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# Investigating the relationship between parental weight stigma and weight-related parenting practices

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INVESTIGATING THE RELATIONSHIP BETWEEN PARENTAL WEIGHT STIGMA AND WEIGHT-RELATED PARENTING PRACTICES

by

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ABSTRACT

Reducing rates of overweight and obesity in children remains a prominent public health priority. Parents have been shown to be a major influence on their children's weight-related behaviors and weight status, but limited research has been devoted to exploring the factors that lead parents to select certain weight-related parenting practices over another. Past research has demonstrated a link between weight stigma (i.e., prejudicial attitudes or discriminatory behavior targeted at individuals who carry excess weight) and an individual's own weight-related behaviors and outcomes, but no study has examined how parental levels of weight stigma may affect weight-related parenting practices. The primary objective of this study was to examine the cross-sectional associations between parental levels of weight-based stigmatization with parental feeding practices and parental support for physical activity. Responses were collected on Amazon's Mechanical Turk website for $n$ = 406 parents who 1) had at least one child aged 5-10 and 2) perceived themselves to be overweight or obese. After adjusting for relevant covariates, parental weight stigma was shown to be significantly associated with restrictive feeding practices, verbal modeling of eating behaviors, unintentional modeling of eating behaviors, child unhealthy snack consumption, and explicit modeling of physical activity (all $ps < .05$). *A priori* exploratory mediation analysis identified concern about child weight as a significant mediator between weight stigma and parental feeding practices. A discussion of the potential limitations of this study, future directions of research, and implications of these findings are included.

PUBLIC ABSTRACT

Reducing rates of overweight and obesity in children remains a prominent public health priority. Parents have been shown to be a major influence on their child's weight, but limited research has been devoted to understanding why parents choose specific weight-related parenting behaviors over others. Previous studies have shown how weight stigma (i.e., prejudicial attitudes or discriminatory behavior targeted at individuals who carry excess weight) can affect an individual's own weight-related behaviors, but no study has examined how parental levels of weight stigma may affect weight-related parenting behaviors. The primary objective of this study was to examine the relationships between parental levels of weight stigma with feeding and physical activity-related parenting behaviors. Responses were collected on Amazon's Mechanical Turk website for parents who 1) had at least one child aged 5-10 and 2) perceived themselves to be overweight or obese. Results showed that even when taking sociodemographic factors into account, parents who reported higher levels of weight stigma were more likely to restrict their child's food intake and model healthy eating and physical activity behaviors for their children. Additionally, the study found evidence for the notion that concern about child weight may partially explain these relationships. Specifically, our data suggest that higher levels of weight stigma lead to higher levels of concern about their child's weight, and this heightened level of concern then leads to additional efforts to modify their child's food intake. A discussion of the potential limitations and implications of these findings is included.

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# CHAPTER 1: INVESTIGATING THE RELATIONSHIP BETWEEN PARENTAL WEIGHT STIGMA AND WEIGHT-RELATED PARENTING PRACTICES

Since the 1970's, rates of child overweight and obesity have more than tripled where today nearly one in three youths meet these criteria (Ogden, Carroll, Kit, & Flegal, 2014). As the number of new cases has slowed in recent years, many predicted the beginning of the end of the epidemic (Ludwig, 2018). More recent analysis suggests that this slowdown may have been overstated and that trends toward an increasing prevalence of obesity continue in many subgroups (Skinner, Ravanbakht, Skelton, Perrin, & Armstrong, 2018). Specifically, substantial racial and ethnic differences have been observed in which African American and Hispanic children experience significantly higher rates of obesity compared to their White and Asian peers (Skinner et al., 2018).

Continued efforts to address this issue are essential to maintain the short-term and long-term health of our children. Carrying excess weight in childhood has been associated with increased risk in developing a number of chronic health conditions including asthma, sleep apnea, bone and joint problems, type 2 diabetes, and heart disease (Boyer, Nelson, & Holub, 2015; Must & Strauss, 1999; Reilly, 2005). The impact of overweight and obesity has also been shown to be detrimental to psychological health, contributing to feelings of social isolation, depression, and lower self-esteem (Must & Strauss, 1999). Moreover, it has been theorized that these negative health outcomes, in conjunction with weight-based teasing, may lead to increased school absenteeism and poorer academic achievement (Krukowski et al., 2009; Taras & Potts-Datema, 2005). Beyond these short-term outcomes, untreated obesity can set children on a trajectory of increased health risk well into adulthood. For example, a systematic review and meta-analysis concluded obese children and adolescents were around five times more likely to be obese in adulthood compared to those who were not obese (Simmonds, Llewellyn, Owen, & Woolacott, 2016).

Based on the magnitude of this problem, it is not surprising that reducing rates of overweight and obesity in children constitutes a major public health priority (Office of Disease Prevention and Health Promotion [ODPHP], 2017). At first glance, addressing childhood obesity can appear to be quite simple. If excess weight is the direct result of consuming more energy from foods and beverages than is expended for healthy functioning and physical activity, the problem can be solved simply by limiting caloric intake and increasing physical activity. However, the dietary and physical activity behaviors of children are affected by many interdependent factors and addressing specific determinants remains challenging. Determinants of child obesity can be classified into three broad areas: genetic/biological, environmental, and psychological/social. A common thread across all domains is the influence that parents have on their child's weight. Beyond the obvious genetic contributions, parents (or other adult caretakers in the home) typically serve as the primary social influences on a child's physical, psychological, and social development and play a central role in shaping their eating and activity patterns (Sung-Chan, Sung, Zhao, & Brownson, 2013; White & Klein, 2008). Due to the breadth and depth of influence parents have on their children's behaviors, a substantial literature has formed examining which types of parenting behaviors increase risk for or protect against child overweight and obesity. While these findings represent an important first step in describing the links between parenting behaviors and child weight, substantially less research has been devoted to identifying factors that promote or inhibit these obesogenic parenting practices.

One underexplored factor that may influence how parents interact with their children in the domains of feeding and physical activity is weight stigma. Weight stigma can be defined as "the social devaluation and denigration of people perceived to carry excess weight and leads to prejudice, negative stereotyping and discrimination toward those people," (Tomiyama, 2014, p. 8). In their review on the health impacts of weight stigma, Puhl and Suh (2015) found significant associations between weight stigma, maladaptive eating behaviors (i.e., binge eating and increased food consumption), physical inactivity, and weight-related outcomes (e.g., weight gain, weight loss, and risks of developing obesity). While these associations have been consistently demonstrated in both adults and youth, researchers have almost exclusively focused on the direct effect that weight stigma has on an individual and their own health behaviors. The goal of this study is to extend this research by examining the potential intergenerational effects of weight stigma. Specifically, just as weight-based stigmatization has been shown to influence a person's own behaviors, we believe that experiences and attitudes associated with weight stigma may also impact weight-related parenting behaviors.

**Conceptualizing Weight Stigma**

Before we can draw the connection between weight stigma and weight-related parenting practices, it is important to understand exactly what stigma is and how it is theorized to influence behavior. The concept of stigmatization refers to the social devaluation and denigration of people that possess (or are believed to possess) an attribute or characteristic that conveys a social identity that is deemed to be undesirable within a given social context. Erving Goffman, an early pioneer of stigma research, stated, "Stigma is an attribute that extensively discredits an individual, reducing him or her from a whole and usual person to a tainted, discounted one." (Goffman, 1963, p. 3). While some scholars believe stigmatization has its origins in and serves evolutionary functions (Kurzban & Leary, 2001), what groups and what identifiable "marks" ultimately become stigmatized varies widely between cultures and thus is believed to be largely a socially constructed phenomenon. For example, stigmatizing marks may be linked to appearance (e.g., physical deformity), behaviors (e.g., illicit drug use), or group affiliation (e.g., occupation, ethnicity, or religious group) (Major & O'Brien, 2005). Stigmatization occurs when these marks become associated with negative stereotypes and evaluations that are widely known throughout a society and form the foundation for prejudice and discrimination (Abrams & Marques, 2004). Within Western society, stigmatization of individuals who carry excess weight is pervasive. Specifically, the overweight and obese are stereotyped as being lazy, weak-willed, unsuccessful, unintelligent, lacking self-discipline, having poor willpower, and being noncompliant with weight-loss treatment (Puhl & Brownell, 2001). These stereotypes give way to exclusion and discriminatory behaviors against overweight persons across a multitude of contexts including the workplace, health care facilities, educational institutions, the mass media, and even in close interpersonal relationships (Puhl & Heuer, 2010).

Social Identity Theory (Tajfel & Turner, 1979), and in particular, Social Identity Threat theories (Major & O'Brien, 2005; Steele, Spencer, & Aronson, 2002) provide a conceptual framework for detailing how stigma is believed to affect the stigmatized. Tajfel and Turner (1979) argue that individuals are inherently motivated to maintain a positive self-esteem or self-concept. Furthermore, a substantial portion of one's self-esteem is derived from their social identity (i.e., the aspect of the self that is based on their group membership(s)). Ultimately, our social identity can be thought of as the collection of all our group memberships (e.g., sex, age, race, ethnicity, social class, religion, and professional identity). Within our society, some group memberships are seen as valuable and are associated with positive stereotypes (e.g., being a doctor, Caucasian). In contrast, other memberships are associated with negative stereotypes and thus are devalued (e.g., having a mental illness, African-American). Social identity threat occurs when an individual encounters a situation where they feel they have been, or potentially could be, categorized based on a devalued identity and subsequently marginalized or discriminated against. In other words, social identity threat is not only activated in situations where discrimination is directly experienced, but can also occur when stigmatization is suspected, expected, or even anticipated (Steele et al., 2002). In summation, stigmatization refers to the act of devaluing a person based on their group membership while social identity threat denotes the psychological response of being stigmatized.

Although much of the research on social identity threat and stigma has been conducted within the domain of race, a substantial body of literature has applied these concepts to weight. To begin with, a social identity of being a "fat person" is created when an individual categorizes themselves or believes others will categorize them as being overweight or obese. Being classified as a member of this group elicits specific negative stereotypes which are pervasive within our society (Andreyeva, Puhl, & Brownell, 2008). The mechanism that connects these stereotypes to excess weight is the widespread belief that a person's weight is largely under their control (Crandall, 1994). This notion is supported by evidence demonstrating that obese individuals who are not perceived to be making efforts to reduce their weight are more negatively stereotyped compared to those believed to be exerting effort to control their weight (Black, Sokol, & Vartanian, 2014). As personal responsibility and control are highly prioritized in Western societies, these negative stereotypes are likely to be made salient across a number of contexts including academic/job performance, healthcare, and everyday social situations. Furthermore, as excess weight is typically believed to be the result of an individual's inability to regulate their diet and physical activity (Hunger, Major, Blodorn, & Miller, 2015), contexts where these behaviors are brought to the forefront (e.g., public restaurants and gyms) may increase the likelihood a social identity threat will be perceived.

Thus far, weight stigma and weight-based social identity threat have been discussed in terms of interpersonal experiences of actual, perceived, suspected, or expected discrimination. In addition to this conceptualization, substantial research has been devoted to understanding the process and effects associated with weight-bias internalization. Sometimes referred to as "self-stigma," weight bias internalization denotes the degree to which an individual accepts culturally shared negative weight-related attitudes and stereotypes about themselves. For example, the greater a person internalizes weight stigma, the more likely they are to believe they are lazy, indulgent, and lack self-control. According to a recent meta-analysis conducted by Pearl and Puhl (2018), weight bias internalization has been consistently linked with negative mental health outcomes including depression, anxiety, low self-esteem, poor body image, and disordered eating. Fewer studies have examined the relationship between weight bias internalization and physical health outcomes, but high weight bias internalization has been associated with greater severity of obesity, reduced motivation to engage in weight-related health behaviors, lower diet and exercise-related self-efficacy, and poorer adherence to weight-management interventions (Pearl & Puhl, 2018). Traditionally, weight bias internalization has been treated either as an independent measure of stigma or as a moderator of weight stigma experiences (Vartanian & Novak, 2011). A recent line of research has challenged this perspective and argues weight bias internalization is better conceptualized as a mediator between weight stigma experiences and outcomes. In other words, higher frequency of weight stigma experiences leads to more weight bias internalization which, in turn, affects psychological and behavioral outcomes. Studies have shown weight bias internalization to be a full or partial mediator between the frequency of stigma experiences and psychological well-being (Hayward, Vartanian, & Pinkus, 2018), disordered eating (O'Brien et al., 2016), and exercise behavior (Pearl, Puhl, & Dovidio, 2015). However, these findings should be met with some degree of caution as they are all cross-sectional in nature and thus are insufficient to establish a temporal ordering of variables. For this study, weight bias internalization was treated as an independent correlate of weight stigma and not a mediator. However, given the recent developments in the field described above, mediation models were also constructed within exploratory analyses.

## Parental Feeding Practices

The literature on how parents influence their children's feeding behavior is extensive and can be conceptualized as operating within several concentric spheres of influence (Figure 1). The outermost sphere consists of general parenting styles (i.e., preferred patterns of parent-child interactions) (Maccoby & Martin, 1983). According to this perspective, parenting styles are characterized across two dimensions: 1) responsiveness (i.e., degree of warmth and acceptance in response to their child's needs) and 2) demandingness (i.e., amount of control and restrictedness a parent exercises over their child's behavior). Contained within the sphere of parenting style is feeding style, which describes preferred patterns of parent-child interactions specific to the domain of feeding. Although there is some overlap between general parenting and feeding styles, research indicates many parents (over 66% in one sample) apply a feeding style specific to the feeding environment instead of their preferred general parenting style (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). The most proximal level of influence parents have on their children's feeding behaviors are the specific feeding practices they engage in. Feeding practices can be defined as the specific goal-directed behaviors utilized by parents to influence their children's eating. In reference to overweight and obesity, a common goal parents have is to promote consumption of healthy foods and decrease intake of unhealthy ones (Savage, Fisher, & Birch, 2007). While it is possible parental weight stigma may affect a child's weight status through general parenting or feeding style, due to the distal nature of these constructs, any effects are likely to be small and difficult to detect. As parenting practices represent the most proximal influence parents have on their child's feeding behaviors, any effects of weight stigma on parenting behaviors are likely to be most detectible at this level. Furthermore, if a relationship between these constructs does in fact exist, designing interventions to alter feeding practices, as opposed to general parenting, are likely to be both more practical and effective.

Although researchers have identified a number of feeding practices that have been shown to affect children's food intake and weight, this study will focus on the feeding practices of restriction and modeling. These specific feeding practices were selected due to their established links with child obesity and theorized potential to be influenced by weight-based stigmatization. Restrictive feeding (also referred to as controlling) practices can be defined as "intrusive, coercive and authoritarian feeding practices used to enforce constraints on children's access to and intake of foods" (Rollins, Savage, Fisher, & Birch, 2016, p. 327). Restrictive feeding is arguably the most researched feeding practice and has been studied using a range of methodologies within a variety of contexts (for a review see Shloim, Edelson, Martin, & Hetherington, 2015). According to three narrative reviews examining parental influence of feeding behaviors, restrictive feeding practices appear to be positively associated with child body mass index (BMI) (Hurley, Cross, & Hughes, 2011; Shloim et al., 2015; Thompson, 2010). It should be noted that the majority of studies are cross-sectional in nature and therefore are unable to establish temporal ordering. This is a very real concern, as parenting practices are not static, but rather are bidirectionally influenced by both parents and children and are constantly being updated depending on different environmental factors, parental attributes, and child characteristics. Although less common, several longitudinal studies have yielded mixed findings when exploring the reciprocal relationship between feeding practices and weight. For example, some prospective studies provide evidence for a positive relationship between restrictive feeding practices and child weight (Faith et al., 2004; Rodgers et al., 2013). Still others have found either no relationship (Gregory, Paxton, & Brozovic, 2010) or even a protective effect of parental restriction on child weight (Campbell et al., 2010). Moreover, other studies have shown a reverse effect where restrictive feeding practices appeared to be a response of parents to an unhealthy weight of their child as opposed to a cause of their children's overweight (Derks et al., 2017; Jansen et al., 2014). One explanation for these inconsistencies is that general parenting style and/or feeding style may moderate the impact of feeding practices on weight and future studies should consider the unique context in which restrictive feeding practices are employed (Gerards & Kremers, 2015). To account for this line of research, a measure of general parenting was included in exploratory analysis.

