2018; Vartanian & Shaprow, 2008). Vartanian & Shaprow (2008) found that within a small sample of college-aged women, no direct association was found between EWS and physical activity behaviors. However, EWS was positively correlated with exercise avoidance motivation (r = .61), and exercise avoidance motivation was negatively associated with both moderate and
strenuous exercise (Vartanian & Shaprow, 2008). Similar results were found in a more recent study of bariatric surgery patients, where exercise avoidance motivation significantly mediated the association between EWS and physical activity (Han et al., 2018). A moderating role of BMI may also exist between EWS and exercise avoidance motivation, as those with a higher BMI experienced a greater correlation between EWS and exercise avoidance motivation ($r = .76$) (Vartanian & Shaprow, 2008). These results indicate a possible, yet important, mediating role of exercise avoidance motivation on physical activity as an outcome which may differ by BMI weight status.

Another recent study revealed that among a sample of adults with overweight or obesity, experiencing weight stigma within a fitness setting did not significantly impact gym use (Schvey et al., 2017). However, it was associated with generally avoiding physical activity behaviors, self-consciousness within fitness spaces, and greater preferences for a shame-free environment (Schvey et al., 2017). Because of the important role that fitness spaces may play in engaging in physical activity behaviors, exploring preferences and barriers to utilizing these spaces among a larger and more diverse sample may be helpful in better understanding the full impact of weight stigma within these settings.

In summary, the association between EWS and modifiable risk factors of obesity such as physical activity, could ultimately result in perpetuating weight gain. Perceived EWS has been shown to be associated with a relative increase in weight and waist circumference over a period of four years in men and women over the age of 50 (Jackson et al., 2014), potentially due to resulting changes in physical activity and dietary behaviors. In contrast, in a study with a shorter duration of only one year, EWS was
actually associated with greater odds of weight loss among a sample of weight loss seeking adults (Pearl et al., 2020). This difference may largely be due to the length of time in which the studies were conducted. To that end, this association between EWS and physical activity is lacking conclusive evidence and requires more research efforts in order to fully understand the larger picture of how weight stigma is associated with physical health behaviors especially within fitness settings, and also emotional and mental health, and potentially weight status. Additionally, mostly quantitative associations were explored, which overlooks importance aspects of how participants perceive these impacts and views on physical activity in general.

2.4.2. EWS and Emotional and Mental Health Outcomes

Although physical activity and diet patterns are important for weight-related health, EWS is often also accompanied by emotional and mental health outcomes that may also be associated with or influence weight status. Like adolescents, adults may experience psychosocial responses such as higher anxiety, stress, body dissatisfaction, greater depressive symptoms, and other general mood and anxiety disorders associated with weight stigma experiences (Emmer et al., 2020; Pearl et al., 2020; Tomiyama et al., 2018; Wu & Berry, 2018). Lower emotional health and wellbeing, such as self-esteem, self-confidence, depression, and anxiety, was one of the most common qualitatively-reported outcomes of EWS in adults with overweight or obesity (Lewis et al., 2011). Additionally, participants discussed feelings of loneliness, difficulty forming new relationships, and challenges in relationships with family and friends caused by the impact of EWS on their participation in social settings (Lewis et al., 2011). Moreover, adults who reported EWS were more than twice as likely to receive a psychiatric
diagnosis than those that did not experience weight stigma (Pearl, 2018). According to a quantitative meta-analysis, those that perceived higher levels of EWS had a higher risk of diminished mental health, and these results were exacerbated as BMI weight status increased (Emmer et al., 2020). However, a recent study revealed that participants that coped with weight stigma experiences using healthy lifestyle behaviors (e.g., eating healthy foods and exercising), had better mental health (Himmelstein et al., 2017).

In summary, adults who have experienced weight stigma may be more inclined to decrease their physical activity behaviors and engage in less healthy dietary behaviors, as well as encounter negative mental health effects. The role that those health behaviors can play in altering weight status and perpetuating the obesity cycle identify a crucial need to better understand and address EWS in future research studies and interventions (Brewis, 2014; Puhl et al., 2020). If those that fall victim of stigmatizing experiences cope with those experiences by engaging in more healthy behaviors, they may reduce their risk of negative emotional and mental health outcomes providing another benefit of engaging in physical activity behaviors among this population.

2.4.3. Other Psychosocial Factors Related to EWS and Physical Activity Behaviors

Since EWS may lead to low levels of physical activity and impact psychological well-being, it is important to gain a better understanding of the role that different psychosocial factors may play in its association with physical activity behaviors. The benefit of physical activity on self-esteem, and the impact of self-efficacy on physical activity have been well-documented (McAuley et al., 2005; Sonstroem et al., 1991; Zamani Sani et al., 2016). However, there is a lack of evidence exploring self-esteem as it relates to the relationship between EWS and physical activity.
The evidence revealing an association between EWS and self-esteem have been inconsistent (Vartanian & Novak, 2011; Vartanian & Shaprow, 2008). Neither of the studies that have reviewed the potential association, assessed the role that self-esteem played between EWS and physical activity behaviors as an outcome. Although previous literature indicates that self-esteem may be influenced by both EWS and physical activity, research aimed at understanding a potential moderating role that self-esteem may play between EWS and physical activity behavior may be warranted.

Despite research having not yet explored self-esteem as a potential moderator between weight stigma and physical activity outcomes, it has been studied in relation to perceived physical competence (Schmalz, 2010). Among 76 older adults, awareness around weight stigma was weakly but negatively associated with perceived physical competence which was mediated by body self-esteem. Of importance, this association was not mediated by BMI, which suggests that perception of weight may impact physical activity more than objective weight status (Schmalz, 2010).

Lastly, self-efficacy is a consistent predictor of exercise and physical activity behaviors (Pearl et al., 2015). Perceived self-efficacy, as defined by Bandura in the early 1990’s, is a person’s belief in one’s own capabilities of a task or behavior (Bandura, 1998, 2004). Based on this definition, it is unsurprising that a greater belief in one’s own abilities to perform physical activity and related movements would have the potential to improve actual physical activity behaviors. Given the well documented impact that EWS has on psychosocial outcomes such as self-esteem, exploring the role that EWS plays in impacting self-efficacy for exercise may also provide more context to how it may relate to physical activity behavior. To the researcher’s knowledge, the mediating role of self-
efficacy between EWS and physical activity has not yet been explored but may help to better understand the psychosocial impact of weight stigma on physical activity levels in adults.

As stated in the previous section, exercise avoidance motivation mediates the association between EWS and physical activity behaviors for those that experience weight stigma (Han et al., 2018; Vartanian & Shaprow, 2008), but no research to date has explored the potential mediating role of self-efficacy. Future research should fill the gap in assessing self-efficacy and physical activity outcomes and extend previous findings to explore the mediating role of perceived physical competence on physical activity among adults with obesity that have experienced weight stigma. Additionally, the potential moderating role that self-esteem plays in the relationship between EWS and physical activity behaviors should also be investigated.

2.4.4. EWS and Sociodemographic Differences

EWS is often closely related to weight status, and obesity prevalence differs among sociodemographic groups. As such, sociodemographic characteristics should be considered when exploring EWS. In adults over the age of 50 years, EWS was more prevalent in those that were of younger ages (62 years vs 67 years), women (61% vs. 39% of men), and of low socioeconomic status (26% vs 13% high socioeconomic status) (Jackson & Steptoe, 2017). These findings were also reported in a more racially/ethnically diverse sample of adults (Himmelstein et al., 2017). No significant differences were found between educational levels or different racial/ethnic groups in the study by Himmelstein et al. (2017), but EWS was more commonly reported among participants with obesity.
Similarly, in a sample of adults ages 25 and over, younger adults (25 – 44 years of age) had higher rates of perceived EWS than the adults 45 years and over, men were half as likely than women to report daily or lifetime EWS (4.6% vs 10.3%), and the greatest differences among males and females between age groups existed for those 35-54 years of age (Puhl et al., 2008). Major differences in EWS by weight status were also reported: only 2% of adults with normal weight reported weight stigma experiences, compared to nearly 40% of adults with severe obesity (BMI ≥ 35). These findings further confirm the association between weight stigma and weight status. Additionally, women with moderate obesity (BMI 30-35 kg/m²) and severe obesity were significantly more likely to experience weight stigma during their lifetime than men of the same weight status ($P<0.05$, $P<0.01$ respectively). African-American men (12.7%) and women (23.9%) had a higher prevalence of lifetime experiences of weight stigma than adults that identified as White or other/multiracial. Finally, differences in weight stigmatizing experiences by marital status, education level, and occupation were less evident (Puhl et al., 2008).

In conclusion, gender differences are the most prominent sociodemographic difference for EWS, but women tend to be studied more than men especially when understanding the association between EWS and physical activity. Racial and age differences also exist, although the supporting evidence of racial differences are mixed. This warrants the need for a sample of different genders, ages, and racial/ethnic groups when exploring the association between weight stigma on physical activity behavior.

### 2.5 Internalized Weight Stigma

Separate from EWS, IWS occurs when someone recognizes and agrees with negative social stereotypes about themselves, resulting in self-devaluation (Pearl & Puhl,
Higher levels of IWS are associated with previously experienced weight stigma, and especially for those that report weight stigma occurring for the first time in childhood or young adulthood (Pearl et al., 2019; Puhl et al., 2018). Of those that report low levels of IWS, 18.6% reported having experienced weight stigma, compared to 84% who reported high levels of IWS (Puhl et al., 2018). In general, IWS is prevalent in over 40% of adults and may be influenced by the source from which EWS is received, such as from friends, family, or at work (Pearl et al., 2018; Puhl et al., 2018). An association between IWS and BMI exists, but is only weak-to-moderate in most studies that found a relationship between the two, suggesting people of all weight statuses can internalize weight stigma (Pearl & Puhl, 2018).

**2.5.1. IWS, Diet, and Physical Activity Behaviors**

Although IWS can result from previous EWS, it can also be an outcome of other life experiences and may result in altered health and weight-related behaviors that differ in strength and significance to those associated with EWS (Pearl et al., 2015). While a recent review displays a consistent association between IWS and disordered eating behaviors (i.e., binge eating and symptoms of food addiction), findings of a relationship between IWS and diet behaviors specific to weight loss are mixed (Pearl & Puhl, 2018). A study by Puhl et al. (2018) determined that among those with higher levels of IWS, a higher percentage were more likely to diet or currently be trying to lose weight than those with lower levels of IWS (Puhl et al., 2018). In contrast, a study by Vartanian (2016) assessed the impact of IWS following a stigmatizing experience in real time as they happen in participants everyday lives. They found that higher levels of IWS were associated with lower motivation to diet or lose weight following the stigmatizing
situation (Vartanian et al., 2016). The assessment directly following a stigmatizing situation may explain the different findings compared to Puhl et al. (2018).

The same review revealed that few studies assessed physical activity outcomes and inconsistently found a direct relationship between IWS and physical activity engagement (Pearl & Puhl, 2018). The studies that found a relationship had small or only marginally significant effect sizes (Pearl et al., 2015; Puhl, Quinn, et al., 2017). However, IWS did impact physical activity outcomes among women in a healthy living program (Mensinger, 2017). IWS mediated the impact of the program on physical activity levels as those that had low levels of IWS significantly improved physical activity behaviors after six months, but no changes in physical activity were found among participants with high levels of IWS (Mensinger, 2017).

Although findings remain unclear for a direct relationship between IWS and weight-related behaviors, a study revealed that among women in a weight loss program, those that started with lower IWS scores had greater weight loss success than those that started with higher scores (Mensinger, 2017). These results suggest that weight-related behaviors that may perpetuate weight gain (i.e., physical activity), should be further explored when investigating the impact of IWS on health outcomes. Similar to EWS, the relationships explored between IWS and weight-related behaviors like physical activity, were purely quantitative. This leaves a gap in literature yet to be explored through qualitative data collection to gain a better understanding of how participants perceive these associations and potentially changed views about physical activity.

2.5.2. IWS and Emotional and Mental Health Outcomes
A comprehensive review of 74 studies provides more consistent evidence supporting associations between IWS and negative mental health than those between IWS and weight-related health behaviors (Pearl & Puhl, 2018). Depression, anxiety, and body image are all significantly negatively correlated with IWS independent of weight status. The negative impact IWS has on mental health outcomes has been strongly supported and displays the important and negative role that IWS plays beyond the potential for impacting the perpetuation of obesity-related behaviors and increased weight status.

2.5.3. Other Psychosocial Factors Related to IWS and Physical Activity Behaviors

Despite the lack of direct association between IWS and physical activity behaviors, IWS more clearly impacts psychological well-being. Therefore, psychosocial factors such as self-efficacy for exercise, exercise avoidance motivation, and self-esteem should also be explored for IWS. Self-efficacy as it relates to weight stigma has only been researched in one study (Pearl et al., 2015). In this sample of women with overweight or obesity, IWS was negatively correlated with self-efficacy and exercise motivation, as well as lower levels of physical activity behavior. Therefore, IWS may lead to a loss in self-efficacy and motivation and ultimately drive people to give up on trying to engage in more physical activity, posing a potential mediating effect of self-efficacy (Pearl et al., 2015).

Exercise avoidance motivation is especially prevalent among adults that internalize weight stigma and that have also previously experienced weight stigma (Vartanian & Novak, 2011). Vartanian & Novak (2011) were one of few studies to begin exploring IWS as a moderator itself, between EWS and exercise avoidance motivation.
IWS was a significant predictor of exercise avoidance motivation in this sample, and significantly moderated the impact of EWS on exercise avoidance. However, the mediating role of exercise avoidance motivation on the outcome of actual physical activity behaviors were not explored in this sample.

IWS has also been associated with self-esteem, regardless of BMI status (Durso & Latner, 2008; Pearl & Puhl, 2014), indicating that lower levels of self-esteem are related to higher levels of IWS. Although self-esteem has been explored as having a mediating role between IWS and other health indices such as depression and anxiety, it has yet to be explored as a mediator between IWS and physical activity behaviors (Pearl & Puhl, 2018).

In summary, self-efficacy, self-esteem, and exercise avoidance motivation have been studied in exploring their association with IWS. However, more research is needed to understand the role of these psychosocial factors on physical activity behaviors in relation to IWS.

2.5.4. IWS and Sociodemographic Characteristics

Sociodemographic differences are important considerations when exploring IWS. In a large sample (n=18,769) of adults, higher levels of IWS were more commonly reported among younger participants, women, and those that had a higher BMI (Pearl et al., 2019). Racial differences also exist, with reports of Black participants having lower levels compared to White, Asian, and Latinx participants, although it is important to note that 91% of participants were White, non-Hispanic/Latino.

Utilizing a more diverse sample of adults, Puhl et al. (2018) found similar results to Pearl et al. (2019) and revealed that IWS differed across gender, race, age, weight
status, income and education groups. Of those with high IWS scores, 72% were women, although gender was not a significant predictor of IWS. As internalization scores increased, so did the proportion of White participants with 77.8% of them having high internalization scores. In comparison, being Black or Latinx was negatively associated with IWS, meaning lower levels of internalization. As related to age and weight status, higher IWS scores were reported among younger participants (41 vs 48 years of age with high internalization), and those with higher a BMI weight status. Adults that perceived that they were overweight or obese had higher scores compared to those that felt they were about the right weight. Lastly, income and education were significantly negatively associated with IWS (Puhl et al., 2018).

In summary, sociodemographic differences are apparent for those that report IWS. White women, adults with a higher BMI weight status or self-perceived body weight, lower education and income, younger ages, and those with a history of having experienced weight stigma, are at an increased risk for experiencing higher levels of IWS (Himmelstein et al., 2017; Pearl et al., 2019; Puhl et al., 2018).

2.6 Similarities and Differences between EWS and IWS

A study that demonstrated conflicting results of associations between EWS versus IWS and physical activity behaviors provided a novel introduction to the thought that there are likely differences in the roles the two constructs play in impacting health behaviors (Pearl et al., 2015). Although the sample included only women with overweight or obesity (n=177), EWS resulted in greater levels of physical activity, while IWS significantly predicted decreased exercise motivation and lower levels of physical activity (Pearl et al., 2015).
In 2020, Pearl and colleagues further explored these differences in the most recent and largest assessment of both experienced and internalized weight stigma and their associations with weight-related health outcomes (Pearl et al., 2020). Their findings, from over 18,000 majority White and majority female participants, revealed that higher scores of IWS were significantly associated with weight cycling, less physical activity, and greater odds of eating to cope. However, EWS in this sample was associated with fewer mental health outcomes, and those associations were not as strong as those from IWS (Pearl et al., 2020). IWS was also found to have moderating effects between EWS and exercise avoidance behaviors (Pearl et al., 2015; Vartanian & Novak, 2011). In a more recent study of post-surgery bariatric patients, both EWS and IWS had significant positive effects on exercise avoidance motivation. Neither EWS nor IWS directly affected physical activity behaviors, but these associations were mediated by exercise avoidance motivation (Han et al., 2018).

Another recent review comparing the two different types of stigma revealed that IWS had a stronger association with mental health outcomes than EWS (Emmer et al., 2020), which is consistent with the ample evidence in support of the negative impact of IWS on mental health outcomes discussed in section 2.5.2. This may suggest that adults who experience weight stigma and ultimately internalize it, are at a greater risk for mental health outcomes than those that do not internalize it.

Research also suggests sociodemographic differences exist between adults who experience versus internalize weight stigma. White participants in comparison to Hispanic/Latinx reported higher levels of IWS, which differs from the lack of racial differences found for EWS (Pearl et al., 2018). These results suggest that women and
White individuals are more likely to internalize weight stigma, but race and gender may not predict EWS.