This study will also examine the effects of parental weight stigma on explicit modeling of healthy eating behaviors. Modeling, a central component of Social Cognitive Theory (Bandura, 1978), refers to a process of observational learning where children rely on adult demonstration, facilitation, and encouragement to learn about how to behave and the consequences of their choices and actions. Applied to the context of feeding, parents use modeling as a strategy to promote consumption of healthy foods, avoidance or limited consumption of unhealthy foods, and to provide evidence regarding the likely outcomes associated with engaging in these behaviors. According to several reviews on the environmental correlates of obesity-related dietary behaviors, parental modeling of healthy and unhealthy eating has consistently been linked with fruit, vegetable, and soda intake in children (De Craemer et al., 2012; Gerards & Kremers, 2015; Pearson, Biddle, & Gorely, 2009; van der Horst et al., 2006). Consumption of soda and other sugar sweetened beverages have been associated with weight gain, and reductions in their intake have been correlated with weight loss (Malik, Pan, Willett, & Hu, 2013). In contrast, although fruit and vegetable consumption has well established health benefits, large scale meta-analyses suggest intake has a minimal, if any, effect on adiposity in children (Ledoux, Hingle, & Baranowski, 2011). It is important to note that this finding does not suggest that a diet rich in fruits and vegetables cannot help children maintain a healthy weight, but rather, consumption of these foods, independent of other factors, does not seem to be associated with child weight status. Furthermore, many of these studies failed to distinguish between different types of fruits and vegetables consumed and thus may obfuscate any relationship to weight. For example, in a large scale prospective study of adults, increased intake of starchy vegetables, including corn, peas, and potatoes, was associated with weight gain while fruits and vegetables that were both higher in fiber and lower in glycemic load (e.g., broccoli, Brussel sprouts, cauliflower, apples, and pears) were associated with weight loss (Bertoia et al., 2015). Additionally, consuming fruits and vegetables high in flavonoids (a naturally occurring bioactive compound) has been prospectively associated with weight loss (Bertoia et al., 2016; Klinder et al., 2016). Combined, these studies provide evidence that consuming certain subgroups of fruits and vegetables may, in fact, be associated with healthier weights.

## Physical Activity-Related Parenting Practices

In addition to feeding practices, this study aims to investigate the effects of parental weight stigma on physical activity related parenting practices. Although the available evidence suggests that physical activity and exercise alone should not be considered an effective approach for treating obesity in youth (Kelley & Kelley, 2013), studies have shown higher levels of physical activity to be protective against child and adolescent obesity (see Jiménez-Pavón, Kelly, & Reilly, 2010 for a review). Furthermore, physical activity-related parenting practices have been associated with higher levels of child activity (see Yao & Rhodes, 2015 for a review). Thus, while it is important to differentiate the treatment efficacy and protective effects associated with physical activity in youth, we feel there is sufficient justification to categorize physical activity-related parenting practices as a sub factor of weight-related parenting practices.

Within this literature, parenting practices are typically viewed through the lens of social support behaviors that prompt, promote, facilitate, and encourage physical activity for their children. Beets, Cardinal, and Alderman (2010) conceptualized parental social support for physical activity as falling under two distinct forms - tangible and intangible types of social support (Figure 2). Tangible support consists of providing concrete resources to facilitate activity. Categories of tangible support include instrumental support (i.e., providing physical aid and services such as purchasing sporting equipment) and conditional support (i.e., direct involvement in the activity or being physically present during activity). In contrast, intangible support refers to verbal and non-verbal communications that promote physical activity. Two types of intangible support include motivational support (i.e., providing verbal and non-verbal prompts to engage in physical activity as well as positive affirmations for engaging in said activity) and informational support (i.e., providing advice, suggestions, and information to assist their child in being physically active). While there is some variation in the magnitude of their effects, there is a general consensus that motivational, conditional, and instrumental forms of physical activity-related social support are positively correlated with child activity levels (for a comprehensive meta-analysis see Yao & Rhodes, 2015).

This study examined the degree to which parental weight stigma correlates with reports of tangible support for physical activity. Instrumental support was operationalized as logistic support, which is defined as financial and travel-related parenting practices that facilitate their children's physical activity. Conditional support was measured by assessing explicit parental modeling (i.e., how much parents use their own behavior to demonstrate to their children how to be physically active). Tangible, as opposed to intangible, support behaviors were selected as primary dependent variables in this study due to their established links with child activity, measurement considerations, and potential susceptibility to be influenced by aspects of weight-based stigmatization. Specifically, just as weight stigma has been negatively associated with an individual's own physical activity levels, it may follow that stigmatized parents may be less likely to participate in physical activity with their child and less willing to provide resources for their child's activity. Informational support will also be measured, but was treated as an exploratory outcome variable. This decision is based on fact that informational support has received little attention in the literature and its unique relationship with a child's physical activity levels remains unclear (Beets et al., 2010). In contrast, motivational support has shown small to moderate effects on child activity levels (J. Mitchell et al., 2012; Pugliese & Tinsley, 2007; Yao & Rhodes, 2015), and appears to be more likely to be affected by weight stigma compared to informational support. However, assessing this motivational support through parental self-report has proven challenging. Specifically, past research has shown that parents frequently self-report the highest possible levels of emotional support for their child's physical activity (Davison et al., 2012). Due to the high level of response bias and or lack of variability in assessing this construct, motivational support was treated as an exploratory variable.

## Linking Weight Stigma to Weight-Related Parenting Practices

Although this study will not directly investigate the mechanisms by which weight stigma may affect weight-related parenting practices, it is important to offer a theoretical explanation as to how these constructs may be interconnected. Major and O'Brien's (2005) model of Stigma-Induced Identity Threat (Figure 3) illustrates the process by which social identity threat may influence outcomes. According to this model, reaching the conclusion that one's social identity is, in fact, threatened (D) is a function of: A) collective representations (i.e., shared beliefs about members of a given group), B) situational cues (i.e., factors that influence salience of group membership or a stereotyped attribute), and C) personal characteristics (e.g., stigma sensitivity (Pinel, 1999), group identification (Sellers & Shelton, 2003), domain identification (Aronson et al., 1998), and goals/motives (Crocker, Voelkl, Testa, & Major, 1991)). Once a social identity threat is perceived, it is met with a combination of both nonvolitional (E) and volitional responses (F). Nonvolitional responses refer to a number of physiological and psychological changes that result from psychological stress activation. For example, experiences of stigma have been associated with hypothalamic pituitary adrenal (HPA) axis activation (Tomiyama et al., 2014), increased blood pressure (Blascovich, Spencer, Quinn, & Steele, 2001), and anxiety (Spencer, Steele, & Quinn, 1999). In contrast, volitional responses refer to active coping strategies aimed at alleviating the perceived social identity threat. Three of the most common and most studied coping mechanisms for stigma-induced identity threat include: 1) attributing negative events to discrimination and not to deficiencies in the self (Crocker & Major, 1989), 2) increasing identification with the stigmatized group which can provide support, validation, and a sense of belonging (Allport, 1954; Branscombe, Schmitt, & Harvey, 1999), and 3) withdrawing, disengaging from, and/or avoiding domains where negative stereotyping or discrimination is likely to occur (Brenda Major & Schmader, 1998). Over time, how an individual responds to social identity threat can have profound impacts on their life. For example, substantial research has examined the mechanisms by which stigma impacts self-esteem, academic/job performance, and health (for a review see Major & O'Brien, 2005).

Based on the model of Stigma-Induced Identity Threat, weight stigma may impact weight-related parenting behaviors through a number of nonvolitional and volitional responses. In reference to nonvolitional responses, a sizeable body of literature exists describing how social stigmas elicit substantial psychological stress (for a review see Major & O'Brien, 2005). Moreover, stigma induced stress is a dominant mechanism explaining racial health disparities (e.g., Meyer's (2003) Minority Stress Model). Given that weight stigma is a subtype of social stigma, it is not surprising that several studies have demonstrated that weight stigma is, in fact, stressful. For example, overweight participants who engaged in a social-evaluative task where weight was made salient reported significantly more stress-relevant emotions (e.g., anxiety, expectations of rejection) compared to participants who engaged in the same task, but where the participant's weight remained hidden (Major, Eliezer, & Rieck, 2012). Weight stigma has also been shown to provoke a physiological stress response. For instance, self-perceived overweight women showed greater cortisol secretion after being rejected based on their weight (Himmelstein, Incollingo Belsky, & Tomiyama, 2015) and after viewing a weight stigmatizing video (Schvey, Puhl, & Brownell, 2014).

Nonvolitional responses to weight-based social identity threat may affect parenting behaviors by impairing self-regulation and executive function (Hunger et al., 2015). Once a threat is perceived, it is common to shift cognitive resources to suppress negative emotions (Johns, Inzlicht, & Schmader, 2008) and/or increase focus on self-presentation to counteract these negative stereotypes (Miller, Rothblum, Felicio, & Brand, 1995). While these effects have predominantly been studied within the context of race, there is some evidence that these findings extend to the domain of weight. For example, overweight women who knew they would be evaluated based on their weight demonstrated greater interference on a Stroop-color task compared to overweight women who believed their weight would not be accounted for in their evaluation (Major et al., 2012).

Impaired self-regulation and executive function may impact weight-related parenting behaviors through both direct and indirect pathways. Directly, parents facing chronic stigmatization may routinely experience situations where they lack the cognitive capacity to effectively foster, monitor, discuss, and negotiate healthy weight related behaviors with their children. Indirectly, diminished cognitive resources have also been linked to several weight gain promoting behaviors. For example, there is a large body of literature linking psychological stress and HPA activation with an increased consumption of high-sugar, high-fat, and high-calorie foods (for a review see Adam & Epel, 2007). As weight-based stigmatization has been shown to be psychologically stressful, it follows that such experiences would be positively associated with this "comfort eating" response. Experimental evidence supports this notion. For example, overweight women randomly exposed to weight stigma stimuli have been shown to consume more high-calorie foods compared to participants not exposed to a weight-based stigma stimulus (Brochu & Dovidio, 2013; Major et al., 2012; Schvey, Puhl, & Brownell, 2011). Additionally, higher levels of self-control have been linked with more frequent exercise and less sedentary behaviors (Wills, Isasi, Mendoza, & Ainette, 2007). Based on this evidence, we theorize that repeated exposures to weight-based stigmatization may undermine self-regulatory capabilities and decrease the likelihood that parents act as positive role models for their children.

In addition to nonvolitional mechanisms, we believe weight stigma influences obesogenic parenting behaviors through a variety of volitional responses. In describing the cyclic relationship between weight stigma, weight gain, and obesity, Tomiyama (2014) discusses both the behavioral and psychological coping mechanisms utilized to attenuate the effects of weight stigma. Thus far we have focused on responses to stigma that promote weight gain (e.g., comfort eating), but it is important to note that not all coping strategies are obesogenic in nature. Specifically, some people may seek to avoid future stigmatizing experiences by decreasing the chance they will be categorized as overweight or obese by attempting to lose weight through dieting and exercise. For example, in a prospective study of adolescents, Haines et al. (2006) found that girls who were teased about their weight were more likely than their peers to become frequent dieters while boys who experienced weight-based teasing were more likely to engage in unhealthy dieting (e.g., skipping meals, taking diet pills). Just as weight stigma may increase the likelihood of dieting for themselves, it is also possible that stigmatized parents may be more likely to promote weight management behaviors in their children. For example, in an effort to protect their children from the same discrimination they faced, highly stigmatized parents may become more vigilant in their health behavior modeling and offer more support for physical activities. Alternatively, parents who internalized the negative stereotypes associated with being overweight may believe their children lack the self-control to monitor their own caloric intake and thus must have their food restricted.

Tomiyama (2014) also notes that many of the volitional coping mechanisms available to stigmatized individuals are not necessarily applicable within the context of weight-based stigmatization. Recall that Major and O'Brien (2005) identified three common ways individuals cope with stigma. First is attributing negative events to discrimination instead of to the self.

Research shows that this is actually uncommon for overweight people, and that they instead tend to attribute negative feedback to personal deficiencies (Crocker, Cornwell, & Major, 1993). Studies examining the vulnerability of weight stigma assert that this negative self-attribution is largely due to the fact that weight is seen as being under a person's control and thus any experiences of weight-based discrimination are justly due to deficiencies in their personal character (Quinn & Crocker, 1998). The next type of psychological coping strategy involves increasing identification with the stigmatized group. Again, evidence suggests this coping mechanism is not typically utilized by overweight individuals as evidenced by the fact that overweight individuals have been shown to express strong implicit and explicit anti-fat attitudes (Wang, Brownell, & Wadden, 2004).

A final coping mechanism identified by Tomiyama (2014) involves withdrawing, disengaging from, and/or avoiding domains where negative stereotyping or discrimination is likely to occur. Unlike the other strategies, there is strong support for the use of this coping mechanism by overweight individuals to mitigate the negative effects of stigma. Ironically, some of the domains in which stigma is most commonly experienced are also vital for promoting healthy weight management. For example, frequency of weight stigma experiences was found to be positively associated with avoiding exercise in public (Vartanian & Shaprow, 2008) and negatively correlated with self-reported exercise behaviors (Pearl, Puhl, & Dovidio, 2014). These findings are also supported by experimental evidence. For instance, Seacat and Mickelson (2009) found that priming overweight women with negative weight-related stereotypes led to significantly lower intentions to exercise and maintain a healthy diet compared to controls. In addition to exercise contexts, medical settings can also be environments where stigmatizing is likely to occur and thus become avoided. Implicit and explicit anti-fat attitudes have been shown to be pervasive among health professionals (Phelan et al., 2014), including those specializing in obesity treatment (Schwartz, Chambliss, Brownell, Blair, & Billington, 2003). As a result of this, it is not surprising that healthcare professionals have been reported as some of the most frequent sources of weight-based stigmatization (Puhl & Brownell, 2006). This very real fear of stigmatization may reduce the likelihood overweight individuals seek out routine medical care which, over time, may lead to poor long-term health outcomes (Amy, Aalborg, Lyons, & Keranen, 2006). Based on this evidence, it is possible that this tendency to withdraw from and avoid situations where stigmatization is likely to occur may extend to weight-related parenting behaviors. For example, in an effort to avoid potential discrimination, stigmatized parents may be less inclined to engage in physical activity modeling behaviors with their children. Additionally, stigmatized parents may engage in motivated reasoning (i.e., clinging to false beliefs despite overwhelming evidence in an effort to reduce cognitive dissonance) whereby they downplay the importance of physical activity on health. Lower perceived benefits may no longer offset the very real costs associated with instrumental support for their children's activities. Conversely, providing high levels of instrumental support may afford stigmatized parents with psychological justification to avoid being physically active with their children.

Beyond coping mechanisms, weight stigma may affect weight-related parenting behaviors by altering the level of concern parents have about their child's weight status. Concern about child weight (particularly if it is believed the child will be overweight or obese as an adolescent) has been associated with prevention strategies to help their child manage their weight (Crawford, Timperio, Telford, & Salmon, 2006). The effect of concern about child weight on parenting practices has been most extensively studied in the context of restrictive feeding practices. Specifically, parental concern about overweight has been positively associated with restrictive feeding practices (Birch et al., 2001). Moreover, the relationship between child adiposity and restrictive feeding practices has been shown to be partially mediated by maternal concern about child overweight (Webber, Hill, Cooke, Carnell, & Wardle, 2010). Due to their own negative experiences, stigmatized parents may be more concerned about their child's weight status and be more likely to intervene with restrictive feeding practices. Just as concern has been shown to influence restrictive practices, it may also lead stigmatized parents to engage in more positive weight management strategies such as modeling a healthy diet and providing tangible and intangible support for their child's physical activity.

## Study Overview

Parents play a central role in the development of healthy weight-related behaviors in their children. Specifically, the feeding practices of restriction and modeling of healthy eating have been linked to child eating behaviors and weight status. In terms of physical activity, the tangible support behaviors of explicit modeling and instrumental support have been associated with higher child activity levels. To date, limited research has explored how psychosocial factors may influence these weight-related parenting behaviors. Due to the established connections between weight stigma and an individual's own health behaviors, parental experiences of weight stigma and the degree to which this stigma is internalized may also influence weight-related parenting behaviors. Although not directly tested in this study, the Model of Stigma Induced Identity Threat provides a framework for describing the underlying mechanisms which could potentially govern these relationships. Specifically, that a combination of nonvolitional and volitional responses to weight stigma may either promote or inhibit obesogenic parenting behaviors. As this study represents an initial inquiry into this topic, the primary goal was to determine the extent to which a relationship exists between parental weight stigma and weight-related parenting behaviors. A single cross-sectional study was conducted to examine the associations between parental weight stigma and weight-related parenting practices. Our hypotheses are as follows:

**Hypothesis 1a**: Parents who indicate greater frequency of stigmatizing experiences and higher weight stigma internalization will report significantly higher levels of restrictive feeding practices compared to parents who report low levels of stigmatization (Figure 4).

**Hypothesis 1b**: Parents who indicate greater frequency of stigmatizing experiences and higher weight stigma internalization will report significantly lower levels of intentional modelling of eating behaviors compared to parents who report low levels of stigmatization (Figure 5).

**Hypothesis 2a**: Parents who indicate greater frequency of stigmatizing experiences and higher weight stigma internalization will report significantly lower levels of logistic support for physical activity compared to parents who report low levels of stigmatization (Figure 6).

**Hypothesis 2b**: Parents who indicate greater frequency of stigmatizing experiences and higher weight stigma internalization will report significantly lower levels of explicit physical activity modeling compared to parents who report low levels of stigmatization (Figure 7).

It should be noted that the directionality within these hypotheses are not consistent with one another. Specifically, hypothesis 1a predicts that weight stigmatization will be associated with higher levels of restrictive feeding practices (which could be indicative of compensation/greater efforts to modify their child's eating) while hypothesis 1b predicts that weight stigmatization among parents will be associated with lower levels of intentional modeling of eating behavior (suggesting less of an attempt to modify their child's eating). This discrepancy is based on the belief that there may be a different set of mechanisms governing each of these relationships.  For example, it is possible that higher levels of weight stigma may lead to higher levels of concern about child overweight, which then leads to greater modification efforts.  In contrast, higher levels of weight stigma may cause greater feelings of self-shame associated with their child's weight status which then may lead to disengagement and fewer modification behaviors.

## CHAPTER 2: STUDY METHODOLOGY

**Aim 1: Characterize the relationships between experiences of weight stigma, weight stigma internalization, and obesogenic parental feeding practices.**

**Rationale:** High levels of weight-based stigmatization have been associated with obesogenic eating behaviors (e.g., emotional eating and uncontrolled eating) (O'Brien et al., 2016). It is possible that these adverse effects may also extend to food-related parenting behaviors. Specifically, we hypothesize that weight stigma will be associated with higher levels of restrictive feeding practices (i.e., restricting for health and weight concerns) and lower levels of explicit parental modeling of eating behaviors (i.e., explicit verbal and behavioral modeling of healthy food consumption).

**Aim 2: Test the associations between weight stigma experiences and internalization and parental support for physical activity**

**Rationale:** Weight-based stigmatization has been associated with poor physical activity and exercise outcomes (e.g., exercise avoidance, low physical activity enjoyment, and low amounts of moderate to vigorous physical activity) (S. E. Jackson & Steptoe, 2017; Mensinger & Meadows, 2017). It is possible that experiences and feelings of stigmatization may also impact physical activity parenting practices. Specifically, we hypothesize that parental reports of weight stigma will be significantly correlated with levels of logistic support provided to their children and explicit modeling of physical activity behaviors.

## Method

### Overview of Study and Design

Self-perceived overweight and obese parents of elementary school aged children (5-10) participated in an online cross-sectional study where they completed a series of questionnaires aimed at measuring their weight stigma, weight bias internalization, parental feeding practices, physical activity support behaviors, and parent/child level demographics.

### Participants

Participants were recruited through Amazon's Mechanical Turk (MTurk) website. Recruiting participants through this source has seen a dramatic increase over the past decade and substantial research has been conducted examining both the characteristics of MTurk participants and quality of the data that are obtained (Paolacci & Chandler, 2014). MTurk samples have been shown to be equally or more diverse across a wide range of demographics including age, ethnicity, socioeconomic status, political identity, occupation, and geographic dispersion than convenience samples recruited through other methods (Buhrmester, Kwang, & Gosling, 2011; Huff & Tingley, 2015). Despite this benefit of diversity, behavioral scientists have had concerns that anonymity and incentive structures employed by this methodology (i.e., participants are paid small sums for each survey completed and are thus incentivized to complete as many studies as possible in the shortest amount of time) may lead to poor data quality. To test this, researchers compared the quality of responses collected through MTurk with those collected in more traditional, lab-based settings and found minimal differences in the response quality between these methods (Casler, Bickel, & Hackett, 2013; Kees, Berry, Burton, & Sheehan, 2017). Other studies have found high levels of test-retest reliability across various psychological instruments and demographic characteristics of the respondents suggesting that participants are being consistent in their responses (Chandler & Shapiro, 2016). Lastly, several of the survey instruments utilized in this study have been successfully deployed on MTurk including those that measure weight stigma (Pearl et al., 2014) and parental feeding practices (Burrows et al., 2017). Therefore, we are confident that data gathered in this study through MTurk is both reliable and valid.

**Participant Screening Inclusion Criteria**

Participant recruitment involved a two-step procedure. First, participants completed an initial screening survey posted to MTurk. This survey was only viewable to participants who met the following inclusion criteria: 1) age 18 years of age or older, 2) English speaking, 3) living in the U.S., and 4) registered as a worker on MTurk. The prescreening survey asked individuals to report the number and age of children they have as well as their perceived weight status. Specifically, participants who: 5) had at least one child aged 5-10 and 6) perceived themselves to be overweight or obese were provided an invitation to enroll in the larger study.

**Procedure**

Participants were compensated $2.50 for 20 minutes of their time. While this amount of compensation may appear low when compared to that offered in traditional recruitment settings, it is substantially more than the $2.00 median hourly wage typically earned by MTurk workers (Hara et al., 2018). After providing consent, eligible participants were asked to indicate how many children they have between the target ages of 5-10. If a participant indicated that they have multiple children within this age range, one child will be chosen at random and participants were be instructed to direct their responses to how they specifically interact with this particular child. Evidence indicates that parents are not always consistent in their weight-related parenting practices across all children. For instance, parents may select varying strategies depending on the perceived weight status (Farrow, Galloway, & Fraser, 2009) and age (Davison & Jago, 2009) of their children. Therefore, it was essential we have parents report on a single child to maintain consistency in the parenting practices reported throughout the study.

Next, participants were asked to complete measures designed to assess feeding and physical activity-related parenting practices. After these questionnaires were completed, participants reported the frequency with which they feel stigmatized based on their weight (i.e., weight stigma experiences) and the degree to which they believe that negative stereotypes about overweight and obese persons apply to themselves (i.e., weight bias internalization). Next, participants completed a global measure of positive and negative parenting practices followed by a measure assessing self-shame associated with their child being overweight. Parents were then be asked to report on their child's sugar- sweetened beverage intake and unhealthy snack consumption, their child's physical activity behaviors, as well as their child's weight and height. Lastly, parents' own weight, height, and demographic information was collected. Careful consideration was made in regards to the ordering of items within this survey. Chiefly, as it is our hypothesis that weight stigma may affect weight-related parenting behaviors, assessing weight stigma prior to parenting behaviors may have introduced additional bias into their reports of parenting practices. Based on this notion, measures of weight stigma were administered after parenting behaviors.

**Primary Independent Variables**

**Weight Stigma Experiences** was measured through the Stigmatizing Situations Inventory-Brief (SSI-B) (Vartanian, 2015). The unabridged version of the SSI is one of the most widely-used measures of self-reported experiences of weight-based stigmatization (Myers & Rosen, 1999). Initially developed from qualitative interviews with obese patients, the SSI asks participants to rate the frequency of experiencing weight stigma across 11 domains including comments from various groups (i.e., children, family, strangers, doctors), feelings of exclusion, being stared at, perceived embarrassment from loved ones, negative assumptions people make, physical barriers or obstacles (e.g., furniture does not fit your body properly), job discrimination, and physical violence.

Although the SSI has proven useful in characterizing the experiences of stigma, a primary critique of the scale lies in its length. To address this issue, the SSI-B reduced the initial 50 questions to a more manageable 10 items with each subscale maintaining representation (except for physical aggression which only contained one item and was rarely endorsed). In the SSI-B, participants are presented with a statement describing a stigmatizing experience and are asked to report the frequency that they experience this event. Responses are made on a 10-point scale (0 = never…, 4 = several times per year…, 9 = daily). A global measure of weight stigma experiences is calculated by summing responses to all questions. This measure has been validated across 7 samples drawn from community members, university students, and MTurk participants (Vartanian, 2015). Although no differences were found between men and women across these samples, invariance due to ethnicity remains to be tested. This measure has exhibited high internal consistency ($\alpha$ = .84 to .91). Scores on the SSI-B were positively correlated with participants' body mass index (BMI), eating disorder pathology, internalized weight bias, and negative affect and negatively correlated with self-esteem, providing evidence to support good construct validity (Vartanian, 2015).

**Weight Bias Internalization** was assessed using the Weight Bias Internalization Scale-Modified (WBIS-M) (Pearl & Puhl, 2014). This measure was developed to address deficiencies in the original Weight Bias Internalization Scale (WBIS) (Durso & Latner, 2008). Specifically, the WBIS was created to assess weight bias internalization (i.e., self-directed shaming and negative weight-related attitudes and stereotypes about oneself) only among individuals who perceive themselves to be overweight or obese. The WBIS-M modified questions so that internalization could be assessed by participants of all subjective and objective weight statuses. This scale consists of 11 items assessed on a 7-point Likert scale (1 = strongly disagree…, 7 = strongly agree). Scores are summed to create a global measure of weight bias internalization with higher scores corresponding to greater levels of internalization. Items were designed to address the following content areas: 1) degree to which they accept their current weight status, 2) desire for change in weight status, 3) effect of perceived weight status on mood, 4) perceived personal value, 5) beliefs about how weight status impacts social interactions, and 6) recognition of the existence and unfairness of weight stigma. Example items include: “I am less attractive than most other people because of my weight”, “I feel anxious about my weight because of what people might think of me”, and “I am OK being the weight that I am (reverse coded)”.

The WBIS-M has been shown to be both reliable and valid (Pearl & Puhl, 2014). Cronbach's alpha has been measured at $\alpha = .93$, indicating high internal consistency. Scores from the WBIS-M were positively correlated with anti-fat attitudes, drive for thinness, eating disorder pathologies, depression, and anxiety and negatively correlated with self-esteem, providing evidence of convergent validity. Furthermore, in regression analysis, WBIS-M scores were shown to significantly predict body esteem, global self-esteem, depression and anxiety symptoms, and binge eating behavior above and beyond the predictive power of BMI and anti-fat attitudes, suggesting internalized weight bias is related to, but distinct from, these constructs. It should be noted that additional studies have raised concerns with one item on the original WBIS and it is possible similar issues exist on the WBIS-M. Specifically, the item, "As an overweight person, I feel that I am just as competent as anyone (reverse scored)," was shown to have a zero or negative item-to-total correlation across two separate validation studies (Hilbert et al., 2014; Lee & Dedrick, 2016). Inter-item reliability analysis was conducted to determine if the inclusion of this item was appropriate in assessing weight bias internalization in the present study.

**Primary Outcome Variables: Feeding Practices**

**Restrictive parental feeding practices** was assessed through the restriction subscales of the Comprehensive Feeding Practices Questionnaire (CFPQ) (Musher-Eizenman & Holub, 2007). This measure was created to serve as a comprehensive assessment of parental feeding practices and is comprised of 12 subscales (2 of which measure restrictive feeding practices) that each target a unique set of feeding behaviors. A primary critique of earlier measures developed to assess restrictive feeding practices (e.g., the Child Feeding Questionnaire (CFQ) (Birch et al., 2001)) was that they failed to differentiate between alternative motivations for restriction. The CFPQ was developed, in part, to address this shortcoming by incorporating separate subscales to assess food restriction for health reasons (i.e., control of the child's intake for the purpose of limiting consumption of less heathy foods and sweets) and restriction for weight control (i.e., control of the child's food intake for the purpose of decreasing or maintaining the child's weight). To assess these constructs, parents were asked to report their agreement with a series of statements measured on a 5-point Likert scale (1 = disagree…, 5 = agree). The Restriction for Health subscale consists of 4 items (example item: “If I did not guide or regulate my child’s eating, he/she would eat too many junk foods.”) while the Restriction for Weight Control subscale is comprised of 8 items (example item: “I have to be sure that my child does not eat too many high-fat foods.”). Responses are averaged within each subscale, with higher scores corresponding to greater frequency of restrictive feeding practices.

In their initial paper, Musher-Eizenman and Holub (2007) validated the restricive subscales across two sample populations: mothers and fathers of preschool children aged 3-6 years old and mothers of children aged 18 months to 8 years old. Both subscales were observed to have acceptible levels of internal consistency with $\alpha = .70$-$.82$ for the Restriction for Weight subscale and $\alpha = .69$-$.81$ for the Restriction for Health subscale. To assess construct validity, scores were correlated with measures of parental concern for the child being overweight, concern for underweight, and feelings of responsibility toward child feeding. While both scales were shown to be positively correlated with concern for overweight and parental feelings of resposibility, only the Restriction for Health subscale was positively related to concern for underweight. Additionally, while we would expect some shared variance, a partial correlation between the two subscales (after controlling for child age and gender) was $r = .34$, indicating that a large porportion of variance explained by each subscale was not shared. Combined, these findings provide evidence that these measures are both tapping into a higher order factor of restriction, but at the same time represent two unique constructs.

Follow-up studies have validated the restriction subscales of the CFPQ within a number of countries including France (Musher-Eizenman, de Lauzon-Guillain, Holub, Leporc, & Charles, 2009), Norway (Melbye, Øgaard, & Øverby, 2011), Malaysia (Shohaimi, Wei, &

Shariff, 2014), Brazil (Mais, Warkentin, Latorre, Carnell, & Taddei, 2015; Warkentin, Mais, Latorre, Carnell, & Taddei, 2016), and Jordan (Al-Qerem, Ling, & AlBawab, 2017). It should be noted that within these studies, a small number of items were either added to or subtracted from these scales to increase model fit during confirmatory factor analysis. Unfortunately, no disernable pattern emerged regarding which items were selected for inclusion or exclusion. While it is lilkley that these scale modifications were the result of culutral adaptations, it is important to consider that certain items may exhibit poor internal consistency within the current study samples. To address this concern, special attention was paid to ensuring both scales exhibited acceptable levels of internal consistency before further analysis were conducted.