Most of the current literature includes mainly samples of White adults, primarily women, and few have compared weight stigma between White participants and other racial groups. There is a need for even more diverse samples to understand the differences in experienced and internalized weight stigma in different groups of people. Although two different constructs, similarities and differences exist in the way EWS and IWS are associated with health outcomes, psychosocial factors related to physical activity, and sociodemographic factors. These results not only suggest that weight stigma that is internalized may have a greater impact on health and weight related behaviors than experienced weight stigma, but it also may be a driving force in the resulting health outcomes from EWS. Further, these data provide compelling evidence supporting the need for further research comparing and contrasting EWS and IWS.

2.7 Theoretical Frameworks Driving Physical Activity Behaviors

2.7.1. Social Ecological Model

The understanding of how different social, environmental, and cognitive factors influence health behaviors such as physical activity has largely been driven by theory. The Social Ecological Model is a framework that aims to explain social and environmental determinants that influence behavior (e.g., physical activity), and lays the groundwork in understanding the complex interplay between and within those determinants on behavior outcomes (Sallis et al., 2008). The subsystem levels of the model, from the innermost layers, include the individual level, interpersonal, institutional, community, and structure/systems level (CDC, 2012). Physical activity interventions
targeting factors related to the innermost levels of this framework provide the greatest potential for impact on individual health behaviors. Interventions addressing the outermost levels of the framework likely provide a more population level impact through broad system and policy changes as they require the least amount of individual effort (Frieden, 2010).

Weight stigma of varying types can have a multi-level impact on behavior outcomes. EWS can be present on an interpersonal level from family, peers, and acquaintances, or experienced in different public and organizational settings such as healthcare and fitness settings, whereas IWS occurs on a more individual level (Pearl, 2018). Accordingly, addressing weight stigma among adults with overweight or obesity could have multi-level impact on health outcomes such as weight status.

2.7.2. Cognitive and Self-Concept Theories

Although not indicated as specific theoretical frameworks for the current study, the Social Cognitive Theory and self-concept factors such as self-esteem and self-efficacy are important for understanding the Social Ecological framework and physical activity concepts. Within the individual level of the Social Ecological Model framework, cognitive factors also influence someone’s ability to initiate or maintain a behavior such as physical activity. The Social Cognitive Theory, which was developed in the 1980’s by Albert Bandura, aims to explain these cognitive determinants that may be affected by social and environmental factors discussed in the previous section (Bandura, 1998). Key components of the Social Cognitive Theory that drive human action are self-efficacy, goal setting, outcome expectations, self-control and monitoring, and perceived environmental barriers and facilitators. Self-efficacy, which is personal belief in your
own capabilities and ability to produce a change, is the most integral component of the Social Cognitive Theory. Not only can self-efficacy act on its own, but it can also impact other behavior determinants such as motivation, perseverance, and resilience related to being able to commit to a behavior change such as physical activity (Bandura, 1998). Strengthening self-efficacy beliefs can come from personal success, other’s success, social persuasion, and emotional state such as mood (Bandura, 1998).

Specific to physical activity and similar to self-efficacy, perceived physical competence is someone’s own perception of mastery of a skill and control over environment, specific to physical activity (Sonstroem et al., 1991). Self-efficacy and perceived physical competence have both been noted to aid in the promotion and maintenance of physical activity behavior (Bauman et al., 2012; Timo et al., 2016). However, if people experience weight stigma in the form of teasing and bullying and they begin to experience self-devaluation, then perceived self-efficacy and perceived physical competence could be impacted.

Self-esteem is another cognitive attribute that, although not included in the Social Cognitive Theory, may be intertwined with both self-efficacy and physical competence (Sonstroem et al., 1991). The Exercise and Self-Esteem Model is a framework aimed to understand how changes in physical activity behavior may improve self-efficacy and perceived physical competence, which may ultimately influence self-esteem as an outcome (McAuley et al., 2005; Sonstroem et al., 1991). However, self-esteem has yet to be explored as having a role in driving physical activity behaviors.

2.7.3. Summary
Due to the complex nature of many public health concerns, especially that of lack of physical activity and as well as increased weight gain, the Social Ecological Model provides an in-depth approach for researchers to guide intervention approaches around modifiable risk factors associated with those concerns. It also helps to aid in the understanding of behavior-related outcomes as they often result from either a direct or indirect interaction between multiple levels of the model. EWS and IWS fall within multiple levels of the Social Ecological Model, making it a complex and multi-level factor related to physical activity and weight status. Additionally, self-concept constructs such as self-efficacy, and self-esteem as part of the Social Cognitive Theory and the Exercise and Self-Esteem Model, are likely intertwined in their impact on physical activity behaviors. Therefore, all three should be explored regarding the association between weight stigma and physical activity in ways which they have not been previously examined.

2.8 Conclusion

In summary, weight stigma experiences can occur in many different settings and from an abundance of sources and may influence the extent to which individuals internalize that weight stigma. Fitness settings are especially imperative to explore weight stigma and physical activity, since they are common spaces in which people engage in physical activity behaviors. As a result of the high prevalence of both forms of weight stigma, their associations with weight-related and health behaviors as they pertain to different levels of the Social Ecological Model are important for determining the overall role that weight stigma may play in potentially the perpetuation of obesity through those possible weight related behaviors.
There is a high prevalence of EWS among those with a higher weight status, and weight status also plays a potentially moderating role in the association of weight stigma and physical activity outcomes. However, weight stigma can exist among those of all weight statuses and can influence weight related behaviors that may lead to future weight gain and a change of weight status. For this reason, and because of known sociodemographic differences among those that experience and internalize weight stigma, a diverse sample of adults with varying weight statuses should be explored in these associations.

Therefore, the focus of this dissertation research presented in the theoretical framework in Figure 1 is to explore the overall prevalence and prevalence within fitness settings of experienced and internalized weight stigma in a sample of adults, sociodemographic differences of participants by all three types of weight stigma, and their overall association with physical activity behavior. The second purpose is to explore the role that different psychosocial factors play in the relationship between weight stigma and physical activity behaviors. The third and final purpose is to explore weight stigma experiences within fitness settings and utilize qualitative methodology to gain a deeper understanding into those experiences based on the Social Ecological Model, and perceived impacts they have on physical activity behaviors.
Chapter 3. Methods

3.1 Study Design and Recruitment

3.1.1. Study Design

A cross-sectional study design using a sequential mixed-methods approach was utilized for this dissertation research based in Minneapolis, MN. Upon IRB approval, participant recruitment, screening, and study participation began in late summer of 2021 and lasted for approximately twelve weeks. Screening, consent, and survey participation occurred on a rolling basis over the course of the first eight weeks. The last four weeks were used to conduct virtual semi-structured individual interviews with a subset of participants, explained in detail in section 3.3.

3.1.2. Participants and Recruitment

A minimum of two hundred participants were required to participate in the study based on a sample size calculation using data from previously published work related to weight stigma in a fitness setting (Schvey et al., 2017). A total of 217 participants were
recruited, but three were excluded due to missing data or not meeting the inclusion criteria for the study. Therefore, 214 participants were included in the final analyses. The sample size equation (Kadam & Bhalerao, 2010) and actual calculation is presented where n is the required sample size, Z is a constant based on α-error, β is a constant according to power of the study, σ is the standard deviation, and Δ is the estimated effect size:

\[
n = \frac{2(Z_a + Z_{1-\beta})^2\sigma^2}{\Delta^2} = \frac{2(1.96 + 0.8416)^21.39^2}{0.41^2} = 180 \text{ participants}
\]

Inclusion criteria consisted of adults between the ages of 18 and 55 years, BMI ≥ 18.5 kg/m², having utilized or been a member of a fitness setting (defined as a constructed establishment that has a main goal of providing exercise and physical activity spaces to guests, with a monetary value associated with its use) at any point during adulthood (defined as 18 years or over), and having access to a device and reliable internet service to complete electronic surveys and utilize Zoom. Exclusion criteria included any physical disability that limited their current ability to engage in physical activity.

One digital flier with study details and inclusion/exclusion criteria was created to recruit participants in-person, via email, and through social media. Recruitment caps for gender (50% female), race (50% White), and BMI (50% overweight or obese) were initially placed in hopes of recruiting a diverse sample for the study, however these caps were not met, and recruitment closed at the initial 217 participants. A staged recruitment approach was utilized with a desire to recruit an adequate number of participants who are currently members of a fitness setting. First, fliers were distributed to fitness facilities in the Minneapolis/St. Paul Area to be posted within the facility. Centers included 612
Jungle, Herold Mezile North Community YMCA, Oxford Community Center – St. Paul, and Blaisdell YMCA. After the first week of recruitment within fitness settings, listservs and social media sites that target adults affiliated with the University of Minnesota were utilized for recruitment, which reached students, faculty, those that may utilize the Recreation and Wellness Center. At the same time, the flier was posted to Facebook and Instagram to be shared with the general population. University of Minnesota IRB approval was obtained prior to recruitment and data collection (STUDY00013427).

3.1.3. Screening and Informed Consent

Participants were screened via the online platform, Qualtrics, on a rolling basis over the first eight-week period. If participants were eligible based on screening criteria (inclusion and exclusion criteria discussed in section 3.1.2), they were e-mailed a link to the informed consent to be reviewed in Qualtrics prior to participating in the study, as this study was deemed exempt from needing a written signature based on the IRB review.

3.2 Quantitative Data Collection

Once the informed consent was reviewed, participants were directed to the quantitative survey which was completed via the online platform, Qualtrics, through the University of Minnesota. The following measurements were included in the survey (complete listing can be found in Appendix A) and used to address the study aims.

3.2.1. Weight Stigma

*Experienced Weight Stigma (EWS)* was assessed using the Brief Stigmatizing Situations Inventory, a shortened version of the full 50-item Stigmatizing Situations Inventory (SSI) (Vartanian, 2015). The brief SSI is a 10-item measure, focusing on different sources of stigma (including avoidance, exclusion, or being ignored; comments
from children, family, doctors, and others; job discrimination; embarrassment of loved ones; negative assumptions; and physical barriers). The 10-point Likert-scale ranges from 0 (never) to 9 (daily) (Cronbach’s \( \alpha \)=0.90). The 10 items were averaged to determine and overall score (possible range=0-9). A higher score was indicative of greater levels of EWS.

*Internalized Weight Stigma (IWS)* was assessed using the Modified Weight Bias Internalization Scale (Pearl & Puhl, 2014). This 11-item scale was designed to measure the extent to which the participant believes negative stereotypes and statements about themselves and was modified from its original version to be used for people of all weight statuses. The scale is based on a 7-point Likert-scale ranging from 1 (strongly agree) to 7 (strongly disagree) (Cronbach’s \( \alpha \)=0.94). The 11 items were averaged to determine an overall score (possible range=1-7). Higher scores indicated greater levels of IWS.

*Fitness Center Stigma*

### 3.2.2. Physical Activity and Fitness Facility Use

*Physical Activity* was measured using the Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). The questionnaire for the current study was modified to assess hours per week spent engaging in mild, moderate, and strenuous exercise during a normal 7-day period (two-week test-retest reliability coefficient = 0.74). Response options ranged from “none” to “6+ hours a week”. The midpoint of each of the six response options was used to calculate hours per week spent in each category, with the “6+” category counted as 8.0 hours (Barr-Anderson et al., 2021; Barr-Anderson et al., 2008; Folk et al., 2021). Weekly moderate-to-vigorous PA (MVPA) was calculated as the
sum of hours spent in strenuous and moderate exercise per week, and total PA was calculated as the sum of hours spent in strenuous, moderate, and mild exercise per week.

*Fitness Facility Satisfaction* was assessed using the Gym Survey (Schvey et al., 2017), a 13-item scale consisting of the following three subscales: self-consciousness at the gym (three items; Cronbach’s α=0.79), negative attitudes toward the gym (six items; Cronbach’s α=0.88), and stigma at the gym (four items; Cronbach’s α=0.83). Participants rated each item on a scale from 1 (strongly disagree) to 7 (strongly agree) (full scale Cronbach’s α=0.91). The self-consciousness and negative attitudes subscales were used as covariates in the regression models of Aim 1, while the stigma at the gym subscale was used as the main fitness center stigma variable throughout the analyses of this study.

*Additional fitness facility related questions* were asked of participants to gain an understanding of current or past facility use. These questions inquired about frequency of typical facility use and current or past membership status.

### 3.2.3. Psychosocial Factors

*Self-Efficacy for Exercise (SEE)* was assessed using the self-efficacy for exercise scale (Resnick & Jenkins, 2000). The original scales asked participants: ‘How confident are you right now that you could exercise three times per week for 20 minutes if: …’, and given nine different measures of self-efficacy to rate on a scale from 0 (not confident) to 10 (very confident). However, to align with the current Physical Activity Guidelines for Americans, the question was modified to ask about their confidence in exercising five times per week for at least 30 minutes (USDHHS, 2018). The ratings were summed and divided by 9 to indicate the strength of efficacy (Cronbach’s α=0.92). Higher scores indicated greater self-efficacy for exercise.
Exercise Avoidance Motivation (EAM) was assessed using the Exercise Avoidance Motivation Scale (Vartanian & Shaprow, 2008). This eight-item scale measure participant reactions to experiences ‘negative situations related to their weight’. Items included: ‘I avoid going to the gym when I know there will be a lot of people there’, ‘If I go to the gym, there are some exercises or pieces of equipment that I avoid’, and ‘I feel uncomfortable going to a gym where there are a lot of mirrors.’ Participants rated each item on a scale from 1 (not at all true) to 7 (completely true) (Cronbach’s $\alpha=0.83$). Scores were totaled for an overall exercise avoidance motivation score, where higher scores indicated greater avoidance motivation.

Self-Esteem was assessed using the Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965), which measured global self-worth including both positive and negative feelings about oneself. Ten items were included in the scale, and participants rated each item on a scale from 1 (strongly agree) to 4 (strongly disagree). Example items include: ‘On the whole, I am satisfied with myself’, ‘I am able to do things as well as most other people’, and ‘I feel I do not have much to be proud of’. The scale was scored by reverse scoring the five negatively worded items, then totaling all items. Higher scores were an indication of low self-esteem (test-retest reliability correlation = 0.88).

3.2.4. Participant Sociodemographic Variables

The following sociodemographic information were self-reported within the participant survey: race/ethnicity (White, Black or African American (AA), Hispanic or Latinx, Asian American, or other), gender (male, female, or different identity), marital status (single, married or domestic partnership, widowed, divorced or separated), age (date of birth), socioeconomic status (using education level and employment status as
proxies), *employment status* (working for pay or not working for pay), and *education level* (did not finish high school, high school or GED, some college or training after high school, finished college, or advanced degree). Health status indicators included: *height* and *weight* (used to determine BMI), *weight history, blood pressure status, and diabetes*.

### 3.3 Qualitative Data Collection

Qualitative data collection was based on a phenomenological approach to describe lived experiences of participants (Creswell & Poth, 2018), utilizing 60-minute semi-structured interviews held via the online platform, Zoom (see Appendix B for protocol). Semi-structured interviews consisted of questions aimed to gain a deeper understanding of specific weight stigma experiences within different levels of the Social Ecological Model. For the structure/systems level, questions were guided toward the actual fitness setting spaces and equipment; for the community level, questions were guided toward social norms that participants have heard or believe; for the organizational level, questions addressed specific experiences within fitness settings; from an interpersonal level, questions were relate to experiences from other people such as fitness setting employees and guests, family, and peers; lastly, for the individual level, participants were asked about current physical activity behaviors, and how these fitness center weight stigma experiences have had a perceived impact on those behaviors.

### 3.4 Procedures

Due to the recent events related to the COVID-19 pandemic in the United States, all procedures were conducted through online and virtual platforms.

#### 3.4.1. Cross-sectional Survey
After participants were screened and consented, they were directed to the survey questionnaire, which was used to address all three aims of the study. They had one week to complete the final questionnaire from the time that they opened it, which was automatically closed by Qualtrics after this time. The survey included scales and measures outlined in section 3.2. Survey completion was on-going and occurred over an eight-week period. A $10.00 e-gift card was distributed electronically via email to all respondents that fully completed the survey.

3.4.2. Semi-structured Interviews

Based on responses from the survey items, criterion sampling was used to recruit participants who identified as having ever experienced weight stigma within a fitness setting (based on responses from the Gym Survey) and high levels of EWS, were invited to participate in the individual interviews if they indicated interest. The aim of phenomenology is to understand the lived experiences of participants, resulting in the necessity of chosen participants who have experienced some level of weight stigma to provide rich context to said experiences (Moser & Korstjens, 2018; Usher & Jackson, 2017). A high level of EWS was defined as one standard deviation above the mean, a method used by Puhl et al. (2008). Qualitative data collection experts suggest that sample size for phenomenology research has varied greatly, but 3-10 interviews have been deemed sufficient (Creswell & Poth, 2018). Therefore, a minimum of eight participants was the target sample size given that this was a pilot study with a limited sample of participants to choose this subsample from. Of the full sample of participants, 17 qualified for the individual interviews and indicated interest in participating. All 17 participants were notified to request their participation in the qualitative portion. A total
of eight participants (n=8) responded and completed the individual semi-structured interviews.

Saturation of the themes was achieved with the initial eight participants (i.e., no new ideas emerge from the new data), so additional interviews were not required. Interview sessions were moderated by the lead researcher with qualitative research experience and training and recorded via the Zoom app. Participants were able to choose to utilize the video and audio features, or just audio. Upon completion of the interview, participants electronically received an additional $15.00 for their participation.

Audio recordings were professionally transcribed by the transcription company, Datalyst. Trustworthiness of the qualitative portion of this study was achieved by ensuring credibility, transferability, dependability, and confirmability (Guba, 1981), via measures discussed in section 3.5.