**Explicit parental modeling of eating behaviors** was assessed using the Verbal Modeling and Behavioral Consequences subscales from the Parental Modeling of Eating Behaviors Scale (PARM) (Palfreyman, Haycraft, & Meyer, 2014). Although the impact of parental modeling on a child's behavior has been well established (Bandura, 2014), limited research has been conducted within the domain of feeding. Researchers who have explored this topic have typically measured this construct by using only a few items (typically 1-3) (e.g., CFPQ (Musher-Eizenman & Holub, 2007), Parent Mealtime Action Scale (Hendy, Williams, Camise, Eckman, & Hedemann, 2009), and the Parental Dietary Modeling Scale (Tibbs et al., 2001)) thereby significantly limiting their scope. Moreover, previous measures failed to distinguish between explicit (or intentional) modeling of eating behaviors (i.e., actively demonstrating desirable eating behaviors with the purpose of having one's child mimic them), from unintentional modeling of eating behaviors (i.e., children adopting eating behaviors that parents had not deliberately modeled). Research has demonstrated that parents serve as continuous role models for their children, who will often imitate behaviors they have observed even when parents are not intending to serve as an exemplar (C. Jackson & Henriksen, 1997) and it is possible that explicit modeling may lead to different outcomes than unintentional modeling of eating behaviors. In addition to intentionality, earlier measures also failed to distinguish between verbal and behavioral modeling. For example, parents may directly model their eating behaviors through overt means (e.g., eating certain foods in front of their child), verbal means (e.g., stating their food preferences), or both.

Items for the PARM were initially generated from an extensive review of the parental feeding practices and eating behavior literature, a critical review of existing measures, and discussions with clinicians and academics in the field. Questions were presented as statements describing a modeling behavior and parents reported the extent to which they agreed that they engaged in that behavior on a 7-point Likert scale (1 = strongly disagree…, 7 = strongly agree). Principal component analysis resulted in 15-items loading onto three factors: 1) verbal modeling (i.e., modeling through talking with their child about eating and food; example item: "I try to talk more often about foods I would like my child to eat"), 2) behavioral consequences (i.e., parents' perceived consequences of their behavioral modelling on their children's eating behaviors; example item: "My child is more likely to try or eat new foods if I eat the new foods with him/her"), and 3) unintentional modeling (see exploratory variables for further discussion on this subscale).

Evidence supports the reliability and validity of both the Verbal Modeling and Behavioral Consequences subscales of the PARM (Palfreyman, Haycraft, & Meyer, 2014). Both subscales exhibited good levels of internal consistency (α = 0.81 for Verbal Modeling; α = 0.85 for Behavioral Consequences). Additionally, the Verbal Modeling subscale significantly correlated with the previously validated Modeling subscale of the CFPQ (Musher-Eizenman & Holub, 2007)($r = .45$, $p <0.001$), providing evidence of convergent validity. This measure was further validated in a follow-up study conducted by Palfreyman, Haycraft, and Meyer (2015), which examined relationships between maternal self-reports on the PARM and the modelling practices exhibited by mothers during three family mealtime observations. Maternal self-reported verbal modeling was found to significantly correlate with observed verbal modeling ($r = .519$, $p = .020$) and scores form the Behavioral Consequences subscale significantly correlated with observed behavioral modeling ($r = .578$, $p = .009$).

**Primary Dependent Variables: Physical Activity Support Behaviors**

**Parental logistic support for physical activity** was measured using the Logistic Support subscale from the Activity Support Scale for Multiple Groups (ACTS-MG) (Davison, Li, Baskin, Cox, & Affuso, 2011). The ACTS-MG represents the second iteration of the original Activity Support Scale (Davison, Cutting, & Birch, 2003), which was initially created to examine how differing levels of parental support for physical activity predicted future physical activity levels among non-Hispanic White girls (ages 9 to 15 years). The ACTS-MG was developed to standardize items within the survey, enhance clarity, and to test its predictive validity in use with African American and non-Hispanic White parents of elementary school-aged children.

The Logistic Support subscale measures the degree to which parents engage in financial and travel-related parenting practices that facilitate their children's physical activity. This scale consists of 4 items which are answered on a 4-point Likert scale (1 = strongly disagree…, 4 = strongly agree) (example item: "I enroll my child in sports teams and clubs such as soccer, basketball, and dance"). Scores are averaged with higher values corresponding to greater levels of logistic support. This scale exhibited acceptable levels of internal consistency ($\alpha = .72$) and no factorial invariance was observed based on ethnicity (African American vs. non-Hispanic White) or between mothers and fathers. Additionally, mean scores on the Logistic Support subscale were positively correlated with means from the entire ACTS-MG (4 subscales, each containing 3 items) ($r = .73$, $p < .001$) providing evidence that this measure is assessing a component of global parental support for physical activity, but also measuring a unique aspect of this construct.

**Explicit modeling of physical activity** was assessed using a modified version of the Modeling subscale of the ACTS-MG (Davison et al., 2011). This subscale measures how much parents use their own behavior to demonstrate to their children how to be physically active, with 5 items answered using a 4-point Likert scale (1 = strongly disagree…, 4 = strongly agree) (example item: "I encourage my child to be physically active by leading by example (by role modeling)"). Scores are averaged, with higher values corresponding to greater levels of parental modeling of physical activity. While this scale has been shown to be a reliable ($\alpha = .83$) and valid (significant correlation ($r = .69$, $p < .001$) with total ACTS-MG scores) measure of parental modeling of physical activity, it fails to differentiate between explicit and implicit modeling. As the aim of this study was to assess the impact of weight stigma on explicit modeling, questions from this subscale that tap into implicit modeling were replaced. Specifically, two questions that measure parental physical activity levels and parental enjoyment of physical activity were removed and replaced with items that assess explicit modeling. Fortunately, Davison and colleagues (2011) tested several items that target explicit modeling. Because they were ultimately dropped from the Modeling subscale for parsimonious reasons, and not concerns about validity, we felt they were appropriate for use in the current study. These items are: "We have family outings that include physical activity (such going for a walk, bike riding, or ice skating)" and "I try to include my child when I do something active".

### Exploratory Outcome Variables: Feeding Practices and Outcomes

**Unintentional parental modeling of eating behaviors** was measured using the Unintentional Modeling subscale of the PARM. Similar to other subscales of this measure, parents were asked to report the extent to which they agree that they engaged in a given behavior on a 7-point Likert scale (1 = strongly disagree…, 7 = strongly agree) (example item: "My child has picked up eating behaviors from me which I had tried to hide from him/her (e.g., avoiding certain foods)). While we hypothesized weight-based stigmatization would be associated with this construct, we have elected to treat this variable as exploratory due to the fact that this measure has yet to be effectively validated. Specifically, the three items used in this subscale reported less than acceptable internal consistency ($\alpha = .63$) (Palfreyman et al., 2014) and efforts to validate this measure with observed unintentional modeling failed to reach conventional levels of significance ($r = .232$, $p = .19$) (Palfreyman, Haycraft, & Meyer, 2015). However, the authors caution that their inability to validate this subscale may be due to deficiencies in the study's design rather than a lack of construct validity. Specifically, unintentional modeling is substantially more difficult to code based on observation compared to intentional modeling of eating behaviors. For example, observational coding criteria had to be devised that would code only behaviors for which the child copied a behavior displayed by the parent within the observed mealtime where the parent had not used verbal or direct behavioral modelling. Such a stringent coding scheme produced only a few instances of unintentional modeling during each mealtime, thus limiting the power to detect a significant effect. The authors conclude, "The construct of unintentional modelling, while important in understanding the overall effect of parental modelling, needs further development and research, and the relationships found via these preliminary attempts at measuring this construct need to be treated with due caution" (Palfreyman, Haycraft, & Meyer, 2015, p. 35).

**Child sugar-sweetened beverage consumption** was assessed by two items modeled after the Sugar-Sweetened Beverage Module of the Behavioral Risk Factor Surveillance System (BRFSS) (Center for Disease Control and Prevention, 2017). The first question asks, "How often does your child drink regular soda or pop that contains sugar? (Do not include diet soda or diet pop)" and the second item asks "How often does your child drink sugar-sweetened fruit drinks (such as Kool-Aid and lemonade), sweet tea, and sports or energy drinks (such as Gatorade and Red Bull)? (Do not include 100% fruit juice, diet drinks, or artificially sweetened drinks)". Both items are assessed on a 5-point Likert scale (1 = never…, 5 = daily). Responses from these items were summed to create a composite measure of parent-reported SSB consumption.

**Parental report of children's usual intake of unhealthy (i.e., nutrition poor, energy dense) snack foods** was measured using a 6-item food frequency questionnaire initially adapted from the Anti-Cancer Council Dietary Questionnaire (Giles & Ireland, 1996). Specifically, parents were asked to report how frequently in a week their child consumed: 1) potato chips or other crisps, 2) salty flavored or cheesy crackers, 3) cookies, 4) cakes and pastries, 5) chocolates and candies, and 6) hot fried snacks on a 6-point Likert scale (1 = none…, 6 = more than once a day). Unhealthy snack intake was converted to daily frequencies and then summed together to signify the number of unhealthy snacks consumed per day. Modified versions of this measure have been used with success across a number of parental feeding studies (e.g., Boots, Tiggemann, & Corsini, 2018; Boots, Tiggemann, Corsini, & Mattiske, 2015; Corsini, Kettler, Danthiir, & Wilson, 2018). Lastly, a recent meta-analysis on food parenting and child snacking concluded that while there is little consistency in the measurement of parental reports of child snacking, the majority of studies surveyed employed a food frequency questionnaire (Blaine, Kachurak, Davison, Klabunde, & Fisher, 2017).

**Exploratory Outcome Variables: Physical Activity-Related Practices and Outcomes**

**Informational support for physical activity** was assessed with the Use of Community Resources subscale of the ACTS-MG (Davison et al., 2011). The decision to treat this variable as exploratory was largely due to the fact that informational support remains the least studied type of parental support for physical activity and its connection to child activity behaviors remains unclear (Beets et al., 2010). Moreover, there is no established measure that fully assesses the entirety of this construct. Instead of generating a novel measure for use in the proposed study, we have chosen to employ the established Use of Community Resources subscale in an effort to reliably assess a portion of this construct. Specifically, this subscale measures the promotion and utilization of venues (e.g., parks, playgrounds, YMCA) where their child can be physically active and is comprised of three items answered on a 4-point Likert scale (1 = strongly disagree…, 4 = strongly agree) (example item: "I encourage my child to use resources in our neighborhood to be active (such as the park and the school)"). Scores are averaged, with higher values corresponding to greater levels of informational support for physical activity. The Use of Community Resources subscale has demonstrated acceptable levels of internal consistency ($\alpha = .71$) and mean scores significantly correlated with total ACTS-MG scores ($r = .76$, $p < .001$). Combined, these results provide evidence that this subscale is reliably measuring a unique component of parental support for physical activity.

**Parenting practices to limit sedentary behavior** was measured using the Sedentary Time Restriction subscale of the ACTS-MG (Davison et al., 2011). The decision to treat this variable as exploratory was based on the fact that, during our literature review, we were unable to locate any studies that directly linked weight stigma to sedentary behavior. Within this questionnaire, parents are asked to report how frequently they limit TV time, videogame time, and computer time for nonhomework activities. Three questions are answered on a 4-point Likert scale (1 = strongly disagree…, 4 = strongly agree) (example item: "I limit how long my child plays video games (including Playstation, Xbox, and Gameboys)". Scores were averaged with higher values corresponding to greater levels of parenting practices limiting sedentary behavior. This subscale has been shown to be both reliable ($\alpha = .73$) and valid, with mean scores significantly correlated with total ACTS-MG scores ($r = .69$, $p < .001$) suggesting this instrument measures a unique aspect of parental support for physical activity.

**Parental report of their child's physical activity and sedentary behaviors** was measured using a series of questions. These outcomes were treated as exploratory as the associations between parental weight stigma and these outcome measures were expected to be small and our study was underpowered to detect such effects. Weekly physical activity was measured by asking parents, "DURING THE PAST WEEK, on how many days did this child exercise, play a sport, or participate in physical activity for at least 60 minutes?" This question has been used in the 2017 National Survey of Children's Health (NSCH) to assess child physical activity levels. Amount of TV screen time was measured by asking, "Over the past 30 days, on average how many hours per day did your child sit and watch TV or videos? Would you say . . .". Response options are: "less than 1 hour, 1 hour, 2 hours, 3 hours, 4 hours, 5 or more hours, or My child does not watch TV or videos". Lastly, videogame and computer screen time was ascertained by asking, “Over the past 30 days, on average how many hours per day did your child use a computer or play computer games outside of work for school? Include Playstation, Nintendo DS, or other portable video games. Would you say . ..”. Response options are: "less than 1 hour, 1 hour, 2 hours, 3 hours, 4 hours, 5 or more hours, or My child does not use a computer outside of work for school”. These two questions assessing sedentary behaviors in children were slightly modified from the National Health and Nutrition Examination Survey (CDC, 2017).

### Additional Exploratory Outcome Variables

**Global positive and negative parenting practices** was measured using the Alabama Parenting Questionnaire Short Form (APQ-9) (Elgar, Waschbusch, Dadds, & Sigvaldason, 2007). This measure was chosen for inclusion to aid the researchers in more clearly defining the theorized relationships between parent’s weight-based stigma and weight-related parenting behaviors. Specifically, assessing global parenting practices allowed us to explore if any effects of parental weight stigma on parenting practices are localized to the domains of feeding and physical activity or if there is an impact of parenting behaviors more generally. The APQ-9 was developed as a shorter alternative to the original APQ, which contains 42 items (Frick, 1991). This abbreviated version measures general parenting behaviors across 3 dimensions: 1) positive parenting, 2) inconsistent discipline, and 3) poor supervision. Positive parenting refers to a tendency to praise or compliment one’s child after they do something well (example item: “You let your child know when he/she is doing a good job with something”). Inconsistent discipline is defined by threatening punishment, but failing to actually carry it out (example item: “You threaten to punish your child and then do not actually punish him/her”). Lastly, poor supervision refers to the extent to which parents are unaware of where their children are and/or what they are doing (example item: "Your child fails to leave a note or to let you where he/she is going"). Each factor contains three items which are assessed on a 5-potnt Likert scale (1 = Never…, 5 = Always). All subscales demonstrated small, but significant, correlations with each other suggesting they represent related, but distinct dimensions of parenting. Reliability coefficients for the APQ-9 vary by subscale. The positive parenting subscale has been shown to be the most reliable ($\alpha$ = .77 - .84), but the other subscales have at times demonstrated less than acceptable levels of reliability. Reliability coefficients for the inconsistent discipline subscale range from $\alpha$ = .65 -.74 and those from the poor supervision subscale range from $\alpha$ = .58 - .63. Based on this evidence, items from this instrument were subjected to reliability analysis before scores were included in any additional analyses.

**Parental concern about child weight and perceived responsibility for child weight** was measured using their respective subscales from the Child Feeding Questionnaire (CFQ) (Birch et al., 2001). Currently in its third iteration, the CFQ the remains the most widely used measure for assessing aspects of parental feeding practices and has been validated across a number of populations (Shloim et al., 2015). The Concern About Child Weight subscale measures parents' concerns about the child's risk of being overweight and consists of three items measured on a 5-point Likert scale (1 = Unconcerned…, 5 = Very concerned) (example item: "How concerned are you about your child becoming overweight?"). This subscale has demonstrated acceptable reliability ($\alpha$ = .75) and has been positively associated with perceived child weight, indicating convergent validity. The Perceived Responsibility subscale assesses parents' perceptions of their responsibility for child feeding and consists of three items measured on a different 5-potnt Likert scale (1 = Never…, 5 = Always) (example item: "When your child is at home, how often are you responsible for feeding them?"). This measure has been shown to be reliable (α = .88) and has been positively associated with parental concern about child weight and negatively associated with perceived child weight, providing evidence of concurrent validity (Nowicka, Sorjonen, Pietrobelli, Flodmark, & Faith, 2014).

**Self-shame about child overweight** is a novel variable assessed in this study. Parents (especially mothers) are expected to monitor their child's food consumption and physical activities and are frequently blamed for their child's obesity (Maher, Fraser, & Wright, 2010; Warin, Zivkovic, Moore, & Davies, 2012). Based on this premise, it is possible that parents may experience feelings of shame and worry others will view them negatively if their child is perceived to be overweight or obese. Moreover, this self-shame stemming from their child's weight may in lead to variations in weight-related parenting practices. For example, higher levels of self-shame from child overweight may lead parents to engage in more frequent weight modification behaviors as a means of counteracting the narrative that they are a bad parent and have failed at managing their child's weight. As we were unable to locate any previously validated measures to assess this construct, existing measures of related constructs were modified. Specifically, the self-shame subscale of the Parents' Self-Stigma Scale (Eaton, Ohan, Stritzke, & Corrigan, 2018) was modified for use with parents of children with mental health disorders to parents of overweight and obese children. This scale consists of three items measured on a 7-point Likert scale (1 = Strongly agree…, 7 = Strongly disagree) (example item: "I would be embarrassed if my child was overweight.").

### Sample Size Calculation for Primary Outcomes

Based on the literature to date, we anticipated the association between weight stigma and parental feeding practices (after accounting for covariates) would be small-to-medium in size ($f^2$

=.05-.10). Established conventions for assessing effect sizes in fixed linear multiple regression are: .02 for small, .15 for medium, and .35 for large effect sizes (Miles & Shevlin, 2001). With 300 participants, we would have an 89.9% power based on an alpha of .05 to detect an effect size of $f^2$ =.075. However, we recognized that the effect size may not be as large as anticipated, as the associations between weight stigma and parenting practices have yet to be examined. Therefore, we increased our target sample to 400 participants to ensure that we would have adequate power (.80) to detect a smaller effect size of $f^2$ = .044.

**Plan of Analysis**

**Primary outcomes.** The internal consistency of each subscale was assessed using Cronbach's Alpha. Scales that failed to reach good levels of reliability (≤ .70) were subjected to item-total analysis and items that have low item-total correlations (≤ .30) were considered for removal from the scale for further analysis. Next, hierarchical linear multiple regression were used to test associations between both weight stigma variables (and their interaction) and each of the six primary outcome measures (see Table 1 for a complete list). Specifically, four models were tested for each dependent measure. The first model consisted of the following covariates: 1) parent age, 2) child age, 3) parent BMI, 4) child BMI, 5) parent gender, 6) child gender, 7) parent education level, 8) household income, and 9) ethnicity. Weight stigma experiences, weight bias internalization, and their interaction were entered in a second, third, and fourth step, respectively. Individual level coefficients as well as model change in $R^2$ was evaluated for significance.

**Exploratory mediation analyses: feeding-related variables**. All exploratory analysis conducted in this study were designated *a priori*. Multiple mediation analysis (Hayes, 2009; Muthén & Schultzberg, 2017) was conducted to examine whether weight stigma experiences and weight bias internalization have significant indirect effect on child sugar sweetened beverage and unhealthy snack consumption mediated through restriction and explicit modeling. These effects were analyzed using path analysis utilizing the same set of covariates outlined previously. These analyses involved several steps. First, overall model fit was examined based on the following statistics and associated criteria: Chi Square ($p \leq .05$), RMSEA ($< 0.08$), CFI ($\geq .90$), and TLI ($\geq .90$). If model fit was deemed unacceptable, likelihood ratio tests were performed to determine if additional paths and covariances could be included to improve fit. As discussed previously, recent literature has postulated that weight bias internalization may serve as a mediator between weight stigma experiences and outcomes. Based on this evidence, model fit was examined with weight bias internalization treated as either an exogenous or endogenous variable and the model was sequentially updated until an optimal level of fit was achieved. Next, parameter effect sizes and significance levels ($p \leq .05$) were examined. Lastly, the indirect effects of the independent variables on the dependent variable passing through the mediating variable were tested for significance ($p \leq .05$). Four independent path models were generated. In model one, both restriction subscales were used as mediators predicting sugar sweetened beverage consumption (Figure 8). Model two also involved the restriction subscales, but unhealthy snack consumption was used as the outcome variable. Models three and four followed a similar pattern, but explicit verbal and behavioral modeling were tested as mediators.

**Exploratory mediation analyses: physical activity-related variables.** Five independent multiple mediation path models were generated to test whether weight stigma experiences and weight bias internalization have a significant indirect effect on parent-reported child physical activity and sedentary behaviors mediated by logistic support, explicit modeling, and practices of limiting sedentary behavior. A similar analytical procedure described for the exploratory feeding variables was applied here. Specifically, a path model was generated, tested for fit, and once fit was deemed acceptable, direct and indirect effects were examined for effect size and significance. In model one, logistic support was tested as a mediator between the weight stigma variables and parent reported child physical activity (Figure 9). Models two and three examined explicit modeling as a mediator for parent reported child physical activity. Lastly, models four and five tested if parenting practices that limit sedentary behavior mediate the relationship between weight stigma, TV viewing, and computer screen time.

**Exploratory analyses for additional variables.** We also examined the extent to which global parenting practices account for variance in our primary dependent variables. This was achieved by including scores from each of the three subscales into the initial block (which otherwise contained covariates) of the hierarchical linear multiple regression models. Individual level coefficients as well as model change in $R^2$, were evaluated for significance. Specifically, if the weight stigma variables remained statistically significant when these general parenting variables were included in the model, we could infer that they accounted for a significant level of variance above and beyond the effects of general parenting.

Parental concern about child weight, perceived responsibility for child weight, and self-shame associated with child overweight were tested as mediators between weight stigma and the primary weight-related parenting practices (i.e., restriction, explicit modeling of eating behaviors, logistic support for physical activity, and explicit modeling of physical activity). Thus, a total of twelve mediation models were tested, three for each primary dependent variable. Path analysis was conducted following a similar set of procedures and criteria as outlined previously. Specifically, after model fit had been assessed, an examination of total, direct, and indirect effects were tested for significance.

CHAPTER 3: PILOT STUDY

**Study Overview and Methodology**

A small pilot study was conducted with the primary goal of ensuring the feasibility of the approach and whether the larger studies would be able to enroll our target sample of parents within an acceptable timeframe. The survey items used in this pilot were largely identical to weight stigma and parental feeding practices measures previously mentioned. A prescreening survey was first launched to identify parents of children aged 5-11. In an effort to conceal the exact inclusion criteria of the study, the advertisement only mentioned that we were looking for parents and did not specify any limitations on child age ranges or perceived weight status. One hundred participants were prescreened through MTurk and were paid \$0.05 for their time. It took slightly over three hours to collect these responses. Of these 100 participants, $n$ = 49 individuals indicated they had a child aged 5-11 and were then sent invitations to complete the larger study where they were be compensated \$1.50 for their time. Participants were not screened based on weight status as this inclusion criterion were established after this pilot study was conducted. Of those that were sent an invitation, $n$ = 39 completed the survey within four days resulting in a response rate of 80%. Time to completion was positively skewed, with 84% of responses being collected within 24 hours. Including service fees, total costs tallied \$90.60, resulting in a per participant cost of \$2.32. Based on the timeframe and costs observed in this pilot study, it was our belief that data collection could be completed within several weeks with a total budget of \$2,000.

## Results

### Sample Descriptive Statistics

A secondary goal of this pilot study was to ensure our measures were functioning as intended and that sufficient variability existed within our variables of interest. Parent level descriptive statistics of select demographic variables are presented in Table 2. Participants ($n$ = 39) had a mean age of 35.1 ($SD$ = 6.0) years, were majority female (64.1%), married (76.9%), and identified as White/Caucasian (69.2%). Additionally, a majority of respondents met criteria for either overweight (19.4%) or obese (38.9%) based on self-reported weight and height, with a mean body mass index (BMI) of 28.17 ($SD$ = 6.58). Parent reported child level descriptive statistics of select demographic variables are presented in Table 3. Children were, on average, 8.09 ($SD$ = 2.28) years old and were majority male (59%). Child BMI-for-age-percentile and corresponding weight status was calculated by inputting their parent reported height, weight, age, and gender into the CDC's BMI Percentile Calculator for Children and Teens (2018). Following standard criteria for classifying weight in children (Refs), those whose BMI-for-age-percentile was less than the $5^{th}$ percentile qualified as underweight, between the 5th percentile up to the 85th percentile as healthy weight, 85th to less than the 95th percentile as overweight, and equal to or greater than the 95th percentile as obese. The mean BMI-for-age percentile was 70.0% ($SD$ = .31), and almost half of children qualified as being overweight (21.2%) or obese (27.3%). In line with research describing how parents frequently do not consider their children to be overweight or obese even if they meet generally-accepted criteria (Parry, Netuveli, Parry, & Saxena, 2008), the vast majority of parents (72.7%) reported perceiving their child as being about the right weight.

Variability within measures was examined through a visual inspection of score distributions. Of note, scores from the SSI-B were positively skewed. While some degree of skewness was expected (i.e., previous studies using this measure have also been positively skewed (Vartanian, 2015)), we were concerned such a pronounced skew would violate core statistical assumptions required for our analysis. Additionally, WBIS-M scores had a bi-modal distribution further raising concerns of non-normality. Follow-up inspections revealed two distinct WBIS-M distributions- one for participants classified as normal weight and one for participants qualified as overweight or obese. Removing normal weight participants from the sample substantially improved the normality of both SSI-B and WBIS-M distributions. As a result, we chose to limit future samples to only participants who perceive themselves to be overweight or obese. While these additional inclusion criteria likely slowed recruitment, it was our belief that the benefits of having more normalized distributions outweighed this cost. Based on these changes, we felt confident these measures would meet all necessary statistical assumptions required to effectively execute our plan of analysis.

Descriptive statistics of primary independent and dependent variables relating to weight stigma and feeding practices are presented in Table 4. All means and standard deviations in the current sample largely match those reported in previous studies providing evidence that the measures are functioning as intended. Participants reported experiencing at least some levels of weight-based discrimination and had moderately internalized negative weight-relevant stereotypes. Furthermore, feeding practices of restriction (particularly for health concerns) and modeling a healthy diet were regularly endorsed by participants.

## Psychometric Evaluation of Measures

Reliability coefficients for all scales exhibited at least acceptable levels of internal consistency and were comparable to those obtained during previous validation efforts (Table 5). Convergent validity was assessed by examining Pearson correlations between subscales. Specifically, we would expect two related subscales to be positively correlated as they measure components of a single higher order construct. As predicted, the restriction for health subscale was significantly correlated with the restriction for weight subscale ($r$ = .399, $p$ = .012). Additionally, the behavioral consequences subscale was significantly correlated with both verbal modeling ($r$ = .371, $p$ = .02) and unintentional modeling subscales ($r$ = .368, $p$ = .02).

## Correlational Analysis

Beyond convergent validity, we also wanted to take this opportunity to examine if our weight stigma variables were correlated with parental feeding practices. Pearson correlations between select variables of interest are presented in Table 6. Of note, scores from the SSI-B (weight stigma experiences) were significantly correlated with the restriction for weight subscale ($r$ = .396, $p$ = .01). While relationships between other independent and dependent variables failed to reach conventional levels of significance, they still merit discussion. For example, WBIS-M scores were negatively correlated with verbal modeling (r = -.169) and behavioral consequences ($r$ = -.291). Moreover, SSI-B scores were positively correlated with reports of unintentional modeling ($r$ = .267) and child's daily unhealthy snack intake ($r$ = .255). Lastly, parental BMI derived from self-reported height and weight was significantly correlated with WBIS scores ($r$ = .441, $p$ < .01) and child's daily sugar-sweetened beverage consumption ($r$ = .370, $p$ = .03). It is important to interpret, however, these results with caution. Specifically, these analyses were conducted without accounting for covariates, included normal weight parents, and were substantially underpowered.

# CHAPTER 4: RESULTS

## Preliminary Analysis

### Enrollment Statistics

Two thousand participants were screened from March 22nd to April 15th, 2019. Of those, $n = 451$ met the initial inclusion criteria and were enrolled in the study. Within this sample, a total of $n = 45$ participants were excluded from further analysis. Specifically, $n = 8$ did not complete items pertaining to primary independent or dependent variables, $n = 33$ reported their child's age to be outside of the specified 5-10-year-old range, and $n = 4$ failed at least two of three attention check items. After these exclusions, analyses were performed on a sample of $n = 406$.

### Sample Descriptive Statistics

Participants were a mean 36.9 years ($SD = 7.1$) of age and had a mean BMI of 33.8 $kg/m^2$ ($SD = 7.22$). Additionally, the majority of the sample was female (74.9%), had less than a college degree (51.3%), had an annual household income of more than $60,000, and tended to be White/Caucasian (80.3%). These participants also reported demographic and health-related information on their children. The majority was female (52.0%), averaged 7.52 ($SD = 1.7$) years old and had a mean BMI-for-age percentile of .65 ($SD$=.34). Participant demographics are displayed in Table 7 and parent-reported child demographics are presented in Table 8.

### Reliability Analysis

Internal consistency for each scale was assessed using Cronbach's alpha. Both weight stigma scales exhibited good reliability ($\alpha = .89$) similar to that observed in previous validations.

For parental feeding practices, the restriction for weight, verbal modeling, and behavioral control subscales all demonstrated good reliability ($\alpha$ = .81-.87). While the restriction for health and unintentional modeling subscales displayed fair reliability ($\alpha$ = .72-.76), these statistics were either comparable or superior to what was observed in previous studies (D. Musher-Eizenman & Holub, 2007b; Palfreyman et al., 2014).

Internal consistency in the measures assessing parental support for physical activity were less uniform. The reduction in sedentary behavior subscale was the most reliable ($\alpha$ = .87) followed by the logistic support subscale ($\alpha$ = .78). Several issues were observed in the remaining physical activity support measures. Specifically, the explicit modeling, use of community resources, and encouragement subscales all exhibited poor reliability ($\alpha$s = .62 -.65). For each of these measures, item-level analysis was conducted to determine if internal consistency would be improved with the removal of specific items. Within the explicit modeling and use of community resources subscales, no single item was identified to be the primary source of the inconsistency. In the encouragement measure, the removal of one question was found to increase reliability from $\alpha$ = .65 to $\alpha$ = .77. It should be noted, however, that this scale only consists of three items, and while obtaining reliable measures is a priority, removing one third of the items for this measure may limit its scope and negatively impact its construct validity. To balance these two concerns, we have elected to run separate analyses for encouragement using both the original 3-item measure as well as the more reliable 2-item version.

Subscales measuring general parenting practices and responsibility/concern for child weight all exhibited acceptable or better levels of reliability. Specifically, the positive parenting subscale was observed to have good internal consistency ($\alpha$ = .81) while the inconsistent discipline and poor supervision subscales displayed fair levels of reliability ($\alpha$ = .75 and .73

respectively). The responsibility subscale displayed good reliability ($\alpha = .84$) while the concern subscale exhibited excellent internal consistency ($\alpha = .91$). Lastly, the parental self-shame measure was observed to be very reliable ($\alpha = .92$). Ensuring this scale achieved at least acceptable levels of reliability was particularly important as this measure was developed specifically for this study. Reliability statistics for all measures are presented in Table 9.

**Validation Analysis**

In addition to ensuring our measures were reliable, it was also important to include evidence to support their validity. Convergent validity was assessed by examining the Pearson correlations between measures. Specifically, we would expect scales that are designed to assess different components of a single higher order construct to be correlated. For our measures of weight stigma, we observed a significant positive correlation between experiences of weight stigma (SSI-B) and weight-bias internalization (WBIS-M) ($r = .374$, $p < .001$). The parental feeding variables also demonstrated positive correlations with their related subscales. To start, restriction for health scores were positively associated with restriction for weight scores ($r = .443$, $p < .001$). Additionally, all modeling of healthy eating scales were significantly correlated with one another (*rs* = .363 - .507, *ps* <.001). In terms of parent reported child eating behaviors, unhealthy snack and sugar sweetened beverage intake were significantly correlated ($r = .396$, $p < .001$). Correlations for weight stigma and feeding-related variables and outcomes are presented in Table 10.