3.5 Statistical Analysis

All statistical analyses for the quantitative data were conducted using SAS 9.4 (SAS Institute, Cary, NC, 2015), and qualitative data were analyzed using Excel.

Aim 1: Prevalence and differences by sociodemographic characteristics

Descriptive statistics were calculated using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. Differences in experienced, internalized, and fitness center weight stigma between sociodemographic groups (SES, race/ethnicity, and gender) were determined using a one-way MANOVA. A simple linear regression was used to examine the relationships between EWS, IWS, and fitness center stigma and physical activity levels while
accounting for covariates (age, gender, race/ethnicity, BMI, and education), and the interaction between weight stigma variables and BMI categories.

**Aim 2: Determining moderating and mediating effects of psychosocial characteristics on physical activity**

First, responses of EWS were dichotomized to represent participant who had ever been subjected to weight stigma in their life (all scores greater than 0) versus all other participants who had never been subjected to weight stigma before (all scores equal to 0), a method used by other researchers (Jackson & Steptoe, 2017; Pearl et al., 2020). IWS responses were categorized as high, medium, or low levels unique to these data using methods explained by Puhl et al. (2018). The cutoff for high IWS was defined as one standard deviation above the mean (3.96), low IWS was defined as one standard deviation below the mean (1.44), and medium levels were defined as all values between high and low cutoffs (1.45-3.95). The same method was used for determining cutoffs for fitness center stigma. However, the low category became a negative number based on the distribution of data, so only two categories were used: high levels which had a cutoff of one standard deviation above the mean ($\geq$2.63), and low-medium levels (below 2.63). Differences in means of psychosocial variables stratified by the new categorical weight stigma variables were calculated using a one-way ANOVA.

The Preacher and Hayes parallel multiple mediation analysis technique was applied to test the parallel multiple mediating roles of self-efficacy, self-esteem, and exercise avoidance motivation on MVPA levels, while accounting for potential covariates (age, gender, race/ethnicity, BMI, and education).
**Aim 3: Qualitatively explore weight stigma in fitness settings and perceived impact on physical activity**

Descriptive demographic statistics were calculated using means and standard deviations to provide more context for the example comments that were added throughout the text. Deductive and inductive methods were used to analyze the qualitative data derived from the interview sessions. Hypotheses and general themes were formed deductively according to the existing theoretical framework of the Social Ecological Model through each level of the framework – individual, interpersonal, organizational, community, and structure/systems. Inductive coding was achieved through the generation of new results and explanations from the data through first order codes (Bryant, 2020). Completed transcripts were read by the interviewer, while noting reflections of individual data or summaries across transcripts with emerging ideas.

Credibility of the data was addressed through data collection and analysis techniques, as suggested by Creswell & Poth (2018). For instance, three coders (including the first author/interviewer) individually reviewed three separate transcripts to develop a list of significant statements to collectively develop a final code book which included general themes and first order codes within each given theme. Next, all coders applied the code book to all eight transcripts using Excel, which were then compared to settle discrepancies between codes and coders. Once all data were coded and agreed upon, the first author created a textural description of the data and experiences for each participant separately, followed by a summary description of the phenomenon based on the themes and codes from the final coding.
Trustworthiness of the data was addressed through specific criteria first introduced by Guba specifically for qualitative analyses (Creswell & Poth, 2018; Guba, 1981). Credibility was achieved by using multiple coders trained in qualitative methods, utilization of debriefing sessions between the three coders to come to a consensus on final codes, generating a thick description of the research findings, and member checking by sending participants the data summary and allowing them to provide alternative language and an idea of how well the researchers interpretation was representative of their experiences (Amankwaa, 2016; Shenton, 2004). Additionally, the primary researchers and coders independently reviewed all transcripts before consulting with one another to reach consensus prior to advancing to the next stage of analysis which was coding the data. This process was used to reduce researcher bias and improve accuracy of the final summary of data.

Confirmability was achieved by use of triangulation of data to develop a complete and comprehensive understanding of a phenomena by referencing multiple data sources to incorporate into the final description of the phenomena. It is also important to address the researchers inherent beliefs and positionality (Creswell & Poth, 2018). All three coders are normal weight, female physical activity and health promotion scholars who aim to improve physical activity behavior for all people. Thus, our perspective in this study involves kinesiology, physical activity promotion, and behavior change lenses.
Chapter 4. Study 1

Association Between Weight Stigma and Physical Activity Behavior Among a Weight Diverse Sample of Adults.

4.1 Introduction

Physical activity is one of the most influential and adaptable behaviors for people of all weight statuses and ages, that can help to improve disease risk factors and reduce disease development (USDHHS, 2018). However, based on data collected by the Centers for Disease Control and Prevention (CDC, 2021b), only 24% of adults currently meet the physical activity (PA) recommendations for both aerobic and muscle strengthening activities which identifies a critical need for improvement. Increasing individual’s physical activity engagement hinges on better promoting PA and understanding determinants that influence PA behavior. The literature overflows with commonly examined factors such as social support, psychosocial factors, built environment, and demographic factors (Trost et al., 2002), but in order to address the low rates of PA in Americans, it is pertinent to consider less explored, but potentially impactful influences on PA. Recent literature has suggested that weight stigma may be a factor that negatively impacts important health- and weight-related behaviors such as PA (Brewis, 2014).

Weight stigma can take two main forms: when a person is socially rejected or discriminated against because of their weight (experienced weight stigma [EWS]) (Tomiyama et al., 2018), or when a person internally believes those stereotypes about themselves (internalized weight stigma [IWS]) (Emmer et al., 2020). With a prevalence rate of over 40% among U.S. adults across the weight spectrum (Himmelstein et al.,
2017), reducing weight stigma may provide a favorable route to improving PA engagement.

However, the evidence remains mixed related to the impact on PA between weight stigma type and sociodemographic groups. Some literature suggests that there is no significant direct effect of IWS on PA in post-bariatric patients (Han et al., 2018) or a nationally representative sample of diverse men (Himmelstein et al., 2019); while most other literature suggests IWS negatively impacts PA in adults who identified mainly as women and non-Hispanic White (Feig et al., 2020; Pearl et al., 2015; Pearl et al., 2020).

Within the current literature on EWS and PA, one study reports a negative association in men and women over the age of 50 (Jackson & Steptoe, 2017) while more consistent research has displayed a lack of direct association between EWS and PA behavior among mainly women and non-Hispanic White participants (Han et al., 2018; Sattler et al., 2018; Vartanian & Novak, 2011; Vartanian & Shaprow, 2008). Despite these lack of direct associations between EWS and PA, some researchers have found that EWS led to greater exercise avoidance and ultimately less engagement in PA in adults who identified as overweight or obese (Vartanian & Novak, 2011), and weight diverse women (Vartanian & Shaprow, 2008). Contrastingly, Pearl and colleagues found an increase in PA behaviors as a result of EWS in two different studies, again with mainly women and adults with overweight and obesity (Pearl et al., 2015; Pearl et al., 2020). It is clear that much of the current literature on weight stigma and PA has been focused on adults with overweight or obesity and women, although weight stigma prevalence rates among diverse national samples establish that it does not exclusively impact adults in higher weight categories or only women (Himmelstein et al., 2017). This presents a need
to explore more weight diverse samples and including men, which may further help to clarify current confusion on the impact of different types of weight stigma on PA behaviors among adults in the U.S.

Location of weight stigma experiences may also be an important consideration when exploring and understanding its impact on PA. Specifically, fitness centers and similar spaces are venues in which adults frequently engage in PA (Holliday et al., 2017). Recent literature has exposed fitness spaces as another location in which both adults and children are subject to weight stigma experiences (Arguelles et al., 2021; Cardinal et al., 2014; Pickett & Cunnhingham, 2018; Schvey et al., 2017). Teasing during gym class was one of the most common scenarios in which weight stigma experiences were observed by adolescents (Puhl et al., 2011). Schvey et al. (2017) found that among adults with overweight or obesity, fitness center weight stigma was associated with negative attitudes toward the space, self-consciousness experienced within the spaces, as well as poorer physical health (i.e., physical functioning and pain) and unhealthy weight control behaviors (i.e., the use of diet pills and juice cleanses). While this study did not explore the direct impact of fitness center stigma on PA, participants’ past experiences with weight stigma in fitness spaces may reduce their willingness to return out of fear of being subject to more discrimination, similar to the way other EWS encounters have shown to do (Vartanian & Novak, 2011). This avoidance of spaces in which stigma has occurred potentially presents additional barriers to engaging in PA altogether. Exploring these associations between specifically fitness center stigma and PA will add to the current literature to better understand the impact of weight stigma situations and the multifaceted drivers of PA behavior to help improve PA engagement among adults.
To expand on the current literature, the present study aims to describe the overall prevalence of experienced, internalized, and fitness center weight stigma in a weight diverse sample of adults and examine weight stigma differences by sociodemographic characteristics (i.e., SES, race/ethnicity, gender, weight status). Additionally, the study explores the direct relationship between the three different types of weight stigma with PA levels while addressing feelings toward and within fitness spaces.

4.2 Methods

4.2.1 Study Design and Participants

A cross-sectional study design was used to collect data on 214 U.S. adults between the ages of 18 and 55. Inclusion criteria consisted of a BMI $\geq 18.5$ kg/m$^2$, access to a device and reliable internet to complete the electronic survey, and membership or use of a fitness center or setting at any point during adulthood. A fitness center or space was defined as a constructed establishment that has a main goal of providing exercise and PA spaces and services to guests, with a monetary value associated with its use. The only exclusion criterion was any physical disability that limits the participant’s current ability to engage in PA. The study was advertised between the months of August to October 2021 on social media sites (Facebook and Instagram), in weekly emails to the University of Minnesota community, and by email to past participant lists of other University of Minnesota research studies. Flyers were also posted in different fitness spaces around the Twin Cities Metro area (612 Jungle, Harold Mezile North Community YMCA, Oxford Community Center – St. Paul, and Blaisdell YMCA). Responses were initially received from 217 participants, of which a subsample of 214 had complete data and were included for final analysis. Screening, consent, and survey participation took place through a data
management system, Qualtrics, and occurred on a rolling basis over the course of eight weeks. Upon completion of the survey, participants were compensated with a $10.00 electronic gift card. Prior to completion of any surveys, informed consent was obtained from all participants and all protocols were approved by the University of Minnesota Institutional Review Board.

4.2.2 Survey Measures

Weight Stigma

*Experienced Weight Stigma (EWS)* was assessed using the Brief Stigmatizing Situations Inventory, which is a shortened version of the full 50-item Stigmatizing Situations Inventory (SSI) (Vartanian, 2015). The brief SSI is a 10-item measure, focused on different sources of stigma: including avoidance, exclusion, or being ignored; comments from children, family, doctors, and others; job discrimination; embarrassment of loved ones; negative assumptions; and physical barriers. The 10-point Likert-scale ranges from 0 (never) to 9 (daily) (Cronbach’s α=0.90). The 10 items were averaged to determine an overall score (possible range=0-9). A higher score was indicative of greater levels of EWS. To determine prevalence, a method used by other researchers was utilized (Jackson & Steptoe, 2017; Pearl et al., 2020); responses were dichotomized to represent participants who had ever been subjected to weight stigma in their life (all scores greater than 0) vs. all other participants who had never been subjected to weight stigma before (scores equal to 0).

*Internalized Weight Stigma (IWS)* was assessed using the Modified Weight Bias Internalization Scale (Pearl & Puhl, 2014). This is an 11-item scale designed to measure the extent to which participants of all weight statuses believe negative stereotypes and
statements about themselves. The scale uses a 7-point Likert-scale ranging from 1 (strongly agree) to 7 (strongly disagree) (Cronbach’s α=0.94). The 11 items were averaged to determine an overall score (possible range=1-7). A higher score was indicative of greater levels of IWS. For the determination of prevalence rates, IWS was categorized into high, medium, and low levels unique to these data using methods explained by Puhl et al. (2018). (Puhl et al., 2018) The cut point for high IWS was defined as one standard deviation above the mean (≥3.96), low IWS was defined as one standard deviation below the mean (≤1.44), and medium levels were defined as all values between high and low cut points (1.45-3.95).

*Fitness Center Weight Stigma* was measured using the stigma at the gym subscale of the Gym Survey (Schvey et al., 2017). This subscale included 4 items: “Gym staff members [or personal trainers] have commented negatively on my weight”; “People stare or give me dirty looks at my gym”; “I feel negatively judged at my gym”; “The equipment at my gym feels too small for me” (Cronbach’s α=0.83). Participants rated each item on a scale from 1 (strongly disagree) to 7 (strongly agree). The scale total was averaged to determine an overall score with a possible range of 1-7. Higher scores indicated greater levels of fitness center stigma. A similar method was used for determining cutoffs for fitness center weight stigma as were used for IWS. However, the low category became a negative number based on the distribution of data, so only two categories were used: high levels of fitness center stigma which had a cutoff of one standard deviation above the mean (≥2.63), and low-medium levels of fitness center stigma which were values of 2.63 and below.

**Physical Activity and Fitness Facility Use/Satisfaction**
Physical Activity was measured using the Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). The questionnaire for the current study was modified to assess average hours per week spent engaging in mild, moderate, and strenuous exercise during a normal 7-day period (two-week test-retest reliability coefficient = 0.74). Response options ranged from “none” to “6+ hours a week”. The midpoint of each of the six response options was used to calculate hours per week spent in each intensity category, with the “6+” category counted as 8.0 hours. Weekly moderate-to-vigorous PA (MVPA) was calculated as the sum of hours spent in strenuous and moderate exercise per week, and total PA was calculated as the sum of hours spent in strenuous, moderate, and mild exercise per week.

Fitness Facility Use was assessed by asking participants about their current membership status (“Do you currently belong to a gym or fitness center/studio?”) and typical fitness facility use (“How often do you typically go to the gym?”), adapted from the Fitness Facility Satisfaction Survey (Schvey et al., 2017). Current membership status provided a yes or no response option, while typical fitness facility use options ranged from “never” to “every day”. The eight typical fitness facility use response options were collapsed to four categories: “Less than once a month”, “2-3 times per month”, “1-3 times per week”, or “5-7 times per week”.

Self-Consciousness at the Gym was assessed using a subscale of the Gym Survey (Schvey et al., 2017). The subscale included 3 items (“I feel self-conscious at my gym”; “I feel embarrassed by my weight at the gym”; “The other members are all in better shape than I am”; Cronbach’s α=0.79). Participants rated each item on a scale from 1 (strongly
disagree) to 7 (strongly agree). The subscale was averaged to determine an overall score with a possible range of 1-7. A higher score indicated greater levels of self-consciousness at the gym.

*Negative Attitudes Toward the Gym* were assessed using a subscale of the Gym Survey (Schvey et al., 2017) and was a 6-item scale including statements like, “I prefer not to exercise at my gym” and “I dread going to my gym” (Cronbach’s α=0.88). Participants rated each item on a scale from 1 (strongly disagree) to 7 (strongly agree). The scale was averaged to determine an overall score with a possible range of 1-7. A higher score indicated more negative attitudes toward the gym.

**Sociodemographic Variables**

The following sociodemographic information were self-reported within the participant survey: *race/ethnicity* (White, Black or African American, Hispanic or Latinx, Asian American, or other), *gender* (male, female, or different identity), *age* (date of birth), and *education level* as a proxy for socioeconomic status (did not finish high school, high school or GED, some college or training after high school, finished college, or advanced degree). Body mass index (BMI; kg/m²) was calculated from self-reported *height* and *weight*.

**4.2.3 Statistical Analysis**

All statistical analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC, 2015). Descriptive statistics were calculated using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables.

Differences in EWS, IWS, and fitness center stigma between sociodemographic groups (race/ethnicity, gender, education, and BMI), current member status, and fitness
facility use were determined using a one-way MANOVA to reduce Type I error due to
the correlation of the three weight stigma outcome variables. Skewed variables were log
transformed to improve MANOVA assumptions, however, the inferences did not differ
between the transformed and original variable outcomes so analyses using all original
variables were reported. If a significant main effect resulted from the one-way
MANOVA, then individual one-way ANOVAs were used to determine the differences in
mean levels of individual weight stigma scores by specific demographic variables.

Separate regression analyses were used to determine the relationship between
weight stigma variables (EWS, IWS, and fitness center stigma) and PA (total PA and
MVPA). Skewed weight stigma variables were log transformed to improve regression
assumptions and used in all regression models. The first models were unadjusted between
individual weight stigma variables and either total PA or MVPA. The second model
represents a multiple regression - which included all weight stigma variables and all
identified covariates determined a priori (age, race/ethnicity, gender, BMI, and education
level as a proxy for socioeconomic status) and were entered into the model in a single
step. Multicollinearity tests were conducted to ensure that no variables in the model were
highly correlated which each other based on correlation estimates, tolerance testing, and
variance inflation factors (VIF). Interactions between weight stigma variables and BMI
were tested to determine if associations between weight stigma and PA levels differed
according to BMI category.

4.3 Results

Of the full sample (n=214), 78% were female, nearly 74% were White, 15% were
Black/African American, 1.4% were Hispanic/Latinx, 4.2% were Asian, and about 5%
identified as multiracial or other. The mean age of respondents was 28.0±9.91 years, and mean BMI was 25.8±5.81 kg/m², with 42.8% of participants classified as having overweight or obesity. Additional demographic information can be found in Table 1. Participants engaged in an average of 6.4±3.76 hours of MVPA per week, and 9.9±5.45 hours of total PA per week. Nearly 60% of participants self-reported that they were currently a member of a fitness center/gym, and most current members (50.4%) reported utilizing the space 1-3 times per week. Mean self-consciousness at the gym was 3.0±1.26 and mean negative attitudes toward the gym were 2.4±1.09 (possible range for both items: 1-7).