The physical activity support variables also had moderate to strong positive correlations with one another (*rs* = .264 - .561, *ps* < .011). Additionally, parent reported child videogame time was negatively correlated with reported child physical activity ($r = -.131$, $p < .001$) and positively correlated with TV/video screen time ($r = .460$, $p < .001$). Correlations for physical activity-related variables and outcomes are displayed in Table 11.

Lastly, measures of general parenting, concern for and responsibility about child weight, and self-shame associated with child overweight were assessed for convergent validity. For measures of general parenting, inconsistent discipline was positively correlated with poor supervision ($r = .159$, $p <.001$). Positive parenting was negatively associated with poor supervision ($r = -.318$, $p < .001$), but showed minimal relationship with inconsistent discipline ($r = -.034$, $p = .499$). It is unclear why the latter relationship was not observed in this dataset. Previous validations have found a small, but significant negative relationship between these variables ($r = -.17$, $p < .01$) (Elgar et al., 2007). No significant relationship was detected between responsibility and concern about child weight and this is consistent with previous studies (Birch et al., 2001). Lastly, special attention was paid to the measure of parental shame of child overweight as it was developed for this study and not previously validated. Conceptually, we would expect to observe a positive relationship between concern about child overweight and parental shame of child overweight. More specifically, shame about child overweight could potentially be one reason why a parent would be concerned about their child's weight status, and as such, we would anticipate these variables to be positively correlated. Our analysis revealed these two variables were in fact significantly correlated ($r = .187$, $p < .001$) lending credence to the notion that this scale was measuring its underlying construct as intended. Correlations for these variables are presented in Table 12.

## Primary Results for Feeding Practice Outcomes

Hierarchical multiple linear regression was used to determine the extent to which parental weight stigma predicted parental feeding practices. Each set of analysis consisted of four blocks.

The initial block (block zero) consisted of only covariates. In blocks one, two, and three weight stigma experiences (SSI), weight bias internalization (WBIS), and their interaction was added to the regression equations, respectively. Particular interest was paid to the predictive power of each variable (standardized beta coefficient; β) as well as the amount of additional variance weight stigma was able to explain in the particular dependent variable ($R^2$ change). No significant effects were found for the weight stigma interaction term (i.e., SSI x WBI) across any feeding of physical activity related outcome and will not be discussed further. Relevant statistics for the weight stigma interaction are presented in Table 13.

**Restriction for Health**

All regression models significantly predicted restriction for health scores (*ps* ≤ .001). The initial block accounted for 7.1% of the variance in the dependent variable and this effect was primarily driven by parent age (β = -.110, *p* = .05), household income (β = .138, *p* = .019), and child BMI percentile (β = .194, *p* < .001). Specifically, younger parents, higher household income, and higher child BMI percentiles were significantly associated with higher restriction for health scores. The inclusion of SSI did not significantly increase the predictive power of the model. In contrast, the addition of WBIS significantly increased the amount of variance explained in restriction for health scores ($R^2$ change = .019, β = .156, *p* = .006), where higher levels of WBIS were associated with higher levels of restriction for health. Additionally, parent race emerged as a significant predictor within this model, where non-White parents were more likely to restrict for health concerns compared to White parents (β = .102, *p* = .044). Table 14 displays the results of the hierarchical regression analysis for restriction for health.

**Restriction for Weight**

All regression models significantly predicted restriction for weight scores (*ps* ≤ .001). The covariate block accounted for 12.7% of the variance in restriction for weight. This effect was primarily driven by parent gender ($\beta = -.186$, $p < .001$), parent race ($\beta = .114$, $p = .020$), and child BMI percentile ($\beta = .227$, $p < .001$). More precisely, being a male, non-White, and having a child with a higher BMI percentile were associated with greater restriction for weight scores. The addition of SSI in block one significantly increased the amount of variance explained in restriction for weight scores ($R^2$ change = .076, $\beta = .293$, $p < .001$) with higher SSI scores being associated with higher levels of restriction for weight. In this block, parent BMI also became a significant predictor, with lower parent BMI being associated with more restriction for weight ($\beta = -.176$, $p < .001$). In block two, the inclusion of WBIS significantly increased the amount of variance explained in restriction for weight scores ($R^2$ change = .013, $\beta = .128$, $p = .016$) where higher WBIS scores were associated with higher levels of restriction for weight. Table 15 displays the results of the hierarchical regression analysis for restriction for weight.

**Verbal Modeling of Eating Behaviors**

None of the tested regression models significantly predicted verbal modeling scores. The initial (i.e., covariates only) block accounted for only 1.1% of the variance in verbal modeling, and no predictor reached conventional levels of significance. The inclusion of SSI in block one significantly increased the amount of variance explained in the model ($R^2$ change = .021, $\beta = .154$, $p = .005$), but not enough for the overall model to significantly account for verbal modeling scores. Specifically, higher SSI scores were associated with higher reported verbal modeling. Within this block, parent BMI became a significant predictor of verbal modeling ($\beta = -.119$, $p = .031$) wherein lower BMIs were associated with higher verbal modeling. In block two, the addition of WBIS increased the amount of variance accounted for in verbal modeling by 1%, and this increase was marginally significant ($\beta = .113$, $p = .053$). Table 16 displays the results of the hierarchical regression analysis for verbal modeling of eating behavior.

**Behavioral Control**

None of the tested regression models significantly predicted behavioral control scores. The covariate-only block accounted for a modest 2.8% of the variance in behavioral control, and no individual predictor reached conventional levels of significance. The addition of SSI in block one did not significantly account for any additional variance ($R^2$ change = .008, $\beta = .093$, $p = .087$). Within this block, parent education significantly predicted behavioral control scores ($\beta = -.130$, $p = .028$) where lower levels of education were associated with higher behavioral control scores. For block two, the inclusion of WBIS did not significantly change the amount of variability accounted for in the model ($R^2$ change = .002, $\beta = .049$, $p = .401$). Table 17 displays the results of the hierarchical regression analysis for restriction for weight.

## Exploratory Hierarchical Regression Results for Feeding-Related Outcomes

**Unintentional Modeling**

The initial block did not significantly predict unintentional modeling scores ($R^2 = .040$, $p = .089$). The variance that was explained was primarily accounted for by parent age ($\beta = -.143$, $p = .012$) and household income ($\beta = -.130$, $p = .029$). The addition of SSI significantly increased the predictive power of the model ($R^2$ change = .063, $\beta = .267$, $p < .001$) where higher SSI scores were associated with higher levels of unintentional modeling. In block two, the addition of WBIS also significantly increased the amount of variance explained in unintentional modeling ($R^2$ change = .031, $\beta = .200$, $p < .001$) where higher WBIS scores were associated with higher levels of unintentional modeling. Table 18 displays the results of the hierarchical regression analysis for restriction for unintentional modeling.

**Unhealthy Snack Consumption**

Block zero failed to significantly predict parent reported child unhealthy snack consumption ($R^2 = .039$, $p = .110$). The only significant predictor in this block was child age, where younger children were associated with greater unhealthy snack consumption ($\beta = -.135$, $p = .013$). In block one, the addition of SSI significantly increased the amount of variance explained in unhealthy snack consumption, where higher levels of SSI were associated with higher levels of unhealthy snack consumption ($\beta = .146$, $p = .007$). Adding WBIS in block two did not significantly increase the amount of variance the model accounted for ($R^2$ change < .001, $\beta = .024$, $p = .667$). Table 19 displays the results of the hierarchical regression analysis for unhealthy snack consumption.

**Sugar Sweetened Beverage Consumption**

None of the tested regression models significantly predicted parent reported child sugar sweetened beverage consumption. The covariate-only block accounted for 4.4% of the variance in sugar sweetened beverage consumption, and no predictor reached conventional levels of significance. The addition of SSI in block one did not significantly account for additional variance ($R^2$ change = .001, $\beta = .040$, $p = .461$). For block two, the inclusion of WBIS did not significantly change the amount of variability accounted for in the model ($R^2$ change = .002, $\beta = .056$, $p = .341$). Table 20 displays the results of the hierarchical regression analysis for sugar sweetened beverage consumption.

**General Parenting**

As discussed in the introduction, it is possible that weight stigma may be associated with differences in parenting more globally as opposed to weight-related parenting practices more specifically. To test this hypothesis, three subscales from the APQ-S (positive parenting, inconsistent discipline, and poor supervision) were included in hierarchical regression models for all primary and exploratory dependent variables. Specifically, these measures were included with the other covariates in block zero of the analysis and were present in all subsequent blocks. If the associations between weight stigma and weight-related practices persisted when these general parenting variables in the models, we could infer that this relationship exists above and beyond what is accounted for by general parenting behaviors. While these subscales frequently accounted for additional variance in the outcome variables, their impact on either weight stigma variable was generally immaterial. The two exceptions were for the variables of behavioral control and unhealthy snack consumption. Recall that in the initial analysis SSI did not significantly predict variability in behavioral control. However, with the inclusion of the three general parenting subscales, the addition of SSI was associated with a significant increase in the amount of variance that was explained in the model ($R^2$ change = .015, β = .140, $p$ = .016). In contrast, the addition of the general parenting measures into models predicting unhealthy snack consumption attenuated the predictive power of SSI. Specifically, SSI went from significantly explaining an additional 1.9% variance in unhealthy eating (β = .146, $p$ = .007) to explaining 0.8% of the variance (β = .106, $p$ = .070).

**Summary of Hierarchical Regression Results for Feeding-Related Outcomes**

Parental weight stigma was significantly associated with a number of feeding practices and child feeding outcomes. Specifically, weight stigma experiences were positively associated with restriction for weight, verbal modeling of eating behaviors, unintentional modeling, and parent reported child unhealthy snack consumption.  Weight bias internalization was positively associated with restriction for health, restriction for weight, and unintentional modeling.  Lastly, these effects persisted even when accounting for relevant covariates including general parenting behaviors.

## Exploratory Mediation Results for Feeding-Related Outcomes

### Review of Mediation Procedures

Across all mediation models tested, all but one fit index exceeded the desired thresholds outlined previously (CFI = 1.00, TLI = 1.00, RMSEA < 0.01).  The only exception was the chi squared test which did not indicate satisfactory fit ($p \leq .05$).  However, such findings are common when using larger sample sizes and do not necessarily signal poor fit (Bergh, 2015).  Combined with the other measures of model fit, we can be reasonably confident that all tested models were accurately constructed.  Therefore, no additional model modifications were made.

Within each mediation model, the direct, indirect, and total effects of weight stigma on the dependent variables were tested for significance.  With partial mediation, an independent variable (e.g. stigma experiences) has both direct and indirect effects on a dependent variable (e.g., restriction for weight).  The direct effect is not mediated, whereas the indirect effect is transmitted through one or more mediating variables.  The total effect is equal to the sum of the direct and indirect effects of an independent variable on the dependent variable.  It is also important to note that modern conventions in mediation analysis do not preclude a significant indirect effect from occurring in the absence of a significant total effect.  In such instances, although the independent variable may not account for a significant level of variance in the dependent variable, the amount of variance than can be explained may still pass through the mediating variable. Additionally, it is also possible for the direct and indirect effects to exert opposing forces on the outcome variable, resulting in a null effect. For example, the direct effect may be positively valenced while the indirect effect may be negative. As the total effect is equal to the sum of the direct and indirect effects, these differentially valenced effects may lead to a non-significant total effect (Hayes, 2009).

**Unhealthy Snack Consumption**

The first set of models examined the extent to which the restriction subscales mediated the relationship between the weight stigma variables and unhealthy snack consumption. Specifically, multiple mediation models were constructed with both restriction for weight and restriction for health tested as mediators. A significant direct ($\beta = .160$, $p = .028$) and marginally significant total effect ($\beta = .136$, $p = .057$) was observed between parental weight stigma experiences and child unhealthy snack consumption. Restriction for weight ($\beta = -.025$, $p = .079$) or restriction for health ($\beta \leq .001$, $p = .851$) did not mediate this relationship. No direct ($\beta = .060$, $p = .285$) or total effects ($\beta = .046$, $p = .408$) were found between weight bias internalization and child unhealthy snack consumption. Furthermore, no evidence was found for restriction for weight ($\beta = -.025$, $p = .079$) or restriction for health ($\beta < .001$, $p = .851$) mediating this relationship.

The next set of models examined the extent to which explicit modeling mediated the relationship between weight stigma and child unhealthy snack consumption. A significant total effect ($\beta = .137$, $p = .016$) and direct effect ($\beta = .165$, $p = .004$) of weight stigma experiences on child snack intake was observed. However, neither verbal modeling ($\beta = -.008$, $p = .366$) nor behavioral control ($\beta = .020$, $p = .084$) were shown to mediate this relationship. In contrast, no total (β = .045, $p$ = .438) or direct effects (β = .049, $p$ = .387) were found linking weight bias internalization to unhealthy child snack consumption. Furthermore, no significant indirect effects were observed for the mediators of verbal modeling (β = -.004, $p$ = .442) or behavioral control (β = -.001, $p$ = .955).

**Sugar Sweetened Beverage Consumption**

No significant total (β = -.025, $p$ = .664) or direct (β = -.049, $p$ = .396) effects were detected linking parent weight stigma experiences to child sugar sweetened beverage consumption. Furthermore, no indirect effects were observed passing through restriction for weight (β = .024, $p$ = .090) or restriction for health (β = .001, $p$ = .847). Similarly, the total (β = .076, $p$ = .185) and direct (β = .051, $p$ = .378) effects were not significant for weight bias internalization predicting sugar sweetened beverage consumption. Moreover, no evidence was found for restriction for weight (β = .017, $p$ = .116) or restriction for health (β = .008, $p$ = .341) mediating this relationship.

No significant paths emerged when examining the relationship between weight stigma, explicit modeling, and sugar sweetened beverage consumption. Specifically, weight stigma experiences were not significantly associated with child sugar sweetened beverage intake either in total (β = -.025, $p$ = .664) or directly (β = .002, $p$ = .977). Additionally, no indirect effects were observed for the mediators of verbal modeling (β = -.021, $p$ = .067) or behavioral control (β = -.005, $p$ = .069). A similar pattern emerged for weight bias internalization where no significant total (β = .076, $p$ = .184) or direct (β = .089, $p$ = .119) effects were detected. Moreover, no evidence was found supporting the hypothesis that verbal modeling (β = -.012, $p$ = .207) or behavioral control (β = -.001, $p$ = .775) mediated this relationship.

In summary, parental weight stigma experiences appear to be linked to unhealthy snack intake, but not to sugar sweetened beverage consumption. Furthermore, no evidence was found to indicate that either of these relationships were mediated by explicit parental modeling.

**Concern about Child Weight**

Next, parent concern about child weight was tested as a mediator between weight stigma and restriction. To begin, the total effect linking weight stigma experiences to restriction for health was not significant ($\beta = .011$, $p = .844$), but the total effect for weight bias internalization was ($\beta = .136$, $p = .016$). Despite these differences in total effects, a number of significant indirect effects were observed. Specifically, concern about child weight significantly mediated the relationships between weight stigma experiences ($\beta = .097$, $p < .001$) and weight bias internalization ($\beta = .064$, $p = .001$) with restriction for heath. The direct effects of weight stigma experiences ($\beta = -.085$, $p = .124$) and weight bias internalization ($\beta = .072$, $p = .193$) on restriction for health failed to reach conventional levels of significance. The total, direct, and indirect effect of weight bias internalization on restriction for health are presented in Figure 10.