Experiencing weight stigma at least once in their lifetime was reported by 66.4% of all participants. High levels of IWS (≥3.96) were reported by approximately 17% of participants, while the majority of participants (67.9%) reported medium levels (1.45-3.96). High levels of weight stigma within fitness centers (≥2.63) were reported by nearly 17% of participants (Figure 1). All weight stigma variables (EWS, IWS, and fitness center stigma) were significantly positively correlated with one another (p<.0001).

Table 1 presents data to examine weight stigma by sociodemographic groups and fitness center use including means and standard deviations, as well as the statistical testing results for the MANOVA and ANOVA analyses. A significant difference was present between men and women and their distribution of EWS, IWS, and fitness center stigma (F=5.82; p=0.001). Specifically, men and women scored similarly for EWS and fitness center stigma, but females scored significantly higher for IWS than males in the sample (F=16.87; p<.0001; mean=2.89±1.31 and 2.06±0.80, respectively). Similarly, BMI categories differed in their distribution of EWS, IWS, and fitness center stigma.
where both BMI categories scored similarly for fitness center stigma, but participants with overweight/obesity had higher EWS and IWS scores than those categorized as normal weight (F=20.26 and 24.86 respectively; p’s<.0001). Membership status significantly differed in their distribution of EWS, IWS, and fitness center stigma (F=3.79; p=0.004); EWS and IWS scores were similar between current and not-current members, but current members had significantly lower fitness center stigma scores compared to those that were not current members (F=3.79; p=0.01; mean=1.63±0.73 and 1.95±0.93 respectively). Of the participants that were current members of a fitness center, weight stigma scores did not differ between different levels of average fitness center use (F=1.25; p=0.30).

Table 2 presents the unadjusted and adjusted regression models for the association of the three weight stigma variables with total PA and MVPA. Among the unadjusted models, only IWS was independently associated with MVPA and trended toward significance with total PA (p=0.02 and 0.07, respectively); no other models were statistically significant. However, after controlling for the other weight stigma variables, self-consciousness at the gym, and negative attitudes toward the gym as well as covariates (model 2), significant positive relationships were revealed between EWS and both total PA and MVPA. Specifically, for every 10% increase in EWS levels while controlling for IWS, fitness center stigma, and other aforementioned variables, total PA increased by 0.05 hours per week and MVPA increased by 0.03 hours per week. Neither IWS or fitness center stigma were significantly associated with total PA or MVPA in the adjusted model. Interactions between weight stigma variables and BMI were not significant for either total PA or MVPA outcomes.
4.4 Discussion

In the current sample of weight-diverse adults, the majority of participants have reported having experienced weight stigma at least once in their lifetime, medium levels of IWS, and low levels of fitness center stigma. The prevalence of IWS and EWS in this sample were comparable to larger U.S. samples aimed at understanding weight stigma prevalence; 68% medium levels of IWS in the current sample compared to 60% in nationally representative samples (Puhl et al., 2018), and 66% of EWS ever in the current sample compared to 56% in a large sample from two Universities (Prunty et al., 2020). However, this is the first study to identify prevalence rates of weight stigma experienced in fitness spaces, making it not possible to compare with other populations but adds an important dimension to understanding weight stigma to close a specific gap in the literature.

The current study found mixed results between type of weight stigma and their associations with PA level outcomes, which are consistent with the current body of evidence. EWS was the only type of stigma found to be associated with PA in the current sample, while IWS and fitness center stigma were not. Greater levels of EWS were associated with greater levels of both total PA and MVPA; however, the clinical significance of the findings should be interpreted with caution as the increase is only by a matter of minutes per week and may not provide a significant contribution to health benefits and meeting the overall physical activity recommendations. Reporting on exercise frequency, Pearl et al. (2015) found that in a sample of women with overweight/obesity, EWS more strongly predicted higher levels of exercise frequency per week than our current sample (β=0.41). Although the results may be positive for
increasing PA levels, they may in part be due to a coping mechanism in order to alter weight status as a result of direct judgments of their weight (Himmelstein et al., 2018; Pearl et al., 2015; R. Puhl & K. D. Brownell, 2003), rather than positive motivation to exercise, which may be an important distinction to make in future research. Additionally, EWS in the current sample was based on ever versus never being subject to EWS throughout someone’s life, so for those whose experiences potentially occurred a long time ago, they may not be enough to influence current PA behaviors. To our knowledge, only one study found EWS to have a negative direct impact on PA; though these data were only in older adults which may in itself be a factor to consider for current PA levels among that group (Jackson & Steptoe, 2017). Most other literature suggests no direct effect on PA as a result of EWS (Han et al., 2018; Sattler et al., 2018; Vartanian & Novak, 2011; Vartanian & Shaprow, 2008), in which our results may more closely align with and support.

Conversely, neither IWS or fitness center stigma were found to be associated with total PA or MVPA in the current sample even after accounting for attitudes toward these spaces and self-consciousness, and all other covariates. The lack of direct association between IWS and PA support some of the current literature in diverse samples of men, (Himmelstein et al., 2019) and previous bariatric surgery patients (Han et al., 2018). However, the differing literature that supports a potentially negative association between IWS and PA in populations with similar racial/ethnic and gender distributions as ours, mainly studied adults with overweight and obesity (Feig et al., 2020; Pearl et al., 2015; Pearl et al., 2020), which may indicate that weight status may play a major role in the way IWS manifests itself onto PA outcomes.
Although there is a lack of previous research aimed at understanding the impact of fitness center stigma on PA behaviors, the current lack of association between fitness center stigma and PA among current members of fitness spaces in the current sample may be explained by the fact that there was no association between fitness center stigma and frequency of gym use which are in line with findings from Schvey et al. (2017). Additionally, the majority of the current sample were considered to have low levels of fitness center stigma which may also be playing a role in the lack of significant findings. By further considering self-consciousness in the gym and negative attitudes toward the gym as covariates in the regression models, our current findings may be more robust toward potential confounders that may also be associated with both weight stigma and PA behaviors. Furthermore, the average levels of MVPA among participants in the current sample exceed the upper end of the recommended guidelines by nearly 1.5 hours per week; the unusually high overall level of engagement in this sample may have dampened the ability to determine a significant association between weight stigma with PA behaviors. Further, there are a multitude of places to exercise and be active other than in fitness spaces, which should be considered in future studies as it was not addressed in the current sample.

The current findings additionally expand upon previous research indicating difference in weight stigma between sociodemographic groups; specifically BMI and gender (Himmelstein et al., 2017; Jackson & Steptoe, 2017; Pearl et al., 2019; Puhl et al., 2008; Puhl et al., 2018). EWS and IWS were significantly associated with BMI, which supports a large body of current evidence indicating that those of higher weight statuses encounter greater levels of weight stigma (Himmelstein et al., 2017; Pearl et al., 2019;
Prunty et al., 2020; Puhl et al., 2008; Puhl et al., 2018; Spahlholz et al., 2016). Gender was also associated with IWS, with women having significantly higher scores than men, which support findings by Pearl et al. (2019) and Prunty et al. (2020). Females tend to rate themselves at a higher weight status than they actually are (Crawford & Campbell, 1999), which may provide explanation as to why they believe the weight stigma stereotypes against them and present greater levels of IWS than males. However, gender was not associated with EWS in the current sample, which differ from previous findings (Himmelstein et al., 2017; Jackson & Steptoe, 2017; Puhl et al., 2008). Fitness center stigma was also not significantly associated with BMI or gender in the current sample, which support findings by Schvey et al. (2017). This may be an indication both males and females are subject to similar weight stigma experiences, but the internal manifestations of those experiences differ for males and females and those of different body sizes.

A strength of the current study is the inclusion of fitness center stigma with EWS and IWS to understand overall weight stigma associations with PA in a single group of participants, allowing for important comparisons between weight stigma types. This study is also one of the first (along with (Schvey et al., 2017)) to quantitatively understand the specific association of fitness center stigma on PA, which addresses an important gap in the literature around different locations in which people can be subject to weight stigma. Lastly, by including participants from different weight categories as opposed to only a sample of overweight or obese adults, we improved the generalizability of the findings to a broad range of weight statuses in the U.S.

Several limitations of the current study should also be considered. While the current results may be generalized to adults of different weight statuses, the lack of
racial/ethnic and gender diversity does limit the generalizability and ability to compare results to larger and more diverse samples. Additionally, self-report data were used to measure PA through the Godin Leisure Time Exercise Questionnaire which may have resulted in overreporting of activity and potentially dampening the effect sizes of the regression analyses results. Therefore, objective measures an important next step in exploring weight stigma with PA behavior.

4.5 Conclusion

The lack of evidence of an association between IWS or fitness center stigma and PA, but significant association between EWS and increased levels of PA, suggest that mechanisms through which different types of weight stigma have an impact of physical activity behaviors are distinct from one another. Additionally, weight stigma types may manifest differently between weight categories and gender categories, which should be considered in the future when addressing and reducing weight stigma for adults to improve PA behaviors. Overall, there was minimal impact on total and MVPA behaviors through EWS, IWS, or fitness center stigma, and future research should consider the location in which people are choosing to engage in PA. It is clear that weight stigma differentially impacts those with a higher weight status, so obesity clinicians, weight loss specialist, and exercise specialists working with adults that have overweight and obesity, should be cognizant of weight stigma experiences in this group and the potential impact that they may have on psychosocial factors, which may impact the success of weight loss and obesity treatment and prevention strategies through mechanisms other than PA engagement.
Figure 1. Prevalence of EWS, IWS, and FCS by category

Note: Internalized weight stigma high $\geq$3.96, medium =1.45-3.95, low $\leq$1.44; Fitness center stigma high $\geq$2.96, low-medium $\leq$2.95.
Table 1. Descriptive and Test Statistics for MANOVA and ANOVA values.

<table>
<thead>
<tr>
<th>Variables</th>
<th>n (%)</th>
<th>Experienced Weight Stigma (Range: 0-9)</th>
<th>Internalized Weight Stigma (Range: 1-7)</th>
<th>Fitness Center Stigma (Range: 1-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Total Sample</td>
<td>214 (100)</td>
<td>0.49</td>
<td>0.86</td>
<td>2.7</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>167 (78.0)</td>
<td>0.30</td>
<td>0.35</td>
<td>2.06*</td>
</tr>
<tr>
<td>Male</td>
<td>47 (22.0)</td>
<td>0.54</td>
<td>0.95</td>
<td>2.89</td>
</tr>
<tr>
<td>BMIa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>122 (57.0)</td>
<td>0.26*</td>
<td>0.36</td>
<td>2.35*</td>
</tr>
<tr>
<td>Overweight/obese</td>
<td>92 (43.0)</td>
<td>0.78</td>
<td>1.19</td>
<td>3.17</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>159 (74.3)</td>
<td>0.43</td>
<td>0.68</td>
<td>2.73</td>
</tr>
<tr>
<td>Black/AAb</td>
<td>32 (15.0)</td>
<td>0.79</td>
<td>1.53</td>
<td>2.77</td>
</tr>
<tr>
<td>Hispanic/Latinx</td>
<td>3 (1.4)</td>
<td>0.43</td>
<td>0.35</td>
<td>3.03</td>
</tr>
<tr>
<td>Asian</td>
<td>9 (4.2)</td>
<td>0.44</td>
<td>0.64</td>
<td>2.63</td>
</tr>
<tr>
<td>Multi-racial/Other</td>
<td>11 (5.1)</td>
<td>0.37</td>
<td>0.82</td>
<td>2.12</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than Bachelor’s</td>
<td>102 (47.7)</td>
<td>0.53</td>
<td>0.96</td>
<td>2.62</td>
</tr>
<tr>
<td>Bachelor’s or Higher</td>
<td>112 (52.3)</td>
<td>0.45</td>
<td>0.76</td>
<td>2.78</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>66 (30.8)</td>
<td>0.39</td>
<td>0.49</td>
<td>2.65</td>
</tr>
<tr>
<td>Employed</td>
<td>148 (69.2)</td>
<td>0.53</td>
<td>0.58</td>
<td>2.73</td>
</tr>
<tr>
<td>Current Mem. Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, currently mem.</td>
<td>127 (59.3)</td>
<td>0.46</td>
<td>0.62</td>
<td>2.56*</td>
</tr>
<tr>
<td>No, not currently mem.</td>
<td>87 (40.7)</td>
<td>0.52</td>
<td>1.13</td>
<td>2.92</td>
</tr>
<tr>
<td>Frequency of Gym Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ Once per month</td>
<td>8 (6.3)</td>
<td>0.53</td>
<td>0.97</td>
<td>2.70</td>
</tr>
<tr>
<td>2-3 times / month</td>
<td>2 (1.6)</td>
<td>0.50</td>
<td>0.71</td>
<td>3.27</td>
</tr>
<tr>
<td>1-3 times / week</td>
<td>64 (50.4)</td>
<td>0.53</td>
<td>0.72</td>
<td>2.61</td>
</tr>
<tr>
<td>5-7 times / week</td>
<td>53 (41.7)</td>
<td>0.36</td>
<td>0.39</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Note: *BMI = body mass index; assigned according to National Heart, Lung, and Blood institute standards (overweight/obese: BMI ≥ 25 kg/m²; normal weight: BMI ≥ 18 kg/m² and < 25 kg/m²).

Note: One-way MANOVA tests were run first for each variable. Significant results from the MANOVA test warranted further individual one-way ANOVA tests for each weight stigma variable for that group. Multivariate F ratios were generated from Pillai’s statistic.

aUnivariate df = 1, 213

Note: AA=African American
Table 2. Regression Models for Weight Stigma and Physical Activity.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Physical Activity</th>
<th></th>
<th></th>
<th>MVPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td>$\beta$</td>
<td>$p$</td>
<td>$\beta$</td>
<td>$p$</td>
</tr>
<tr>
<td>Experienced Weight Stigma</td>
<td>0.38</td>
<td>0.44</td>
<td>1.24</td>
<td>0.02*</td>
</tr>
<tr>
<td>Internalized Weight Stigma</td>
<td>-1.44</td>
<td>0.07</td>
<td>-0.41</td>
<td>0.75</td>
</tr>
<tr>
<td>Fitness Center Stigma</td>
<td>-0.74</td>
<td>0.39</td>
<td>-2.15</td>
<td>0.14</td>
</tr>
<tr>
<td>Self-Consciousness at Gym</td>
<td></td>
<td></td>
<td>-0.57</td>
<td>0.35</td>
</tr>
<tr>
<td>Negative Attitudes to Gym</td>
<td></td>
<td></td>
<td>-2.15</td>
<td>0.14</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>-0.13</td>
<td>0.04</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td>0.43</td>
<td>0.50</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>0.76</td>
<td>0.52</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td>-1.42</td>
<td>0.19</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>-0.35</td>
<td>0.75</td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p<0.05; Model 1= independent models individually testing weight stigma variables with PA variables; Model 2 = full model including all weight stigma variables and covariates.
Chapter 5. Study 2

Self-Efficacy Mediates the Association Between Weight Stigma and Physical Activity Levels in a Sample of Adults.

5.1 Introduction

Weight stigma is prevalent in over 40% of adults in the U.S., and more commonly reported by those with overweight and obesity (Himmelstein et al., 2017). Experienced weight stigma (EWS) occurs when a person’s weight – regardless of their size - does not match current social norms of weight and body shape, they may be stigmatized by others (Brewis, 2014; Pont et al., 2017) and discriminated against through acts of teasing or disrespect (Emmer et al., 2020). These experiences commonly occur in a multitude of settings like healthcare and schools (Pearl & Puhl, 2018; Puhl & Heuer, 2009; Spahlholz et al., 2016; Sutin & Terracciano, 2017), but can also occur in fitness centers and spaces (termed fitness center stigma) (Cardinal et al., 2014; Pickett & Cunnhingham, 2017; Schvey et al., 2017). A person may begin to believe and agree with those weight stigmatizing stereotypes toward them, ultimately presenting as internalized weight stigma (IWS) (Emmer et al., 2020).

An abundance of evidence currently reinforces that EWS, IWS, and fitness center stigma incidents, although more commonly IWS, can result in negative psychosocial responses such as lower self-esteem, higher anxiety and stress, body dissatisfaction, and greater depressive symptoms (Durso & Latner, 2008; Emmer et al., 2020; Friedman et al., 2005; Pearl & Puhl, 2018; Pearl et al., 2020; Puhl et al., 2020; Schvey et al., 2017; Tomiyama et al., 2018; Vartanian & Shaprow, 2008; Wu & Berry, 2018). Weight stigma can also negatively impact specific health behaviors, such as physical activity (PA);
however, the current evidence related to PA outcomes is less consistent (Pearl, 2018; Pearl et al., 2021). PA provides clear physical health benefits for people of all weight statuses, including reduced disease risk and weight-related outcomes, as well as improved psychosocial outcomes related to weight stigma such as self-esteem, lower anxiety, increased body satisfaction, and lower depressive symptoms (Sonstroem & Morgan, 1989). Fitness centers and spaces are locations in which adults often choose to participate in PA (Holliday et al., 2017). Currently, only about 24% of U.S. adults meet the PA recommendations of 150-300 minutes per week of moderate intensity PA, 75-150 minutes per week of vigorous intensity exercise or a combination of both (USDHHS, 2018). These rates indicate that a better understanding of factors that impact PA behavior, such as weight stigma, are important to discern and can be used to improve MVPA engagement in adults.