Both weight stigma experiences ($\beta = .207$, $p < .001$) and weight bias internalization ($\beta = .152$, $p = .004$) were significantly associated with restriction for weight in total. While the direct effects from weight stigma experiences ($\beta = .034$, $p = .432$) and weight bias internalization ($\beta = .037$, $p = .392$) were not significant, the indirect effects were. Specifically, concern about child weight significantly mediated the relationships between weight stigma experiences ($\beta = .173$, $p < .001$) and weight bias internalization ($\beta = .115$, $p < .001$) with restriction for weight. The total, direct, and indirect effect of weight stigma experiences on restriction for weight are presented in Figure 11.

Similar mediation models were also generated to test the extent to which concern about child weight, mediated the effects of weight stigma on explicit modeling of eating behaviors. Within these models, a significant total effect was observed linking weight stigma experiences to verbal modeling ($\beta = .153$, $p = .007$) and behavioral control ($\beta = .125$, $p = .028$). In contrast, the total effects of weight bias internalization on verbal modeling ($\beta = .082$, $p = .158$) or behavioral control ($\beta = .012$, $p = .831$) were not significant. Within these models, weight stigma experiences did not directly predict verbal modeling ($\beta = .100$, $p = .087$) or behavioral control ($\beta = .112$, $p = .058$). Similarly, weight bias internalization was also not directly associated with verbal modeling ($\beta = .047$, $p = .419$) or behavioral control ($\beta = .004$, $p = .950$). However, concern about child weight significantly meditated the relationship between weight stigma and verbal modeling. Specifically, indirect effects were observed from both weight stigma experiences ($\beta = .052$, $p = .005$) and weight bias internalization ($\beta = .035$, $p = .015$) passing through concern. Conversely, no indirect effects were observed connecting weight stigma experiences ($\beta = .013$, $p = .430$) or weight bias internalization ($\beta = .009$, $p = .437$) to behavioral control. The total, direct, and indirect effect of weight stigma experiences on verbal modeling are presented in Figure 12.

**Responsibility for Child Weight**

Responsibility for child weight was also tested as a mediator between weight stigma and restrictive feeding practices. The total effects of weight stigma on restriction are identical to those described in the previous paragraph. No evidence was found supporting a direct effect between weight stigma experiences and restriction for health ($\beta = .011$, $p = .847$). In contrast, weight bias internalization was directly associated with restriction for health ($\beta = .135$, $p = .017$). Significant direct effects were also observed linking weight stigma experiences ($\beta = .206$, $p <$

.001) and weight bias internalization ($\beta = .146$, $p = .006$) with restriction for weight. In terms of the indirect effects, responsibility for child weight did not significantly mediate the relationship between weight stigma experiences and restriction for health ($\beta < .001$, $p = .847$) or weight ($\beta = .002$, $p = .742$). Likewise, responsibility had no mediating effect on the relationship between weight bias internalization and restriction for health ($\beta = .001$, $p = .847$) or weight ($\beta = .006$, $p = .303$).

The next model examined whether responsibility for child weight significantly mediated the relationships between parental weight stigma and explicit modeling of eating behaviors. Within this model, weight stigma experiences directly predicted both verbal modeling ($\beta = .151$, $p = .008$) and behavioral control ($\beta = .123$, $p = .029$). In contrast, no significant direct effects were observed linking weight bias internalization to either verbal modeling ($\beta = .074$, $p = .201$) or behavioral control ($\beta = .005$, $p = .937$). No significant indirect effects were detected in this analysis. Specifically, responsibility for child weight did not mediate the relationships between weight stigma experiences and verbal modeling ($\beta = .002$, $p = .740$) or behavioral control ($\beta = .002$, $p = .741$). Likewise, parental responsibility did not significantly mediate the effects of weight bias internalization on verbal modeling ($\beta = .008$, $p = .280$) or behavioral control ($\beta = .008$, $p = .238$).

**Parental Self-Shame about Child Overweight**

Parental self-shame about child overweight was examined as a potential mediator between weight stigma and restrictive feeding practices. Again, the total effects between weight stigma and restriction were identical to those previously reported. Weight stigma experiences were not directly associated with restriction for health ($\beta = .009$, $p = .879$), but were directly associated with restriction for weight (β = .204, $p < .001$). In contrast, weight bias internalization did not directly predict restriction for health (β = .001, $p = .847$), but was directly associated with restriction for weight. No significant mediating effects were detected in the analysis. Specifically, self-shame did not mediate the relationship between weight stigma experiences and restriction for weight (β = .001, $p = .847$) or health (β = .001, $p = .847$). Similarly, no indirect effect was observed for self-shame mediating the relationship between weight bias internalization and restriction for weight (β = .031, $p = .061$) or health (β = .025, $p = .154$).

Lastly, parental self-shame associated with child overweight was tested as a mediator between weight stigma and explicit modeling. Within this model, a significant direct effect of weight stigma experiences on verbal modeling (β = .155, $p = .006$) and behavioral control (β = .128, $p = .023$) were observed. Weight bias internalization did not directly predict verbal modeling (β = .105, $p = .082$) or behavioral control (β = .043, $p = .478$). Furthermore, self-shame about child overweight did not significantly mediate any paths in this model. Specifically, no indirect effects were observed between weight stigma experiences and verbal modeling (β = -.002, $p = .586$) or behavioral control (β = -.003, $p = .571$). Similarly, self-shame did not mediate the relationships between weight bias internalization and verbal modeling (β = -.023, $p = .199$) or behavioral control (β = -.030, $p = .093$).

These models tested three mechanisms which may potentially mediate the effects between parental weight stigma and restrictive feeding practices. Concern about child weight was only factor that consistently explained these relationships. Moreover, the fact that the direct effects were not significant suggests that the pathway passing through concern about child is accounting for a substantial level of variance in this model. These results for explicit modeling are largely consistent with those observed for restrictive feeding practices. Specifically, concern about child weight was the only mediator tested that significantly explained the relationships between weight stigma and explicit modeling of healthy eating. Furthermore, the lack of significant direct effects indicates that concern about child overweight may be a chief mechanism by which parental weight stigma influences explicit modeling of eating behaviors.

**Weight Bias Internalization as a Mediator**

The next set of mediation analysis tested whether weight bias internalization mediated the effects of weight stigma experiences on restriction for weight and/or health. Recall that recent studies have argued that weight bias internalization mediates the relationship between weight stigma experiences and a given outcome. The goal of this analysis was to lend support for or refute this claim. Paths models were generated for both restrictive feeding practices and explicit modeling of healthy eating. Starting with restriction, neither the total effect nor the direct effect of weight stigma experiences on restriction for health was significant (total $\beta = .056$, $p = .297$; direct $\beta = .011$, $p = .844$). However, the indirect effect passing through weight bias internalization was significant ($\beta = .045$, $p = .024$). In contrast, weight stigma experiences significantly predicted restriction for weight both in total ($\beta = .258$, $p < .001$) and directly ($\beta = .207$, $p < .001$). Furthermore, this effect was significantly mediated by weight bias internalization ($\beta = .050$, $p = .008$).

This analysis was repeated for explicit modeling of healthy eating. Both the total and direct effects of weight stigma experiences on verbal modeling were statistically significant (total $\beta = .180$, $p = .001$; direct $\beta = .153$, $p = .007$). However, the indirect effect was not significant indicating that weight bias internalization does not mediate this relationship ($\beta = .027$, $p = .116$). A similar pattern was observed for behavioral control. Both total and direct effects were significant for weight stigma experiences significantly predicting behavioral control (total β = .129, *p* = .016; direct β = .125, *p* = .028), but this relationship was not significantly mediated by weight bias internalization (β = .004, *p* = .831). Taken together, these results lend partial support for the hypothesis that weight stigma experiences lead to changes in weight bias internalization. Specifically, this relationship was affirmed for restrictive feeding practices, but not for explicit modeling behaviors.

## Primary Results for Parental Support of Physical Activity Outcomes

The plan of analysis for the assessing the relationship between parental weight stigma and parental support for physical activity largely mirrors that what was used when examining parental feeding practices. Specifically, hierarchical multiple linear regression was used to determine the extent to which parental weight stigma predicted physical activity-related parenting practices. Each set of analysis consisted of four blocks. The initial block (block zero) consisted of only covariates. In blocks two, three, and four weight stigma experiences (SSI), weight bias internalization (WBIS), and their interaction was added to the regression equations, respectively. Particular interest was paid to the predictive power of each variable (standardized beta coefficient; β) as well as the amount of additional variance weight stigma was able to explain in the particular dependent variable ($R^2$ change). As discussed previously, no significant effects were observed for the weight stigma interaction and thus, will not be discussed further.

### Logistic Support for Physical Activity

All regression models significantly predicted logistic support for physical activity (*ps* ≤ .001). The initial block (i.e., covariates only) accounted for 8.5% of the variance in logistic support scores. This effect was primarily driven by household income (β = .189, *p* = .001) and ethnicity (β = -.099 *p* = .049). Specifically, higher household income and identifying as White were associated with higher logistic support scores. The inclusion of SSI scores in block one did not significantly increase the amount of variance explained in logistic support scores ($R^2$ change = .004, β = .067, *p* = .204). WBIS scores also failed to significantly increase in the predictive power of the model ($R^2$ change = .001, β = .044, *p* = .443). Table 21 displays the results of the hierarchical regression analysis for logistic support for physical activity.

### Explicit Modeling of Physical Activity

All regression models significantly predicted explicit modeling of physical activity (*ps* = .002 - .010). The covariate-only block accounted for 5.6% of the variance in explicit modeling. Within this block, parent BMI was the only significant predictor (β = -.179, *p* = .001), with lower BMIs being associated with more frequent modeling behaviors. The addition of SSI did not significantly increase the predictive power of the model ($R^2$ change = .008, β = .094, *p* = .080). In contrast, the inclusion WBIS scores did significantly increase the amount of variance explained in the model ($R^2$ change = .012, *p* = .031). Within this block, not only was WBIS a significant predictor of explicit modeling (β = -.124, *p* = .031), but SSI became one as well (β = .133, *p* = .019). Moreover, weight stigma experiences were positively associated with explicit modeling while weight-bias internalization exhibited a negative relationship. Table 22 displays the results of the hierarchical regression analysis for explicit modeling of physical activity.

## Exploratory Hierarchical Regression Analysis for Physical Activity-Related Outcomes

### Informational Support for Physical Activity

All bocks within this analysis significantly predicted informational support (*ps* = .001 - 002). The variables in block zero accounted for 4.4% of the variance in use of community resources scores. Within this block, parent educational attainment was the only statistically significant predictor (β = .154, $p = .007$). SSI was observed to be only a marginally significant predictor and its inclusion did not significantly increase the amount of variance explained in the model ($R^2$ change = .001, β = .098, $p = .067$). The inclusion of WBIS did not have any discernable effects on the model ($R^2$ change = .002, β = -.029 $p = .612$). Table 23 displays the results of the hierarchical regression analysis for informational support for physical activity.

**Parenting Practices to Limit Sedentary Behavior**

No block within this model significantly predicted restriction of sedentary activity scores (*ps* = .269 - .863). Block zero accounted for 2.9% of the variance in parenting practices to limit sedentary behavior and no individual predictor reached statistical significance. The additional inclusions of SSI ($R^2$ change = .002, β = .044 $p = .422$) and WBIS ($R^2$ change < .001, β = -.016, $p = .787$) had no significant impact on the model. Table 24 displays the results of the hierarchical regression analysis for parenting practices to limit sedentary behavior.

**Encouragement of Physical Activity**

All bocks in this analysis failed to significantly predict encouragement of physical activity (*ps* = .630 - .753). The initial block only accounted for 1.8% of the variance in encouragement scores and no individual predictor was statistically significant. The addition of SSI ($R^2$ change = .003, β = .058 $p = .286$) and WBIS ($R^2$ change < .001, β = .012, $p = .835$) had no significant impact on the model. Due to the reliability concerns associated with the three-item version of the measure that were noted previously, this analysis was repeated with a two-item version of the encouragement scale. No significant effects were observed in this subsequent analysis.  Table 25 displays the results of the hierarchical regression analysis for the 3-item measure of encouragement of physical activity.

**Parent Report of Child's Physical Activity and Sedentary Behaviors**

Separate hierarchical regression analyses were conducted predicting child physical activity level, TV/video time, and videogame time.  All blocks significantly predicted child physical activity (*ps* = .010 - .021).  Block zero accounted for 5.6% of the total variance in physical activity scores.  The only significant predictor in this model was child age ($\beta$ = -.183, $p$ = .001) indicating physical activity levels decreased with age.  The inclusion of SSI ($R^2$ change = .004, $\beta$ = -.063 $p$ = .241) and WBIS ($R^2$ change = .002, $\beta$ = -.056, $p$ = .333) had no significant impact on the model.

For TV/video time, no block accounted for a significant level of variance in this outcome variable (*ps* = .315 - .465) with block zero accounting for only 2.8% of the variance. Furthermore, no effects were found for SSI ($R^2$ change < .001, $\beta$ = -.013 $p$ = .810) or WBIS ($R^2$ change = .003, $\beta$ = .062, $p$ = .289).

Lastly, all blocks significantly predicted videogame time (*ps* = < .001) with block zero accounting for 8.8% of the measure's variance.  This effect was principally driven by child age ($\beta$ = -.162, $p$ = .002), child sex ($\beta$ = -.161, $p$ = .001), and child BMI percentile ($\beta$ = .191, $p$ < .001).  In other words, parents of younger, male, and heavier children higher reported higher levels of child videogame time.  The inclusion of SSI ($R^2$ change < .001, $\beta$ = .009, $p$ = .810) and WBIS ($R^2$ change = .003, $\beta$ = .067, $p$ = .289) had no significant impact on the model.  Combined, these results suggest that weight stigma has no significant association with parent report of child's physical activity and sedentary behaviors.  Tables 26-28 display the results of the hierarchical regression analysis for parent report of child's physical activity and sedentary behaviors.

**General Parenting**

Additional hierarchical regression models were generated incorporating measures of general parenting. The purpose of these analyses was to determine if parental weight stigma was associated with physical activity support behaviors above and beyond what was explained by general parenting practices. The inclusion of the three general parenting subscales (positive parenting, inconsistent discipline, and poor supervision) increased the amount of variance explained across all primary and exploratory physical activity outcome variables. However, as with the feeding-related variables, the impact of the general parenting subscales on the weight stigma variables was generally immaterial. Two notable exceptions were with the primary outcome variables of logistic support and explicit modeling of physical activity. Specifically, with the inclusion of the general parenting subscales, SSI became a significant predictor for both logistic support ($R^2$ change = .013, $\beta$ = .130, $p$ = .022) and explicit modeling of physical activity ($R^2$ change = .010, $\beta$ = .116, $p$ = .040). No changes in the significance levels of WBIS were observed. These results suggest that general parenting practices do not fully explain the relationship between parental weight stigma and physical activity support behaviors.

**Summary of Hierarchical Regression Results for Physical Activity-Related Outcomes**

Taken together, these results suggest parental weight stigma has a limited relationship with physical activity-related support behaviors and child outcomes. The only significant relationships observed were between weight stigma experiences, weight bias internalization, and explicit modeling of physical activity. No significant effects were observed for weight stigma predicting informational support, parenting practices limiting sedentary behaviors, or encouragement.  Lastly, parental weight stigma did not significantly predict child physical activity, TV/video time, or videogame time.