Some research argues that PA levels may be negatively impacted among adults who report either EWS or IWS (Feig et al., 2020; Himmelstein et al., 2017; Jackson & Steptoe, 2017; Lewis et al., 2011; Pearl et al., 2015; Pearl et al., 2020; Schmalz, 2010; Vartanian & Novak, 2011), or even increased specifically as a result of EWS (Pearl et al., 2015). However, no study that we were able to identify has quantitatively explored the association between fitness center stigma and PA outcomes. On the other hand, a body of evidence suggests a lack of direct association at all between EWS or IWS and PA levels (Han et al., 2018; Sattler et al., 2018; Vartanian & Novak, 2011; Vartanian & Shaprow, 2008) but have identified that psychosocial factors associated with weight stigma (i.e., exercise avoidance motivation, self-efficacy for exercise, and self-esteem) may act as mediators in some of the relationships. Among participants that identified as women,
EWS was significantly associated with exercise avoidance motivation, which in turn was associated with lower levels of moderate PA (Sattler et al., 2018; Vartanian & Shaprow, 2008), but exercise avoidance motivation has not been explored as a mediator between IWS or fitness center stigma and PA. Self-efficacy for exercise was found to be a partial mediator between IWS and lower levels of PA in primarily female adults who had undergone recent weight loss surgery (Feig et al., 2020), but has not been explored in relation to EWS or fitness center stigma and PA. In another sample of mainly female participants, self-esteem was reported (Schmalz, 2010) to weakly mediate the association between weight stigma consciousness (the extent to which they may be stereotyped by others) and perceived physical competence, but actual PA outcomes were not explored, nor was the mediating role between IWS and PA. Fitness center stigma has been found to be associated with a maladaptive coping behavior subscale (which includes PA avoidance), as well as emotional health and wellbeing in adults with overweight and obesity (Schvey et al., 2017). However, similar to other research, this study did not explore PA levels as an outcome, nor psychosocial factors as mediators. The inconsistency in findings related to weight stigma and PA behaviors may be driven by the potential different ways in which each type of weight stigma may psychosocially manifest itself for different people, as well as the variance in the way or the type of PA examined. To clarify their individual impacts, each type of weight stigma should be explored while considering these potential psychosocial factors as mediators in the relationship between weight stigma type and PA level outcomes. Additionally, since the PA guidelines for Americans specifically highlight moderate to vigorous intensity activity, MVPA is important to explore rather than just total PA.
To expand on current literature, the aim of the present study is to examine how self-efficacy for exercise, exercise avoidance motivation, and self-esteem may mediate the relationship between weight stigma and physical activity levels.

5.2 Methods

5.2.1 Participants

A sample of adults in the U.S. between the ages of 18 and 55 were recruited to participate in the current study. Recruitment materials that specified inclusion criteria were advertised on Facebook and Instagram, in weekly emails to undergraduate and graduate students at the University of Minnesota, and by email to past participant lists of other University of Minnesota research studies; flyers were also posted in different fitness spaces around the Twin Cities Metro area. Eligible participants had a BMI $\geq 18.5$ kg/m$^2$, were a current or former member of a fitness center or setting at any point during adulthood, and had access to a device and reliable internet to complete the electronic survey. A fitness center was defined as a constructed establishment that has a main goal of providing exercise and physical activity spaces to guests, with a monetary value associated with its use. Adults were excluded from the study if they had any physical disability that limited their current ability to engage in physical activity. The final sample included 214 participants after three respondents were excluded for having incomplete data. All study protocols were approved by the University of Minnesota Institutional Review Board, and informed consent was obtained from all participants.

5.2.2 Procedure

Participant recruitment and study participation occurred on a rolling basis between the months of August to October 2021. Participants began the study by
completing a screening survey and consent, followed by survey participation which all took place through a data management system, Qualtrics. Upon completion of the survey, participants were compensated with a $10.00 electronic gift card.

5.2.3 Measures

Weight Stigma Survey Measures

*Experienced Weight Stigma (EWS)* was assessed using the Brief Stigmatizing Situations Inventory, which is a shortened version of the full 50-item Stigmatizing Situations Inventory (SSI) (Vartanian, 2015). The brief SSI is a 10-item measure, focusing on different sources of stigma (including avoidance, exclusion, or being ignored; comments from children, family, doctors, and others; job discrimination; embarrassment of loved ones; negative assumptions; and physical barriers). The 10-point Likert-scale ranges from 0 (never) to 9 (daily) (Cronbach’s α=0.90). The 10 items were averaged to determine an overall score (possible range=0-9). A higher score was indicative of greater levels of EWS. Responses were dichotomized to represent participants who had ever been subjected to weight stigma in their life (all scores greater than 0) vs. all other participants who had never been subjected to weight stigma before (all scores equal to 0), a method used by other researchers (Jackson & Steptoe, 2017; Pearl et al., 2020).

*Internalized Weight Stigma (IWS)* was assessed using the Modified Weight Bias Internalization Scale (Pearl & Puhl, 2014). This is an 11-item scale designed to measure the extent to which participants of all weight statuses believe negative stereotypes and statements about themselves. The scale uses a 7-point Likert-scale ranging from 1 (strongly agree) to 7 (strongly disagree) (Cronbach’s α=0.94). The 11 items were
averaged to determine an overall score (possible range=1-7). A higher score was indicative of greater levels of IWS. IWS was categorized into high, medium, and low levels unique to these data using methods explained by Puhl et al. in 2018. (Puhl et al., 2018) The cutoff for high IWS was defined as one standard deviation above the mean (3.96), low IWS was defined as one standard deviation below the mean (1.44), and medium levels were defined as all values between high and low cutoffs (1.45-3.95).

*Fitness Center Weight Stigma* was measured using the stigma at the gym subscale of the Gym Survey (Schvey et al., 2017). This subscale included 4 items: “Gym staff members [or personal trainers] have commented negatively on my weight”; “People stare or give me dirty looks at my gym”; “I feel negatively judged at my gym”; “The equipment at my gym feels too small for me” (Cronbach’s α=0.83). Participants rated each item on a scale from 1 (strongly disagree) to 7 (strongly agree). The scale total was averaged to determine an overall score with a possible range of 1-7. Higher scores indicated greater levels of fitness center stigma experiences. The same method was used for determining cutoffs for fitness center weight stigma as were used for IWS. However, the low category became a negative number based on the distribution of data, so only two categories were used: high levels of fitness center stigma which had a cutoff of one standard deviation above the mean (≥2.63), and low-medium levels of fitness center stigma which were values of 2.63 and below.

**Physical Activity and Psychosocial Survey measures**

*Physical Activity* was measured using the Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). The questionnaire for the current study was modified to assess average hours per week spent engaging in mild, moderate, and
strenuous exercise during a normal 7-day period (two-week test-retest reliability coefficient = 0.74). Response options ranged from “none” to “6+ hours a week”. The midpoint of each of the six response options was used to calculate hours per week spent in each intensity category, with the “6+” category counted as 8.0 hours (Barr-Anderson et. al., 2008; Barr-Anderson et al., 2021; Folk et al., 2021). Weekly moderate-to-vigorous physical activity (MVPA) was calculated as the sum of hours spent in strenuous and moderate exercise per week.

*Self-Esteem* was assessed using the Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965), which measures global self-worth including both positive and negative feelings about oneself. Ten items were included in the scale, and participants rated each item on a scale from 1 (strongly disagree) to 4 (strongly agree). Example items include: ‘On the whole, I am satisfied with myself’, ‘I am able to do things as well as most other people’, and ‘I feel I do not have much to be proud of’. Five negatively worded items were reverse scored, then all items were totaled for an overall self-esteem score. Higher scores were an indication of higher self-esteem (test-retest reliability correlation = 0.88).

*Exercise Avoidance Motivation* was assessed using the Exercise Avoidance Motivation Scale (Vartanian & Shaprow, 2008). This eight-item scale measured participant reactions to experiencing ‘negative situations related to their weight’. Items included: ‘I avoid going to the gym when I know there will be a lot of thin people there’, ‘If I go to the gym, there are some exercise or pieces of equipment that I avoid’, and ‘I feel uncomfortable going to a gym where there are a lot of mirrors.’ Participants rated each item on a scale from 1 (not at all true) to 7 (completely true) (Cronbach’s α=0.83).
Scores were totaled for an overall avoidance score, where higher scores indicated greater avoidance motivation.

_Self-Efficacy for Exercise_ was assessed using the self-efficacy for exercise scale (Resnick & Jenkins, 2000). The original scales asked participants: ‘How confident are you right now that you could exercise three times per week for 20 minutes if: …’ and given nine different measures of self-efficacy to rate on a scale from 0 (not confident) to 10 (very confident). However, to align with the current Physical Activity Guidelines for Americans, the question was modified to ask about their confidence in exercising five times per week for at least 30 minutes (USDHHS, 2018). The ratings will be summed and divided by 9 to indicate the strength of efficacy (Cronbach’s $\alpha=0.92$). Higher scores indicated greater self-efficacy for exercise.

**Sociodemographic Variables**

The following sociodemographic information were self-reported within the participant survey: _race/ethnicity_ (White, Black or African American (AA), Hispanic or Latinx, Asian American, or other), _gender_ (male, female, or different identity), _age_ (date of birth), and _education level_ as a proxy for socioeconomic status (did not finish high school, high school or GED, some college or training after high school, finished college, or advanced degree). Health status indicators were collected and included: _height_ and _weight_ (used to determine BMI).

**5.2.4 Statistical Analysis**

All statistical analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC, 2015). Descriptive statistics were calculated using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables.
Differences in psychosocial variables (self-esteem, self-efficacy for exercise, and exercise avoidance motivation) between weight stigma categories (EWS, IWS, and fitness center stigma) were determined using a one-way ANOVA. Skewed variables were log transformed to improve ANOVA assumptions. Inferences were tested between transformed and original variables but outcomes did not differ between the two, so analyses using the original variables were reported.

Parallel multiple mediation models were run using bootstrapping with 10000 sampling replications to construct a 95% confidence interval (CI) for the indirect effect via the PROCESS macro for SAS developed by Andrew Hayes (Hayes, 2022). Exercise avoidance motivation, self-efficacy for exercise, and self-esteem were entered simultaneously as mediators in a parallel multiple mediation model of the relationships between IWS and MVPA, EWS and MVPA, and fitness center stigma and MVPA. A 95% CI that did not include zero indicated a significant mediation effect (i.e., indirect effect) of the relationship between the given weight stigma variable and MVPA while controlling for all other mediators in the model. Figure 1 provides a representation of the planned mediation models. All mediation models included age, race/ethnicity, gender, BMI category, and education as covariates, determined a priori. Individual mediation analyses between each weight stigma variable and each psychosocial variable while controlling for covariates were run to compare statistical inferences with the parallel multiple mediation model. Since the inferences were the same, only the results from the parallel multiple mediation model are presented.

5.3 Results
The final sample included adults of whom 78% were female; nearly 74% were White and 15% were Black/AA; mean age of respondents was 28.0±9.91 years; mean BMI was 25.8±5.81 kg/m$^2$ and 42.8% of participants were classified as having overweight or obesity. Participants engaged in an average of 6.4±3.76 hours of MVPA per week. Additional participant information can be found in Table 1.

Most participants indicated that they have been subjected to EWS at least once in their life, medium levels of IWS, and low-med levels of fitness center stigma. Mean levels of self-esteem, self-efficacy for exercise, and exercise avoidance motivation by different levels of weight stigma are presented in Table 2. Higher categories of EWS, IWS, and fitness center stigma were all associated with significantly greater exercise avoidance motivation (p’s<0.0001) and lower self-esteem (p’s <0.0001). Greater levels of IWS and fitness center stigma were also associated with lower levels of self-efficacy for exercise (p=0.0002 and 0.01, respectively), but EWS was not.

Three separate mediation analyses tested whether the impact of EWS, IWS, or fitness center stigma on MVPA were mediated by psychosocial factors of exercise avoidance motivation, self-efficacy for exercise, and self-esteem. The total effect of weight stigma variables adjusting for gender, BMI, race/ethnicity, education, and age, were not significant. Neither EWS, IWS, or fitness center stigma were directly associated with MVPA when all mediators were included in the model.

IWS. The indirect effect of IWS on MVPA through self-efficacy for exercise was -0.25 (bootstrapped CI: -0.47 to -0.07), where higher rates of IWS were significantly associated with lower levels of self-efficacy for exercise and in turn lower levels of MVPA. The confidence interval does not include 0, indicating that self-efficacy for
exercise partially mediated the relationship between IWS and MVPA when controlling for covariates (Table 3). Exercise avoidance motivation nor self-esteem were partial mediators between IWS and MVPA. The mediation model including IWS, psychosocial mediators (exercise avoidance motivation, self-efficacy for exercise, and self-esteem), and control variables accounted for 26% of the variance in MVPA levels.

**Fitness Center Stigma.** The indirect effect of fitness center stigma on MVPA through self-efficacy for exercise was -0.45 (bootstrapped CI: -0.79 to -0.23), where greater levels of fitness center stigma were significantly associated with lower levels of self-efficacy for exercise and lower levels of MVPA. The confidence interval does not include 0, indicating that self-efficacy for exercise partially mediated the relationship between fitness center stigma and MVPA levels when controlling for covariates (Table 3). Similar to IWS, neither exercise avoidance motivation or self-esteem were significant mediators between fitness center stigma and MVPA. The mediation model including fitness center stigma, psychosocial mediators, and control variables accounted for 25% of the variance in MVPA levels.

**EWS.** None of the indirect effects between EWS and MVPA through exercise avoidance motivation, self-efficacy for exercise, or self-esteem were significant given that 0 was present in all of the bootstrapped CIs presented in Table 3, suggesting that none of the psychosocial variables mediated the relationship between EWS and MVPA.

### 5.4 Discussion

The purpose of the present study was to better understand the role that psychosocial factors may play in the relationship between different types of weight stigma and MVPA behavior. In our current sample of adults, consistent findings suggest
that all three types of weight stigma (EWS, IWS, and fitness center stigma) are associated with negative psychosocial outcomes of lower self-efficacy for exercise, greater exercise avoidance motivation, and lower self-esteem. Additionally, levels of MVPA were not directly associated with EWS, IWS, or fitness center stigma, but were influenced by IWS and fitness center stigma through self-efficacy for exercise only, and not exercise avoidance motivation or self-esteem. These results may indicate that 1) the impact on PA behavior may be more so driven by internal determinants that occur as a result of being subject to weight stigma rather than the actual weight stigma experience itself, 2) psychosocial factors manifest themselves differently in the way that they impact PA behavior, and 3) the location and environment in which people are subject to weight stigma may be more important than general EWS when it comes to PA behavior.

The current study revealed that weight stigma (EWS, IWS, and fitness center stigma) did not have a direct effect on MVPA levels which partially align with findings by Han et al. (2018) and Vartanian and Shaprow (2008). The two previously mentioned studies found no direct effect on PA for either EWS or IWS and are similar to findings by Schvey et al. (2017) in which no significant association was present between fitness center stigma and self-reported gym use among overweight/obese adults. The lack of direct association between any weight stigma type and MVPA levels could be due to the fact that participants in the current sample reported high levels of MVPA on average, by exceeding the upper level of PA recommendations by nearly 84 minutes. Those that are already participating in positive health behaviors, such as PA, to obtain and maintain a healthy weight status may be less inclined to be negatively impacted by weight stigma experiences or internalization.
In the current sample, greater levels of either IWS or fitness center stigma when surveyed made it more likely that participants had lower levels of self-efficacy for exercise, and ultimately engaged in lower levels of moderate-vigorous physical activity. Similar findings were present in a mainly female sample of adults who had previously undergone weight loss surgery. IWS, in particular, was indirectly associated with MVPA through self-efficacy for exercise ($\beta=-0.23$) (Feig et al., 2020). Given the role that self-efficacy for exercise may play regarding initiation and maintenance of physical activity behavior (Bauman et al., 2012), these findings are unsurprising. IWS and fitness center stigma were significantly associated with self-efficacy for exercise levels, which are consistent with findings by Pearl et al. (2015) in a sample of self-identified overweight or obese females. However, the results of the current study revealed that self-efficacy for exercise was not a significant mediator in the relationship between EWS and MVPA. These findings suggest that the association between weight stigma and PA behavior may be more so driven by internal factors or experiences directly related to fitness spaces and PA, rather than being outwardly stigmatized through general comments or discrimination unrelated to PA or PA environments.

The lack of a significant mediating role found between the weight stigma variables and MVPA through exercise avoidance motivation and self-esteem in the current sample are not fully in-line with previous findings. Vartanian and Shaprow (2008) found that EWS was positively associated with exercise avoidance motivation ($\beta=0.45$; $p<0.001$), and in turn exercise avoidance motivation was negatively associated with both strenuous and moderate exercise ($r=-0.25$ and -0.20; $p=0.01$ and $<0.05$ respectively). Their study also concluded that internalization of anti-fat attitudes
moderated the impact of EWS on exercise avoidance motivation, where those with higher internalization experienced greater exercise avoidance motivation behavior from experiences of weight stigma (Vartanian & Shaprow, 2008). The present findings may have differed due to most of the current participants falling within low to medium levels of IWS, and IWS was not explored as a moderator of any outcomes. To the best of our knowledge, no other study has explored the association between fitness center stigma and either exercise avoidance or self-esteem. However, in a sample of adults with overweight and obesity, fitness center stigma was significantly associated with general maladaptive coping behaviors which included avoiding physical activity ($\beta=0.41$, $p<.001$), emotional wellbeing ($\beta=-0.24$, $p=.001$), and self-consciousness concerns such as worrying about being judged by others in the space ($\beta=.53$, $p<.001$) (Schvey et al., 2017). Based on current findings that lower self-esteem or greater exercise avoidance motivation occur in relation to weight stigma (EWS, IWS, or fitness center), but do not mediate the association between weight stigma and MVPA indicate that psychosocial factors may manifest themselves differently when it comes to PA behavior.

A strength of the current study is the use of a parallel multiple mediation model in which all potential mediators (self-esteem, self-efficacy for exercise, and exercise avoidance motivation) were included in a single model for each type of weight stigma and PA. Although not a new method for analyses, the parallel multiple mediation model has not been commonly used in previous literature. The use of this type of model reduces the chances for error by considering the possible correlation between proposed mediators and have not been assessed previously in the literature which highlights the need for exploration in other samples. This may help to understand the true underlying factors
driving physical activity behaviors as an outcome of weight stigma. Additionally, the study included participants considered to have a normal weight due to the fact that all weight statuses can be subject to weight stigma, which makes the findings more generalizable.

Limitations of the current study should also be considered. Self-report data were used to measure MVPA levels, height, and weight which may have biased the results of the data. Future research should focus on objectively collecting physical activity data as an important next step in understanding the impact of weight stigma on PA behaviors. Further, the study sample included mainly women and those that identify as Non-Hispanic White, which limit the generalizability of the findings.

5.5 Conclusion

Overall, our findings were mixed regarding the roles of psychosocial mediators (self-efficacy for exercise, exercise avoidance motivation, and self-esteem) in the relationship between different types of weight stigma and MVPA. In particular, self-efficacy for exercise may play the largest role in how weight stigma is associated with physical activity levels in adults. These findings suggest the impact on PA behavior may be more so driven by internal factors that occur as a result of being subject to weight stigma rather than the general weight stigma experiences, and psychosocial factors manifest themselves differently in the way they impact PA behavior. Additionally, the location in which people are subject to weight stigma, specifically within fitness centers and spaces, are an important consideration for reducing barriers to engaging in PA. These findings can help public health officials, weight management programs, and exercise
professionals to understand the impact of weight stigma on physical activity behaviors, to better inform PA interventions and better tailor obesity treatment and prevention efforts.
Table 1. Participant Characteristics.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>167</td>
<td>78.0</td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>22.0</td>
</tr>
<tr>
<td><strong>BMI Category</strong></td>
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<td></td>
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<tr>
<td>Normal Weight</td>
<td>122</td>
<td>57.0</td>
</tr>
<tr>
<td>Overweight/Obese</td>
<td>92</td>
<td>43.0</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
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<td></td>
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<tr>
<td>White</td>
<td>159</td>
<td>74.3</td>
</tr>
<tr>
<td>Black/AA</td>
<td>32</td>
<td>15.0</td>
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<tr>
<td>Hispanic/Latinx</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Asian</td>
<td>9</td>
<td>4.2</td>
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<tr>
<td>Multi-racial/Other</td>
<td>11</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>Education</strong></td>
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<tr>
<td>Less than Bachelor’s</td>
<td>102</td>
<td>47.7</td>
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<tr>
<td>Bachelor’s Degree or higher</td>
<td>112</td>
<td>52.3</td>
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<tr>
<td><strong>Occupation Status</strong></td>
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<tr>
<td>Unemployed</td>
<td>66</td>
<td>30.8</td>
</tr>
<tr>
<td>Employed (part-time or full)</td>
<td>148</td>
<td>69.2</td>
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<tr>
<td><strong>Experienced Weight Stigma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>142</td>
<td>66.4</td>
</tr>
<tr>
<td>Never</td>
<td>72</td>
<td>33.6</td>
</tr>
<tr>
<td><strong>Internalized Weight Stigma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>37</td>
<td>17.3</td>
</tr>
<tr>
<td>Medium</td>
<td>145</td>
<td>67.8</td>
</tr>
<tr>
<td>Low</td>
<td>32</td>
<td>14.9</td>
</tr>
<tr>
<td><strong>Fitness Center Stigma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>36</td>
<td>16.8</td>
</tr>
<tr>
<td>Low-medium</td>
<td>178</td>
<td>83.2</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age, years</td>
<td>28.1</td>
<td>9.92</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>25.8</td>
<td>5.82</td>
</tr>
<tr>
<td>MVPA, hours per week</td>
<td>6.4</td>
<td>3.76</td>
</tr>
</tbody>
</table>

*Note: BMI = body mass index. a Assigned according to National Heart, Lung, and Blood institute standards (overweight/obese: BMI ≥ 25kg/m²; normal weight: BMI ≥ 18kg/m² and < 25kg/m²)*
Table 2. Difference in means for psychosocial variables between levels of weight stigma using a one-way ANOVA (n=214).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall Mean (SD)</th>
<th>Experienced Weight Stigma</th>
<th>Internalized Weight Stigma</th>
<th>Fitness Center Stigma</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Never (n=72)</td>
<td>Low (n=32)</td>
<td>Medium (n=145)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ever (n=142)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Low-Med (n=178)</td>
<td>High (n=36)</td>
</tr>
<tr>
<td>Self-efficacy for exercise</td>
<td>5.98 (2.1)</td>
<td>6.26 (2.3)</td>
<td>5.84 (2.1) p=0.18</td>
<td>7.24 (2.5)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Avoidance Motivation</td>
<td>16.68 (8.8)</td>
<td>12.10 (4.4)</td>
<td>19.00 (9.5) p&lt;.0001</td>
<td>10.66 (3.5)</td>
</tr>
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<tr>
<td>Self-Esteem</td>
<td>31.30 (5.4)</td>
<td>33.38 (5.2)</td>
<td>30.25 (5.3) p&lt;.0001</td>
<td>35.19 (5.3)</td>
</tr>
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</tbody>
</table>
Figure 1. Diagram of proposed parallel multiple mediation model of weight stigma and physical activity behaviors.
Table 3. Indirect Effects of Weight Stigma on Physical Activity Levels; Results of the Parallel Multiple Mediation Model

<table>
<thead>
<tr>
<th>X Variable (mediators)</th>
<th>Indirect Effect</th>
<th>Bootstrapped SE</th>
<th>Bootstrapped CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internalized Weight Stigma</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Avoidance</td>
<td>0.007</td>
<td>0.18</td>
<td>-0.33 – 0.38</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Efficacy for Exercise</td>
<td><strong>-0.251</strong></td>
<td>0.11</td>
<td>-0.48 - 0.07</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-0.233</td>
<td>0.18</td>
<td>-0.62 – 0.09</td>
</tr>
<tr>
<td>** Experienced Weight Stigma**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Avoidance</td>
<td>0.074</td>
<td>0.19</td>
<td>-0.29 – 0.46</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Efficacy for Exercise</td>
<td>-0.067</td>
<td>0.15</td>
<td>-0.49 – 0.09</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-0.102</td>
<td>0.10</td>
<td>-0.34 – 0.07</td>
</tr>
<tr>
<td>** Fitness Center Stigma**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Avoidance</td>
<td>0.105</td>
<td>0.18</td>
<td>-0.26 – 0.45</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Efficacy for Exercise</td>
<td><strong>-0.453</strong></td>
<td>0.14</td>
<td>-0.79 – -0.23</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-0.121</td>
<td>0.12</td>
<td>-0.39 – 0.10</td>
</tr>
</tbody>
</table>

**NOTE:** **bold** if the result is significant when 0 is not included in the confidence interval; CI = confidence interval, SE = standard error; covariates of age, gender, race/ethnicity, BMI, and education are included in the models.
Chapter 6. Study 3


6.1 Introduction

Weight stigma occurs when a person is socially rejected or seen as less of a person due to their weight (Tomiyama et al., 2018). It becomes exacerbated if a person’s weight does not match current social norms of weight and body shape, and commonly occurs toward those with overweight or obesity (Brewis, 2014; Pont et al., 2017; Tomiyama et al., 2018). Stigmatizing individuals often begins with negative beliefs and stereotypes that they are lazy, lack willpower and self-control, and are unmotivated (Brewis, 2014; Pont et al., 2017). These stereotypes can lead to negative treatment through forms of discrimination such as comments, teasing, disrespect, and even through policies and messaging on a structural level such as employment hiring decisions, or lack of equipment that fits their body size (Emmer et al., 2020; Palad et al., 2019; Pearl, 2018).

Previous research has identified that victims of weight stigma may be more likely to experience negative mental and emotional health outcomes (Emmer et al., 2020; Papadopoulos & Brennan, 2015), as well as negative physical health outcomes and weight-related behaviors such as disordered eating and lower motivation to engage in physical activity (Brewis, 2014; Himmelstein et al., 2019; Pearl & Puhl, 2018). Only 24% of adults in the U.S. currently meet the recommended physical activity guidelines (CDC, 2021b), identifying a critical need to address risk factors associated with lower physical activity. Addressing physical activity behaviors though, like other health behaviors, often
requires the consideration of multiple levels of influence and interaction through an ecological model approach to culminate the greatest impact on behavior change (Sallis et al., 2008). The Social Ecological Model is based on the concepts that multiple levels of influence exist (individual, interpersonal, organizational, community, and policy), these influences on behaviors interact across the levels, and interventions addressing multiple levels may be most effective for behavior change (Sallis et al., 2008). Given the high prevalence of weight stigma among adults in the U.S. at nearly 40% (Himmelstein et al., 2017), and its potential association with physical activity behavior (Feig et al., 2020; Jackson & Steptoe, 2017; Pearl et al., 2015; Pearl et al., 2020), understanding the implications of weight stigma on physical activity from all levels of the Social Ecological Model may help to reduce weight stigma experiences among adults and improve physical activity behaviors.

Consideration for location of weight stigma experiences may also be important to understanding the impact that it may have on physical activity behaviors. Adults frequently engage in physical activity in fitness centers and spaces (Holliday et al., 2017), but may also be subject to weight stigma experiences in these venues (Arguelles et al., 2021; Schvey et al., 2017). Most of the current literature explores quantitative associations between weight stigma experiences and physical activity but fails to specifically explore the nature of fitness center stigma experiences and these associations from a multi-level perspective; namely how individuals perceive these experiences/interactions and their impact, where weight stigma stems from, and what changes are warranted in order to reduce weight stigma experiences from the perspective of the individual. Qualitative inquiry would begin to close those gaps to understand
fitness center stigmas perceived impact on physical activity behavior but have insufficiently been explored in the literature.

Two studies have qualitatively explored weight stigma among gym users with obesity; although one did not aim to understand how it may have influenced physical activity behavior in their participants (Arguelles et al., 2021), and the other was only among participants who self-identified as overweight and were instructors of fat-inclusive yoga classes (Pickett & Cunnhingham, 2018). A third study also qualitatively explored weight stigma and physical activity however they did not focus questions specifically to physical activity behavior or location of weight stigma, but still found that participants felt that exercise and gym equipment did not accommodate for larger bodies, and participants feared stigmatizing experiences if they exercise in public (Lewis et al., 2011). The purpose of the current study is to expand on current literature by qualitatively exploring weight stigma experiences and the perceived impact of these experiences, especially those specific to fitness spaces, on physical activity behaviors among adults.

6.2 Methods

Participants (n=214) were initially enrolled in a mixed-methods study and quantitatively reported on weight stigma experiences, physical activity behaviors, and sociodemographics through a Qualtrics survey. In the survey, 185 participants (86.4 of full sample) noted their willingness to take part in a single individual semi-structured interview to further discuss their weight stigma experiences, including those in fitness spaces, and their perceived impact on physical activity. Participants were eligible for the individual interviews only if they reported high levels of experienced weight stigma (defined as 1 standard deviation above the sample mean), and some level of fitness center
stigma according to their survey responses in anticipation of more rich discussion and content related to specific weight stigma experiences. Of those that were eligible (n=17), eight agreed to participate in the interviews and received a $15.00 e-gift card upon completion of the interview. According to Creswell & Poth (2018), 3-10 interviews have been deemed sufficient for this type of qualitative data collection, so a minimum of eight participants was the target given that this was a pilot study with a limited sample of participants to choose this subsample from (Creswell & Poth, 2018). Informed consent was obtained from all participants and all protocols were approved by the University of Minnesota Institutional Review Board.

A phenomenological approach was used to describe the lived experiences of the participants (Creswell & Poth, 2018), utilizing virtual 30 to 60-minute semi-structured interviews on Zoom. The first author conducted all interview sessions which were comprised of questions in the five domains of the Social Ecological Model (see Appendix for specific questions). First, the individual level domain included questions about current physical activity behaviors; the interpersonal level domain included questions about general weight stigma experiences from others, and the impact of those experiences on physical activity and other health behaviors; the organizational level domain addressed the use of fitness spaces for physical activity, and weight stigma experiences specifically within fitness spaces; the community level domain included questions and discussion around social norms related to weight and body standards but in and out of fitness spaces; and lastly, the structural and systems level domain explored ways in which fitness spaces can address weight stigma in their facilities. Deductive and inductive methods were used to analyze the qualitative data derived from the interview sessions. Hypotheses and
general themes were formed deductively according to the existing theoretical framework of the Social Ecological Model through each level of the framework – individual, interpersonal, organizational, community, and structure/systems. Inductive coding was achieved through the generation of new results and explanations from the data through first order codes (Bryant, 2020).

6.2.1 Data analysis, trustworthiness, and credibility

Descriptive demographic statistics were calculated using means and standard deviations to provide more context for the example comments that were added throughout the results section. Interview sessions were audio recorded in the Zoom app, and transcribed by the professional transcription company, Datalyst. Completed transcripts were read by the interviewer, while noting reflections of individual data or summaries across transcripts with emerging ideas. Credibility of the data was addressed through data collection and analysis techniques as suggested by Creswell & Poth (2018). Three coders trained in qualitative data collection and analysis (including the first author/interviewer) individually reviewed three separate transcripts to develop a list of significant statements to collectively develop a final code book which included general themes and first order codes within each given theme (Table 2). From here, all coders applied the code book to all eight transcripts using Excel, which were then compared to settle discrepancies between codes and coders. Once all data were coded and agreed upon, the first author created a textural description of the data and experiences for each participant separately, followed by a summary description of the phenomenon based on the themes and codes from the final coding.
Trustworthiness of the data was addressed through specific criteria first introduced by Guba specifically for qualitative analyses (Creswell & Poth, 2018; Guba, 1981). Credibility was achieved by using multiple coders trained in qualitative methods, utilization of debriefing sessions between the three coders to come to a consensus on final codes, generating an in-depth description of the research findings, and member checking. With member checking, the researcher sent participants the data summary and encouraged them to provide alternative language and an idea of how well the researchers’ interpretation was representative of their experiences (Amankwaa, 2016; Shenton, 2004). Additionally, the primary researchers and coders independently reviewed all transcripts before consulting with one another to reach consensus prior to advancing to the next stage of analysis which was coding the data. This process was used to reduce researcher bias and improve accuracy of the final summary of data.

Confirmability was achieved by use of triangulation of data to develop a complete and comprehensive understanding of a phenomena by referencing multiple data sources to incorporate into the final description of the phenomena. It is also important to address the researchers’ inherent beliefs and positionality (Creswell & Poth, 2018). All three coders are normal weight, female physical activity and health promotion scholars who aim to improve physical activity behavior for all people. Thus, their perspective in this study involves kinesiology, physical activity promotion, and behavior change lenses.

6.3 Results

Results are presented by domain of the Social Ecological Model as described in the methods section. Quotes are used throughout to describe findings and experiences of
participants more thoroughly. Overall, all participants reported on general weight stigma experiences, as well as experiences specifically within fitness spaces.

All participants in the sample (n=8; hereafter referred to as Participant A-H) identified as female, and seven were classified as overweight or obese based on BMI (87.5%). Most participants identified as White (62.5%), while the other three identified as Asian, Black or African American, or multi-racial. The highest level of education earned by participants ranged from a high school diploma or equivalent (n=2), to a Master’s, professional, or doctoral degree (n=3), with n=3 receiving a bachelor’s degree. The age of participants ranged from 18 – 48 years (mean=29.38±9.88 years). Table 1 provides more detailed demographic information.

6.3.1 Individual Level

Current Physical Activity Habits

All of the participants indicated during the interviews that they currently engage in physical activity. The majority (n=7) utilize a gym setting, and four specifically engage in group fitness classes or work with a trainer. It was commonly reported that these class settings or trainers provide positive external motivation for engaging in and continuing their physical activity behaviors and make for more enjoyable ways to be active than on their own. One participant avoids utilizing gym spaces altogether as a result of stigmatizing experiences, addressed in the interpersonal domain:

It just is not always comfortable for me to work out in gyms…I just have found that [working out at home] takes away all of those barriers about wondering what I look like, just some of those things that I just don’t have to worry about.

(Participant A)
Physical Activity Motivators/Facilitators

Other than external motivation from others, positive physical health outcomes were another common motivator for engaging in physical activity. Examples included cardiovascular health and improved strength (n=5), as well as being motivated by weight loss (n=4). Other common facilitators reported for engaging in physical activity were past habits (i.e., playing sports as a child) (n=2), positive mental health outcomes (n=2), and feeling a sense of structure and accomplishment (n=2).

I feel like it’s always been, ‘You look this way, or you feel this way, or your clothes fit this way so you need to do more physical activity so they don’t feel this way anymore, or you don’t feel this way anymore.’ (Participant G)

Negative Weight Related Feelings

Most participants (n=6) reported negative feelings of self-worth based on their weight and body image on an individual level, leading to the fear and worry about what others thought about them. This often came as a result of the internalization of weight stigma experiences discussed in the following section.

6.3.2 Interpersonal Level

Weight Stigma from Others

The interpersonal level mainly explored weight stigma experiences of the participants, not specific to any location, type, or time in their life. Weight stigma in the form of comments and bullying from peers in both school and employment settings were mentioned by nearly all participants (n=7), with respect to things like clothing choices, name calling, and even assumptions about participants lifestyle related to diet and physical activity choices.
I distinctly remember we were in Spanish 2, and we learned the word for whale, and they called me ‘ballena’ for like the whole year. (Participant G)

Family members (both immediate and extended family) were another common source of weight stigma comments (n=6), regarding participants’ weight, looks, and diet or physical activity habits.

In certain moments it could snap into, ‘Why are you eating that?’, or they’ll say, ‘I’m disappointed, you haven’t gone to the gym at all this week?’…It’s hard because you have to keep choosing your family, whether you like it or not. And you like to think that your parents like, love you unconditionally, but when you are fed that image, or that idea that it is conditional, and it changes, you don’t know what you’re going to get, it’s difficult…there’s a lot more tied into [weight stigma from family]. (Participant H)

Comments are not the only type of weight stigma that participants experienced, however. Some participants explained that family members acted upon their comments, which were perceived as weight stigma by participants. For example, one participant’s mother took the initiative to enroll her in WW at a young age, while another participant shared that her mother had taken her to a weight clinic after assuming that her daughter was overweight when she was not:

My mom had [taken] me to this, like fitness health place and it was because she believed I was overweight. And this was sophomore year, and just to put in perspective, I like, I think this was probably when I was at my, like skinniest at a healthy level, which is probably 155-ish. (Participant H)
Importantly, experiences and comments from family members were most often mentioned to have the greatest impact on participants, both mentally/emotionally and related to health behaviors (n=4). Multiple participants (n=3) indicated that previously mentioned comments and actions were meant with positive intent, as a way to reduce their weight and mitigate the potential for experiencing weight stigma for the individual in the future.

I believe it all stems from this weight stigma, like she didn’t want me to experience some of the things that she had experienced or had seen other people experience. She didn’t want that for me. The way in which she was trying to solve that problem was not correct. (Participant C)

Life-stages emerged as a potentially important consideration when understanding weight stigma experiences; a number of participants (n=6) explained that most of their weight stigma experiences from peers and family occurred when they were younger and were less prevalent in their adult life. A potential explanation for this was the shifting acceptability of different body sizes with age, or altered/lowered weight status reducing the amount of occurring experiences:

Impacts of Weight Stigma on Physical Activity and Health Behaviors

While it was commonly reported that participants felt that weight stigma comments and actions were well intended to mean no harm to the participant or to help them experience less stigma in the future (n=3), they often still resulted in negative health behaviors, potentially as a coping mechanism. Negative impacts as a result of stigmatizing experiences included engaging in disordered eating habits (n=4) and
increased physical activity levels (n=5), but often to the extreme in ways which were not always sustainable due to their excessive and non-habit-forming nature.

The negatives have been the drivers of the behavior…instead of the positive reinforcement. So it’s like the more negative the comments, the more extreme the behavior would be…then, what happens is, you actually go into a spiral where you gain back more than what you started with, because it’s all unhealthy habits. So yes, it’s just a cycle. (Participant A)

Importantly, four participants discussed that they experienced more positive treatment and praise from others after they had lost weight further adding to the idea of an existing ideal body shape or size in which they did not achieve prior to weight loss.

6.3.3 Organizational Level

Negative Fitness Center Experiences/Reasons for Avoidance

Although most participants currently utilize fitness spaces for physical activity, common dislikes about fitness centers and spaces were being singled out in classes or feeling a lack of inclusivity or belonging based on looks (n=5), and a reason for avoiding these spaces was because some participants felt that they needed to look a certain way or have a certain level of fitness or knowledge before even going to the gym (n=5).

…I’s just like ‘This is not for me, this is for people who know what they’re doing. This is for people who are already fit.’ I had that mentality where I said I need to be fit to even go to a gym…like why do I have to lose weight before I go to the gym, isn’t that the point? (Participant D)

Fitness Center Stigma
Experiencing weight stigma within a fitness space was common among the current sample (n=7), and it was even noted by some participants (n=3) that they felt these spaces were generally unwelcoming and lacked a sense of community and support. Some participants (n=3) noted that they were subject to looks, staring, and judgement about why they were in the space due to their weight or body size. However, most of the participants expressed that fitness center stigma presented itself as people (trainers, coaches, and other members) making performance assumptions (assuming lack of ability or knowledge and being surprised when they can perform exercises or workouts) (n=5), or that they were there for weight loss purposes (n=1):

[The personal trainer] wasn’t necessarily rude or anything, but you could tell like she didn’t expect me to be able to do the workouts or know how to use the equipment, and like I said, she wasn’t like overtly rude, but it was just uncomfortable. You could tell she was kind of like, ‘What are you doing here?’

( Participant E)

The only participant that reported having never experienced weight stigma in a fitness space, had a BMI of 19.6, and reported that the weight stigma she has experienced in her life was due to low weight instead of high, unlike the other participants.

Fitness Center Stigma Impacts on Physical Activity

Negative attitudes toward fitness spaces and changes in physical activity behavior were commonly a result of experiencing weight stigma in fitness spaces. Over half of the participants reported that weight stigma which specifically occurred in fitness spaces drove them to either quit and choose different fitness spaces (n=5) or avoiding certain types of physical activity as a result (n=3) (i.e., avoiding high intensity). Only one person
specifically stated that she increased her level of activity and gym use as a result of fitness center stigma. Additionally, a couple participants mentioned that they choose to wear certain clothing in the space because of these negative experiences and subsequent body image (n=2) that covered body parts in which participants were self-conscious of.

…there are places that I never went back to because I felt so uncomfortable…

(Participant B)

…anything that was like hard movements where maybe my chest was moving or maybe there is more of me moving around, I would avoid those in the other places because you can tell when people are probably looking at you. (Participant A)

Even when you go to the gym, you think about the stigma, ‘I don’t want that roll to be showing’. I’m spending more time trying to figure out what I’m going to wear to avoid certain triggers. (Participant A)

6.3.4 Community Level

Social Norms (Media Influences)

Social norms were mentioned as a significant driver as the reason others make rude comments, as well as the reason for negative self and body-image views when the participant does not match the “ideal body image” portrayed within social media, advertisements, or within the gym or fitness spaces. One of the most prominent ways in which these social norms were said to be very apparent are through social media platforms (n=5) where the promotion of the ideal body is commonly portrayed:

Instagram and photoshop has made it tremendously impossible to fit anyone’s standards. (Participant G)
It was discouraging that everyone at their gym had to be skinny, had to be already fit…because otherwise they weren’t going to post you to their social media, they weren’t going to advertise… (Participant D)

Social Norms (Racial Influences)

Racial and cultural norms were discussed by two separate participants; one making a point that as a Black/African American child, her parents’ views on a healthy weight may have differed from others which may have driven some of the negative weight stigma behaviors from peers and others when she was younger. The other participant mentioned the differences between her family culture and American culture; her family negatively viewed her engagement in physical activity out of fear of her body changing and not fitting their culture’s norm of an ideal body shape, where American culture praised the engagement in physical activity:

I also think there was a race part to it. I went to a predominantly white school and a predominantly white neighborhood where it wasn’t foreign where I was the only black kid in the classroom. So it was just like the way that my parents saw as healthy for a welfare child, they saw as overweight, didn’t fit the mold of which they grew up. (Participant G)

6.3.5 Systems/Policy Level

Weight Stigma Reduction in FC Spaces

The interview concluded by asking participants what they think fitness spaces and gyms could do to reduce weight stigma experiences and negative feelings toward people that are of different sizes. Three main themes emerged from the data: 1) include more body diversity and inclusivity in the space, classes, and advertisements (n=5), 2) provide
more modifications and maybe a free introductory class to basic exercises and not assume that everyone knows how to or can perform all exercises (n=4), 3) and approach clients and members with an individualized approach and recognize that everyone has a different history and different goals (n=3).

I think imaging is really powerful for people, you know, seeing larger bodies like in advertisements or spaces, seeing that you can participate or having like larger health coaches, or people in a facility that so they can see, ‘Oh we accept different body types.’ I think oftentimes you see just the one body type…(Participant E) …something I think would help people is having a free intro class…I feel like that’s a problem for a lot of people who…are really worried about what they’ll look like, especially more overweight people of like they don’t want to start because they don’t know how to use anything. (Participant C)

Individualized and integrative…meeting people where we’re at, not where we want them to be, and have a smaller, even really smart goals… (Participant A)

6.4 Discussion

The results of the current study provide evidence that perceived weight stigma can impact people through all domains of the Social Ecological Model - from influential factors that elicit weight stigma experiences to their consequential impacts. Results of the current study revealed that weight stigma experiences, including those occurring specifically in fitness spaces, are common and support current prevalence data in larger samples (Himmelstein et al., 2017), and other qualitative studies (Arguelles et al., 2021; Lewis et al., 2011; Pickett & Cunnhingham, 2018). Participants in the current study suggest that weight stigma is mainly driven by the more community-level factors of
social norms that have created an ideal body size and shape through social media, advertisements, and lack of body diversity in fitness spaces. While weight stigma experiences are common, our data endorse the fact that these experiences can manifest themselves differently regarding physical activity attitudes and behaviors, potentially attributed to the type and source of stigma experienced within different levels of the Social Ecological Model. Some participants perceived that they increased physical activity as a result of interpersonal level experiences during childhood from friends or family members, while organizational level experiences specific to fitness spaces as an adult motivated some participants to avoid physical activity or at least alter the location in which they engaged.

Interpersonal experiences from peers and family members were some of the worst culprits of weight stigmatizing behaviors toward participants, which support previous literature in adults with obesity and a large diverse sample (Pearl et al., 2018; Sutin & Terracciano, 2017). These experiences were noted to most often occur during childhood and many participants felt that it was during this time that they were most impacted by these experiences, which resulted in negative mental and emotional health outcomes and engaging in negative weight-control behaviors at that time (i.e., extreme levels of physical activity and disordered eating behaviors). These results differ to quantitative findings of Himmelstein et al. (2018) in a sample of adult men and women who found that weight stigma experiences most often resulted in healthy lifestyle behaviors such as eating healthy and exercising (Himmelstein et al., 2018). However, it’s plausible that the differences may be due to the lack of context and extent of these behaviors and timing (e.g., how much physical activity participants engaged in, or being affected during
childhood vs. adulthood). On the other hand, Puhl et al. (2017) used longitudinal data from Project EAT to identify the long-term impacts of weight-based teasing experienced during childhood and adolescence. They found that not only did these experiences predict greater adverse eating outcomes and unhealthy weight control behaviors in women, but they also predicted higher BMI and obesity 15 years later (Puhl, Wall, et al., 2017). In the current sample, these experiences in childhood were mentioned to have “stuck with” participants on an individual level as internalized weight stigma through adulthood, leading to a fear of experiencing weight stigma in certain situations. These findings in combination with previously mentioned quantitative data suggest that the timing in which experiences occur may play a role in the impact that they have on participants.

Although peers and family provided the most weight stigma instances, seven of the eight participants had also been subject to weight stigma specifically within fitness spaces. Participants made it clear that these negative encounters and feelings of judgement had an impact on their views of and sense of belonging in these spaces. For some, the resulting internalization of the weight stigma and negative body-image on an individual level generated feelings of discomfort or self-consciousness in the fitness space which drove participants to dress in certain clothing to hide their body, or even avoid specific exercises or activities altogether. These findings align with a review by Sabiston et al. (2018) which concluded that negative body image was linked to lower levels of physical activity in quantitative studies and mentioned as a barrier in qualitative studies (Sabiston et al., 2018). To the best of our knowledge, only three other studies have qualitatively explored fitness center stigma and physical activity behavior; one among a large sample of adults that were obese (n=141) (Lewis et al., 2011), another
sample only included instructors of fat-inclusive yoga classes who self-identified as fat or overweight (n=9) (Pickett & Cunnhingham, 2018), and the third among adults that recently had undergone metabolic/bariatric surgery (n=23) (Feig et al., 2022). These studies have found similar evidence that weight stigma experiences negatively impacted mental and emotional health and self-image and decreased motivation to be active in public spaces due to those judgements (Lewis et al., 2011; Pickett & Cunnhingham, 2018). Further, the fear of judgement specifically during physical activity was a driver of negative affect and a barrier associated with physical activity; some participants mentioned avoiding certain exercises, while some expressed general embarrassment for how they look while engaging in physical activity (Feig et al., 2022). Although not aimed specifically at exploring physical activity behavior, findings by Arguelles et al. (2021) also support those that weight stigma experiences in fitness space drove participants to feel negatively about their effort and increased their body self-devaluation and resulted in the fear of more experiences such as staring and judgement in the spaces.

Interestingly, the majority of the participants in this sample currently engage in physical activity and utilize a fitness space (except for one), which support quantitative findings by Schvey et al. (2017). Among their sample of adults with overweight and obesity, experiences of fitness center stigma did not significantly impact gym use, but it was associated with negative attitudes toward the gym, self-consciousness as an impediment to attending the space, and a greater preference for a shame-free environment. The current findings indicate that although fitness center stigma may negatively impact individual level mental and emotional health and body-image, as well as drive fear of judgement in these spaces, it may ultimately not be enough to drive
people away from physical activity and fitness spaces altogether but rather produce a specific set of barriers to engaging in physical activity. Those that are being stigmatized may feel inclined to seek out different spaces or opportunities that are more welcoming to their body size or shape. Quantitative studies have previously found mixed evidence regarding the impact of weight stigma on physical activity behaviors; some evidence supports that weight stigma negatively impacts physical activity (Jackson & Steptoe, 2017) or increases exercise avoidance motivation (Han et al., 2018; Vartanian & Shaprow, 2008), while a sample of women with overweight and obesity actually increased physical activity behaviors as a result (Pearl et al., 2015). The contextual nature as well as the consideration of multi-level factors in the current study may help to discern why and how differences in physical activity outcomes exist in previous literature.

Data currently suggest that weight stigma can be felt among people of all weight statuses but is more common among those of higher weight statuses (Himmelstein et al., 2017; Puhl et al., 2018; Spahlholz et al., 2016). However, the current findings revealed specific instances in which one participant experienced comments about her weight for being deemed “too skinny”. Although only reported by one participant, these experiences still resulted in negative health behaviors, body-image, and use of activity spaces, and reveal that all weight stigma experiences, no matter what size the victim is, can impact people in ways that health behaviors may be compromised. This finding is important to highlight because much of the focus with weight stigma is about stigmatizing behaviors for individuals with overweight and obesity. However, this participant highlights how weight stigma may affect those who are at the other end of the weight spectrum.
Despite some views that stigma and comments toward individuals are doing them a favor and may help elicit positive behavior change (Lewis et al., 2011), other literature disputes these claims and reveal quite the opposite; that they are still detrimental in negatively impacting health behaviors and may even elicit weight gain (Brewis, 2014; Jackson et al., 2014). Our data support the later claims, where many participants believe some comments were made with good intention toward the individual, either out of protection for the person (i.e., so that they didn’t experience similar stigmatizing situations by others in the future), or as negative assumptions that were well-intentioned compliments (i.e., being surprised by and praising their ability and activity level). Previous quantitative literature has also identified negative assumptions (e.g., having low expectations based on weight), to be one of the most common stigmatizing situations in a sample of adults (Puhl & Brownell, 2006). However, similar to qualitative responses found by Pickett & Cunningham (2018), participants expressed that these situations still resulted in negative impacts on their body-image, mental health, physical health behaviors, and future fear of experiencing weight stigma from others which suggests that the use of weight stigma as motivation for physical activity should be prevented, especially in venues in which adults often choose to engage in physical activity, like fitness centers.

Although the current study supports that weight stigma is clearly evident in fitness spaces and concerning alters participant view of these spaces, and sometimes their choice to utilize these spaces, the participants of the current study offered advice on ways in which they believed weight stigma could be reduced at a systems/policy level in fitness centers to make them a more welcoming space for all body types. The four common ways
in which participants recommended for fitness spaces were to advertise and actually enroll more body diversity in the space, provide more modifications and reduce the assumptions that everyone should/could be at the same level for activity, consider using individualized approaches for all clients and members to understand their background with physical activity and weight related experiences, and lastly to celebrate and appreciate all effort that people are putting in in these spaces. Creating more body inclusive spaces and addressing some of these factors within fitness spaces and gyms may encourage more use among these spaces among marginalized populations such as those with overweight or obesity that are most subject to weight stigma in fitness spaces. A review by Pickett & Cunningham (2017) outlines specific ways for how to create inclusive spaces which include committeeeman to inclusion, adapting the physical space, inclusive language, providing a sense of community, and empowering members to develop participant autonomy (Pickett & Cunnhingham, 2017).

A strength of the current study is that the qualitative nature provides a significant contribution to the literature by adding richer and more detailed context about participants’ actual experiences, which are unaccounted for in quantitative data collection. Further, not only recruiting participants with an overweight or obese weight status allowed for a more well-rounded understanding of weight stigma impacts.

Several limitations of the current study should also be considered. The all-women sample reduces the generalizability to other genders that may experience weight stigma. Additionally, since participants had to opt in to being a participant in the qualitative portion of the study, the selected participants may have been more biased to wanting to discuss these experiences and been more aware of them than others may typically be.
Lastly, specific gyms or fitness spaces were not discussed or addressed. Future studies could inquire about specific gyms or fitness spaces to gather a deeper understanding for which types of organizations may be the worst offenders of weight stigmatizing spaces.

6.5 Conclusion

The findings of the current study further develop a foundation for friends, family, trainers, coaches, and fitness organizations to be more aware of their impact of stigmatizing comments and actions toward individuals on not only physical activity behaviors, but also mental and emotional health outcomes that tend to be with them long term. By addressing weight stigma in fitness spaces, people of all weight statuses may begin to feel more included and have less fear of judgements from others based on their weight and have to work through less barriers for engaging in a health promoting behavior. The tangible ways in which participants suggested reducing weight stigma in fitness spaces provides a starting point at an organizational level for fitness spaces to begin making changes to developing more inclusive spaces.
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<th>Gender</th>
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<th>Race/Ethnicity</th>
<th>BMI (kg/m²)</th>
<th>Education</th>
<th>Weekly MVPA (hrs)</th>
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*NOTE: AA=African American; HS=high school*
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<td>Utilize gyms</td>
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<td>Group exercise classes</td>
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<td>Cardiovascular exercise</td>
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<td>Exercise with a trainer</td>
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<td>Skill level / intensity level</td>
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<td>Access / financial barriers</td>
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<td>Time / schedule</td>
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<td>Family</td>
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<td>Reduced experiences with weight loss</td>
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<td>Self-perceptions</td>
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APPENDIX A. Semi-Structured interview questions.

| Individual Level / Current Physical Activity | 1. What do you currently do for physical activity?  
| | a. How often do you do these activities?  
| | b. Where do you usually engage in [physical activities listed above]?  
| | c. Who do you typically do these activities with?  
| | d. Are there any activities that you currently do that you especially like or don’t like? Why?  
| | 2. Are there physical activities you currently avoid doing altogether? If yes, why?  
| | 3. Have you always been physically active or non-active as an adult?  
| | a. Why do you think that is (i.e., stemming from past behaviors, or a specific moment/event)? |
| Interpersonal Level | 1. Have you ever experienced weight stigma before, outside of a fitness space or within your daily life? (i.e., comments, staring, not fitting into seats, discrimination, etc.)  
| | a. If you’re comfortable, can you share more about those experiences?  
| | 2. Thinking back to these experiences, what impact have they had on your physical activity behavior?  
| | a. How have they impacted your motivation or avoidance of physical activity? OR: have they led you to becoming more physically active?  
| | 3. How do you think these weight stigma experiences have impacted other parts of your life (confidence in yourself, changing dietary habits, etc.)?  
| | 4. Is there a certain type of weight stigma (from family, friends, strangers, romantic partner, location, etc.) that you think had the greatest impact on you personally?  
| | a. Why is that/how so?  
| | b. What about the greatest impact significantly on your physical activity behaviors? |
| Organizational Level | 4. Tell me more about your overall experience within adulthood utilizing fitness centers to be physically active…  
| | a. Do you currently utilize them?  
| | b. Have you always utilized them?  
| | c. Have you always enjoyed your experiences?  
| | d. In what ways do you like, or have you liked to utilize them (i.e., group exercise, on your own, weightlifting, etc.)?  
| | a. IF NO: what are some of the reasons that you don’t enjoy these spaces?  
| | 5. Have you ever experienced weight stigma specifically within a fitness space? This can include comments, |
starting, not fitting into certain equipment, general discrimination, etc.
   a. Are you comfortable expanding on those experiences?
   b. How did these experiences make you feel?
   c. Has that changed the way that you utilize fitness spaces like that one?
   d. Have you ever seen or heard weight stigmatizing experiences occurring in these spaces to others?
   e. IF NO: do you think this had to do with the type of fitness space utilized?
   f. IF NO: have you ever felt a fear of being stigmatized in these spaces?

6. Thinking back to these experiences, what impact did they have on your physical activity behavior?
   a. How have they impacted your motivation or avoidance of physical activity? OR: have they led you to becoming more physically active?
   b. How have they impacted your choice to utilize certain spaces?
   c. How have they impacted your confidence in knowing how to utilize these spaces?

7. What things do you think your gym or fitness center can do to reduce weight stigma and provide more positive experiences for you and all people in the space?

| Community Level | 1. How do you think social norms have played a role in weight stigma that people have felt or expressed toward you or others?
| Community Level |   a. What about in a fitness setting specifically?
| Community Level |   b. Where do you think these social norms come from?
| Community Level | 2. How do you think these social norms have influenced how you think about your weight and other people’s weight?
| Structure / Systems Level | 1. What policies or cultures exist in fitness centers you’ve visited that may be weight stigmatizing (fitness setting design, equipment, class offerings, inclusivity of all body shapes and sizes)?
| Structure / Systems Level | 2. How might fitness centers change to reduce the feelings of weight stigma felt by fitness center users?
Chapter 7. Conclusion

The current dissertation aimed to understand if and how different types of weight stigma, including those specific to fitness centers, may be associated with physical activity (PA) behavior for adults through an ecological approach. First, cross-sectional survey data were collected on participants to quantify their levels of experienced weight stigma (EWS), internalized weight stigma (IWS), fitness center stigma, physical activity levels, and psychosocial variables. Second, individual semi-structured qualitative interviews were conducted in a subsample of participants to provide deeper and richer context to those weight stigma experiences and fitness center stigma and how participants feel these occurrences have impacted their PA behavior.

Before discussing the results of each specific aim of the dissertation project, it is important to note minor changes that were made from the original proposal aims and methodology based on the sample of participants, specific data that were reported, as well as the need to create more focused and specific purposes for each manuscript. First, recruiting a diverse sample of adults residing within the Twin Cities metro area was proposed; however, as recruitment efforts were under way, a significant lack of diversity emerged within the data. Therefore, the requirement for residing within the Twin Cities metro area was removed in order to recruit more non-white participants within specific groups outside of the Twin Cities. It was more important to recruit a diverse sample regardless of their place of residence. Second, although a wider physical range was accepted for recruitment purposes, the diversity of the final sample was not enough to claim diversity, so that verbiage has been updated accordingly throughout the proposed methods and study chapters to properly reflect the true sample that was collected. Third,
the exploration of participant preferences, satisfaction, and barriers to engaging in activity related to fitness settings has been removed from Aim 1 in order to keep the focus of the aim on the direct association between weight stigma and physical activity. Fourth, the use of the perceived physical competence variable has been removed from Aim 2 due to lack of clarity of the question in Qualtrics, resulting in data that could not be used for analysis. Further, this psychosocial variable was the least impactful discussed in Chapter 2 (Literature Review) of this dissertation, resulting in a change that would not significantly change the Aim. Fifth, the decision was made to analyze self-esteem as a mediator rather than moderator between weight stigma and PA. Using self-esteem as a mediator still fits within the nature of the variable and definition of mediation, while also refining the scope of the manuscript to keep the focus on mediation rather than both techniques. All of the mentioned changes have been reflected in the current Chapter 3 (Methods) of the dissertation document, as well as the described aims and hypotheses in Chapter 1 (Introduction). The following conclusions for each aim of the dissertation project address the updated aims and hypotheses based on the previously mentioned changes to the original proposal.

Specific aim 1: The hypotheses attached to specific aim 1 were tested using MANOVA tests to determine the differences in EWS, IWS, and fitness center stigma between sociodemographic groups, and regression analyses to determine the direct relationships between each weight stigma variable, and PA (total PA and MVPA). The results and answers were provided in dissertation Chapter 4 (Study 1). Study findings provided evidence that the prevalence of EWS, IWS, and fitness center stigma were comparable in the current sample to previously reported findings, and different types of
weight stigma may differentially be associated with PA levels. Contrary to the study hypothesis, in a sample of weight diverse adults, experienced weight stigma may be associated with slightly greater total PA and MVPA levels among adults, while neither internalized or fitness center stigma were significantly associated at all.

**Specific aim 2:** They hypotheses attached to specific aim 2 were tested by mediation analyses using the Preacher and Hayes technique to determine the mediating roles of different psychosocial characteristics (self-esteem, self-efficacy for exercise, and exercise avoidance motivation) between each weight stigma variable and the outcome of MVPA. The results and answers were provided in dissertation Chapter 5 (Study 2). Study findings provide evidence that levels of psychological characteristics significantly differ by level of EWS, IWS, and fitness center stigma. However, contrary to the study hypothesis, self-efficacy for exercise was the only psychosocial variable to play a significant mediating role specifically between IWS and MVPA, and fitness center stigma and MVPA. It did not mediate the relationship between EWS and MVPA, and no other psychosocial variables provided evidence of a mediating role between any type of weight stigma and MVPA outcomes.

**Specific aim 3:** They hypotheses attached to specific aim 3 were tested by using a phenomenological approach to qualitative data collection to describe the phenomena of weight stigma and its association with PA behavior from a Social Ecological Approach. The results and answers were provided in dissertation Chapter 6 (Study 3). Study findings provide evidence that weight stigma has a multi-level impact from a Social Ecological Model perspective and may manifest itself differently based on type or context of the weight stigma and how it may be perceived to impact PA behavior. Additionally,
although fitness center stigma is common, it may only produce more barriers to engaging in PA rather than driving people away from PA altogether.

These findings provide a foundation for future public health officials, weight management interventionists, and clinical staff addressing overweight and obesity to offer a more well-rounded approach to weight management by addressing weight stigma as a potential hindrance on self-efficacy for exercise and ultimately PA behavior. Additionally, by understanding the context related to weight stigma experiences, providers will be able to utilize a more individualize approach for mitigating or treating the potential impact it has had on the client to improve obesity treatment outcomes. Specifically, within fitness spaces, by utilizing more inclusive advertisements, classes, and patrons, providing better modifications for people of varying body sizes, and taking an individualized approach for each client or participants, people of all weight statuses may begin to feel more comfortable in these spaces and reduce the barriers they face for engaging in PA. In conclusion, the results from the current dissertation suggest that context matters for addressing weight stigma as a factor associated with PA behaviors and may be worth addressing for obesity and weight management intervention to promote healthy PA habits.
Chapter 8. References


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https://doi.org/10.1097/00006199-200005000-00007


## Chapter 9. Appendix

### APPENDIX A. Measurement Scales and Items Included in the Main Survey

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight Stigma</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stigmatizing Situations Inventory – Brief (SSI-B) (Vartanian, 2015)</td>
<td>Please indicate whether, and how often, each of these situations happens to you.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Being singled out as a child by a teacher, school nurse, etc., because of your weight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Being stared at in public.</td>
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<tr>
<td></td>
<td>3. Children loudly making comments about your weight to others.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Having a doctor recommend a diet, even if you do not come in to discuss weight loss.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Having a romantic partner exploit you, because she or he assumed you were ‘desperate’ and would put up with it.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Overhearing other people making rude remarks about you in public.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Not being hired because of your weight, shape, or size.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. Having family members feel embarrassed by you or ashamed of you.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Having people assume you overeat or binge eat because you are overweight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Being glared at or harassed by bus passengers for taking up ‘too much’ room.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 (never)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (once in your life)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (several times in your life)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (about once a year)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (several times per year)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 (about once a month)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 (several times per month)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (about once a week)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 (several times per week)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 (daily)</td>
<td></td>
</tr>
<tr>
<td>Modified Weight Bias Internalization Scale (WBIS-M) (Pearl, 2014)</td>
<td>1. Because of my weight, I feel that I am just as competent as anyone*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. I am less attractive than most other people because of my weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I feel anxious about my weight because of what people might think of me</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. I wish I could drastically change my weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Whenever I think a lot about my weight, I feel depressed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. I hate myself for my weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. My weight is a major way that I judge my value as a person</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. I don’t feel that I deserve to have a really fulfilling social life, because of my weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (strongly disagree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (disagree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (somewhat disagree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (neutral)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 (somewhat agree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 (agree)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (strongly agree)</td>
<td></td>
</tr>
</tbody>
</table>

Cronbach’s α=0.90

Cronbach’s α=0.94
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>I am OK being the weight that I am*</td>
</tr>
<tr>
<td></td>
<td>10. Because of my weight, I don’t feel like my true self</td>
</tr>
<tr>
<td></td>
<td>11. Because of my weight, I don’t understand how anyone attractive would want to date me</td>
</tr>
<tr>
<td></td>
<td>*reverse coded</td>
</tr>
</tbody>
</table>

### Physical Activity and Fitness Facility Use

**Godin/Shephard Leisure Time Exercise Questionnaire (Godin, 1985)**

- **Considering a 7-day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time?**
  - a. Strenuous exercise (heart beats rapidly) (i.e. running, jogging, hockey, football, …..)
  - b. Moderate exercise (not exhausting) (i.e. fast walking, baseball, tennis, easy bicycling…)
  - c. Mild exercise (minimal effort) (i.e. yoga, archery, fishing from river bank…….)

- **Two-week test-retest reliability coefficient = 0.74**

### Gym Survey (Schvey, 2017)

1. I prefer to exercise elsewhere^a^  
2. Gym staff members (or personal trainers) have commented negatively on my weight^c^  
3. People stare or give me dirty looks at my gym^c^  
4. I am satisfied with my gym^b,^  
5. I feel comfortable going to my gym^b,*  
6. I feel negatively judged at my gym^c^  
7. I feel self-conscious at my gym^a^  
8. The other members are all in better shape than I am^a^  
9. The equipment (e.g., stationary bicycle, elliptical machine) at my gym feels too small for me^c^  
10. I prefer not to exercise at my gym^b^  
11. I enjoy going to my gym^b,d^  
12. I dread going to my gym^b^  
13. I feel embarrassed by my weight at my gym^a^  

- ^a^Self-consciousness at the gym  
- ^b^Negative attitudes towards the gym  
- ^c^Stigma at the gym  
- *Reverse scored

- ^a^Cronbach’s α=0.79  
- ^b^Cronbach’s α=0.88  
- ^c^Cronbach’s α=0.83  
- Full scale Cronbach’s α=0.91
### Additional fitness facility related questions *(Schvey, 2017)*

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Answer Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you currently belong to a gym? If yes…</td>
<td><em>Answer options vary by question but have been noted in the survey shared with researcher by Schvey et al. (2017).</em></td>
</tr>
<tr>
<td>2</td>
<td>For how long have you been a member of the gym listed above?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>How likely are you to renew your membership at this gym?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>When is the last time you visited the fitness facility?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>How often do you typically go to the gym?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Have you been a member of a fitness facility in the past?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. How long ago were you a member?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For how long were you a member at this gym?</td>
<td></td>
</tr>
</tbody>
</table>

### Psychosocial Factors

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Efficacy for Exercise Scale (SEE)</strong> (Resnick &amp; Jenkins, 2000)</td>
<td>How confident are you right now that you could exercise three times per week for 20 minutes if:</td>
<td>0 (not confident) 1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
<td>1. The weather was bothering you</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. You were bored by the program or activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. You felt pain when exercising</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. You had to exercise alone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. You did not enjoy it</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. You were too busy with other activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. You felt tired</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. You felt stressed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. You felt depressed</td>
<td></td>
</tr>
<tr>
<td><strong>Exercise Avoidance Motivation (EAM)</strong> (Vartanian, 2008)</td>
<td>Using the following scale, please indicate the extent to which each response is true of you in those circumstances:</td>
<td>1 (not at all true) 2 3 4 5 6 7 (completely true)</td>
</tr>
<tr>
<td></td>
<td>1. I avoid looking in the mirror so that I don’t have to think about my weight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. I feel uncomfortable going to a gym where there are a lot of mirrors.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I avoid going out in public places because I am afraid that people will make comments about my size.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. I avoid going to the gym when I know there will be a lot of thin people there.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. I think to myself, ‘I can’t lose weight, and so I will not try.’</td>
<td></td>
</tr>
</tbody>
</table>

Cronbach’s $\alpha = 0.92$
6. If I go to the gym, there are some exercises or pieces of equipment that I avoid.
7. I feel unmotivated to try to lose weight.
8. I am too embarrassed to participate in physical activity in public places (e.g. gym or fitness club; walking outside in public; swimming in public, etc.).

<table>
<thead>
<tr>
<th>Rosenberg Self-Esteem Scale (Rosenberg, 1965)</th>
<th>Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On the whole, I am satisfied with myself.</td>
<td></td>
</tr>
<tr>
<td>2. At times I think I am no good at all.*</td>
<td></td>
</tr>
<tr>
<td>3. I feel that I have a number of good qualities.</td>
<td></td>
</tr>
<tr>
<td>4. I am able to do things as well as most other people.</td>
<td></td>
</tr>
<tr>
<td>5. I feel I do not have much to be proud of.*</td>
<td></td>
</tr>
<tr>
<td>6. I certainly feel useless at times.*</td>
<td></td>
</tr>
<tr>
<td>7. I feel that I’m a person of worth.</td>
<td></td>
</tr>
<tr>
<td>8. I wish I could have more respect for myself.*</td>
<td></td>
</tr>
<tr>
<td>9. All in all, I am inclined to think that I am a failure.*</td>
<td></td>
</tr>
<tr>
<td>10. I take a positive attitude toward myself.</td>
<td></td>
</tr>
<tr>
<td>9. *Reverse coded</td>
<td></td>
</tr>
</tbody>
</table>

1 (strongly agree)  
2 (agree)  
3 (disagree)  
4 (strongly disagree).  

2-week test-retest reliability correlations = 0.85
APPENDIX B. Zoom Protocol for Creating and Holding Informal Participant Interviews

Before the meeting:

1. Create a google calendar meeting for said interview
2. Go to zoom.umn.edu and click “log in”
   a. Enter x500 and go to meetings tab
3. Find the FG meeting event and click “edit”
4. Meeting security, video, and audio settings should be set as below:

   ![Security Settings](image1)

   5. Meeting options should be set as:

   ![Meeting Options](image2)
6. Add assistant moderator as alternative host

7. Click “SAVE”

8. Click on “settings” on the far-left navigation bar
   a. At the top of the page, toggle to “recordings”

9. Save the following settings:

Upon the start of the meeting:

1. Sign into zoom.umn.edu
   a. VERY important to ensure that you will join as host

2. Under meetings tab, find the FG event and click “start”.

3. Upon entering the room:
   a. Ensure the meeting is already recording (top left corner)

4. Once all participants have joined, click on the security icon (bottom of screen) and choose “lock meeting”
5. After meeting is over, click “end meeting for all” and leave the zoom room.

6. The cloud recording will be available within ~30 minutes, and a transcript of the meeting will be auto generated within the hour.