## Exploratory Mediation Results for Physical Activity-Related Outcomes

### Child Physical Activity and Sedentary Behaviors

The first set of analyses examined whether logistic support mediated the relationships between weight stigma and parent reported child physical activity and sedentary behaviors. Within these models, no paths reached conventional levels of significance.  Specifically, no total effects were observed between weight stigma experiences and child physical activity ($\beta$ = .001, $p$ = .981), TV/video time ($\beta$ = -062, $p$ = .284), or videogame time ($\beta$ = -.038, $p$ = .509).  The direct effects of parental weight stigma on these child outcomes were also not significant (physical activity $\beta$ = -.028, $p$ = .607; TV/video time $\beta$ = -.051, $p$ = .386; videogame time $\beta$ = -.028, $p$ = .627).  However, the indirect effect of weight stigma experiences on child physical activity passing through logistic support was marginally significant ($\beta$ = .030, $p$ = .052).  The remaining indirect effects were not significant (TV/video time $\beta$ = -.011, $p$ = .150; videogame time $\beta$ = -.010, $p$ = .154).  For weight bias internalization, no significant total effects were observed on child physical activity ($\beta$ = -.068, $p$ = .219), TV/video time ($\beta$ = .064, $p$ = .275), or videogame time ($\beta$ = .065, $p$ = .300).  Likewise, no significant direct effects of weight bias internalization on child physical activity ($\beta$ = -.069, $p$ = .204), TV time ($\beta$ = .064, $p$ = .274), or videogame time ($\beta$ = .066, $p$ = .297) were detected.  Lastly, logistic support did not significantly mediate the relationships between weight bias internalization and child physical activity ($\beta$ = < .001, $p$ = .978), TV/video time ($\beta$ < .001, $p$ = .978), or videogame time ($\beta$ < .001, $p$ = .977).

The next set of models examined the extent to which explicit modeling of physical activity mediated the relationship between weight stigma and parent reported child physical activity and sedentary behaviors. The total effects of weight stigma experiences and weight bias internalization on these outcomes are comparable to the total effects reported in the previous paragraph, with all being non-significnat. Although weight stigma experiences were not directly associated with child physical activity (β = -.036, $p$ = .516), TV/video time (β = -062, $p$ = .284), or videogame time (β = -.038, $p$ = .509), several significant indirect effects were observed. Specifically, explicit modeling of physical activity was found to mediate the association between weight stigma experiences with child physical activity levels (β = .037, $p$ = .008) and TV/video time (β = .047, $p$ = .047). The total, direct, and indirect effect of weight stigma experiences on child physical activity are presented in Figure 13. No indirect effects were found linking weight stigma experiences to child videogame time (β = -.006, $p$ = .525).

For weight bias internalization, no significant direct effects were found linking this construct to child physical activity (β = -.033, $p$ = .548), TV/video time (β = .038, $p$ = .515), or videogame time (β = 059, $p$ = .357). Weight bias internalization did significantly predict child physical activity through explicit modeling (β = -.034, $p$ = .014). The total, direct, and indirect effect of weight bias internalization on child physical activity are presented in Figure 14. The indirect effects on weight bias internalization on TV/video (β = .026, $p$ = .060) and videogame time (β = .007, $p$ = .529) were not significant.

Combined, these findings suggest that while parental levels of weight stigma were not significantly associated with child physical activity and sedentary behaviors in total, the variance that was shared maybe at least partially mediated by parental weight stigma.

Mediation models were also generated to examine the extent to which parental concern about child weight, responsibility for child weight, and self-shame associated with child weight explained the relationship between parental weight stigma and logistic support for and explicit modeling of physical activity. Significant total effects were observed for weight stigma experiences on logistic support ($\beta = .110$, $p = .030$) and explicit modeling of physical activity ($\beta = .181$, $p = .001$). Recall that in the hierarchical regression analysis, weight stigma experience scores did not significantly predict logistic support or explicit modeling. While the nature of this discrepancy is unclear, it may be possibly due to differences in case selection between the two methodologies. Specifically, the hierarchical regression analysis utilized pairwise deletion in an effort to include as many data points as possible. This option was not available when analyzing mediation models and cases missing any values across all variables were not included in the analysis resulting in a difference of n = 30 participants.

**Concern about Child Overweight**

For the models testing concern as a mediator, weight stigma experiences were directly associated with logistic support ($\beta = .114$, $p = .036$) and explicit modeling of physical activity ($\beta = .163$, $p = .003$), but no indirect effects were detected (logistic support $\beta = -.003$, $p = .844$; explicit modeling $\beta = .018$, $p = .293$). Weight bias internalization did not directly predict logistic support ($\beta = .004$, $p = .946$), but was directly associated with explicit modeling ($\beta = -.179$, $p = .001$). Concern about child weight did not significantly mediate the relationship between weight bias internalization and logistic support ($\beta = -.002$, $p = .843$) or explicit modeling ($\beta = .012$, $p = .318$).

### Responsibility for Child Weight

Responsibility for child weight was also tested as a potential mediator. In these models, weight stigma experiences were directly associated with both logistic support (β = .108, $p$ = .035) and explicit modeling of physical activity (β = .179, $p$ = .001). However, no significant indirect effects through responsibility for child weight were detected for either logistic support (β = .003, $p$ = .668) or explicit modeling (β = .002, $p$ = .635). In contrast, weight bias internalization did not directly predict logistic support (β = -.007, $p$ = .895), but was directly associated with explicit modeling (β = -.175, $p$ = .001). No evidence was found for responsibility for child weight mediating these relationships (logistic support β = .009, $p$ = .256; explicit modeling β = .008, $p$ = .286).

### Self-shame about Child Overweight

Self-shame about child overweight was examined as a mediating variable between weight stigma and the primary physical activity-related outcomes. Significant direct effects were observed linking weight stigma experiences to both logistic support (β = .111, $p$ = .029) and explicit modeling of physical activity (β = .182, $p$ = .001). Self-shame did not significantly mediate the association between weight stigma experiences and logistic support (β = -.001, $p$ = .754) or explicit modeling (β = -.001, $p$ = .717). Similar to previous analyses, weight bias internalization was not directly linked to logistic support (β = .008, $p$ = .888), but was significantly associated with explicit modeling (β = -.158, $p$ = .006). No indirect effects were observed in these models. Specifically, self-shame did not mediate the effects of weight bias internalization on logistic support (β = -.007, $p$ = .725) or explicit modeling (β = -.009, $p$ = .634).

In contrast to the mediation analyses involving feeding practices, no variable tested in these analyses emerged as a significant mediator of the relationship between parental weight stigma and support behaviors for physical activity. More specifically, while concern about child weight was found to mediate the effects of weight stigma and feeding practices, such an effect was not observed for physical activity-related parenting practices.

**Weight bias internalization**

Lastly, analyses were conducted examining if weight bias internalization mediated the relationship between weight stigma experiences and both logistic support and explicit modeling of physical activity. Weight stigma experiences was found to be significantly associated with logistic support, both in total ($\beta = .11$, $p = .017$) and directly ($\beta = .110$, $p = .030$). However, weight bias internalization was not found to mediate this relationship ($\beta < .001$, $p = .978$). Similarly, significant total and direct effects were observed between weight stigma experiences and explicit modeling of physical activity (total $\beta = .126$, $p = .018$; direct $\beta = .181$, $p = .001$). Furthermore, weight bias internalization was found to significantly mediate this relationship ($\beta = -.055$, $p = .003$). Combined, these results lend partial support to the notion that weight bias internalization mediated the effects of weight stigma experiences on outcome variables. In this case, weight bias internalization was found to mediate the effects of weight stigma situations on explicit modeling, but not on logistic support.

CHAPTER 4: GENERAL DISCUSSION

## Summary of Results

Child overweight and obesity remains a prominent public health priority. A large body of literature has developed exploring how specific parenting practices can increase the risk for, or protect against, child overweight and obesity (for a review see Shloim et al., 2015). However, less research has been devoted to understanding the psychosocial factors that contribute to these parenting behaviors. Weight-based stigmatization has been shown to trigger physiological and behavioral changes linked to poor metabolic health and increased weight gain (for a review see Major, Tomiyama, & Hunger, 2017). Scientists have largely examined these constructs in reference to an individual's own health behaviors and outcomes. To our knowledge, the current study marks the first attempt to investigate the intergenerational impact of weight stigma. Specifically, just as frequent experiences of weight stigma and high levels of weight-bias internalization have been shown to affect a person's own weight-related behaviors, we sought to investigate whether stigmatization also affects parenting behaviors in the domains of feeding and physical activity.

The primary goal of this study was to determine if an association exists between parental reports of weight stigma and weight-related parenting practices. To test this relationship, a large, cross-sectional study was conducted examining parental reports of feeding practices (i.e., restriction and explicit modeling of healthy eating), physical activity support behaviors (i.e., logistic support and explicit physical activity modeling) and weight stigma (i.e., experiences and internalization). Several exploratory outcome variables were also measured including: unintentional parental modeling of eating behaviors, parent-reported child sugar sweetened beverage and unhealthy snack consumption, , informational support for physical activity, parenting practices to limit sedentary behavior, and parental report of their child's physical activity and sedentary behaviors. Hierarchical regression models were utilized to determine the relationships between weight stigma and these parenting practices and child outcomes. Additionally, global positive and negative parenting practices were incorporated into these models to determine the extent to which the effects of weight stigma were localized to the domains of feeding and physical activity or if they were associated with parenting behaviors more generally. Lastly, several exploratory mediation models were generated to examine the theoretical pathways by which weight stigma affects weight-related parenting practices and child outcomes. Specifically, parental concern about, responsibility for, and self-shame associated with child weight were tested as potential mediators.

Weight stigma scores were found to significantly predict parental restriction and modeling of healthy eating behaviors. Specifically, both weight stigma experiences and weight-bias internalization were positively associated with restriction for weight scores, but only weight-bias internalization was significantly associated with restriction for health. No significant relationship was observed between parental weight stigma and behavioral modeling. Additionally, both weight stigma variables were positively associated with unintentional modeling. In terms of child-related behavioral outcomes, parental weight stigma experiences were positively associated with reported unhealthy snack consumption. No effects were found for sugar sweetened beverage consumption. Combined, these findings provide evidence that parental weight stigma is positively associated with the feeding practices of restriction and modeling.

The relationships between parental weight stigma and physical activity-related parenting behaviors and child outcomes were less robust than that for feeding practices. No significant relationships were observed between parental weight stigma and logistic support, informational support, or encouragement. Additionally, weight stigma did not significantly predict parent reported child physical activity and sedentary behaviors. The only two significant associations that were observed were between weight stigma experiences, weight-bias internalization, and explicit modeling of physical activity. While weight stigma experiences were positively correlated with explicit modeling, weight-bias internalization exhibited a negative relationship. That is, greater internalization of negative weigh-related bias was associated with less explicit modeling of physical activity. This latter finding was particularly interesting as it represents the only significnat inverse relationship between weight stigma and weight-related parenting behaviors observed in our analyses. This differential effect of weight stigma on explicit modeling may have support in the literature. Specifically, Pearl, Puhl, and Dovidio (2014) found that while weight stigma experiences were positively correlated with exercise behavior, weight bias internalization was negatively associated with exercise self-efficacy and motivation.

Although the present work was not primarily focused on isolating underlying mechanisms for the observed effects, several mechanistic pathways were explored. Specifically, concern about, responsibility for one's child's weight, and parental self-shame were tested as mediators. Concern about a child's weight was found to mediate the effects of weight stigma on restriction for health, restriction for weight, and explicit verbal modeling. Additionally, concern was found to be a significant mediator even in the absence of significant total effects between these constructs. This may suggest that while the total amount variance weight stigma can explain in these feeding practices may not be significant, the amount that can be explained is mediated through concern about child weight. Moreover, within several mediation models, a null total effect was found to be the result of opposing direct and indirect effects on the outcome variable.

Responsibility for child weight and self-shame associated with one's child being overweight were also tested, but no evidence of any significant indirect effects was observed. These findings could be interpreted based on the aforementioned Model of Stigma-Induced Identity Threat (Major & O'Brien, 2005). Specifically, concern could be conceptualized as a volitional response to weight stigma and thus mediate the effects of weight-based social identity threat (i.e., weight stigma) on outcomes (i.e., feeding practices). Models examining indirect pathways for physical activity-related parenting practices failed to yield significant results. These findings suggest that concern about child weight may represent a key mechanism by which weight stigma affects feeding practices, but not physical activity support behaviors. Furthermore, concerns about one's child's weight might be a way in which personal experiences of weight stigma manifests itself in parents. Experiencing stigmatization can be psychologically painful and stigmatized parents may be highly motivated to avoid having their children suffer a fate similar to theirs. Furthermore, there are very real costs associated with modifying a child's diet. Specifically, such interventions may be met with resistance, lead to parent-child conflict, and foster resentment. Parents who have not been discriminated based on their weight may underestimate the psychological impact of stigmatization and may view these costs associated with modifying their child's diet as exceeding any potential benefits.

**Alternative Mechanisms: Feeding Practices**

It should also be noted that there are a number of additional mediators not tested in this study that may potentially help to explain these relationships. To begin, several studies have linked weight stigma with poor mental health. More specifically, weight-based stigmatization has been found to be a significant psychological stressor (Schvey, Puhl, & Brownell, 2014; Tomiyama, 2014), and has been negatively associated with psychological wellbeing (e.g., self-esteem, depression, and quality of life) (Hunger & Major, 2015). Furthermore, in a nationally representative sample, individuals discriminated against based on their weight were approximately 2.5 times more likely to experience mood and anxiety disorders compared to those who did not face this discrimination (Hatzenbuehler, Keyes, & Hasin, 2009). Based on this evidence, it is possible that chronic exposure to weight-based stigmatization may lead to higher levels of stress, anxiety, and depressive symptoms, which, in turn, may increase the chance that certain parenting practices are selected over others.

A literature has begun to emerge detailing the relationships between parental depression, stress, and anxiety with variations in feeding styles and practices. For example, a narrative review examining the associations between maternal depressive symptoms and feeding styles and practices found good evidence linking depressive psychopathology with instrumental (i.e., using food as a reward or withholding food as a punishment) and nonresponsive (i.e., feeding while ignoring the appetite signals the child is sending) feeding practices (Lindsay, Mesa, Greaney, Wallington, & Wright, 2017). Moreover, the authors found some support connecting maternal depression with pressuring to eat, emotional feeding, and restricting child food intake. Less research has been devoted to the effects of parental stress and anxiety on feeding styles and practices. The available evidence has linked both parental stress with an uninvolved feeding style (i.e., failing to prepare for and participate in feeding) (Hurley, Black, Papas, & Caufield, 2008; Tovar et al., 2012) and controlling feeding practices (i.e., restriction and pressure to eat) (Farrow & Blissett, 2005; S. Mitchell, Brennan, Hayes, & Miles, 2009).

When integrating these two lines of research, a theoretical path emerges where weight stigma may lead to heightened stress and poor mental health which, in turn, may lead to variations in feeding practices including more restrictive feeding. Anxiety, in particular, may play an important role. For example, characteristics commonly associated with anxiety, such as excessive nervousness, fear, apprehension, and worry may translate into higher levels of concern about one's child's weight. Thus, the mediating effect of concern on feeding practices in the current study may be, at least partially, explained by higher overall levels of anxiety. In other words, weight stigma may lead to higher levels of concern in general, and within the context of feeding, may manifest as an elevated concern about their child's weight. Alternatively, anxiety (as well as the other aforementioned mental health constructs) may function as a "third variable" as opposed to a mediator. For instance, high levels of anxiety may increase the likelihood of both attributing negative events to weight-based discrimination as well as restrictive parenting practices. If such a scenario were to hold true, weight stigma would not be causing changes in feeding practices, but rather be simply covarying in unison. Future research should look to untangle these relationships and determine the role anxiety and other mental health states play in the relationship between weight stigma and parental feeding behaviors

**Alternative Mechanisms: Physical Activity Support Practices**

As neither concern nor responsibility about child weight were shown to mediate the effects of weight stigma on explicit modeling of physical activity, additional mechanisms should be considered. The literature exploring the effects of weight stigma on exercise and physical activity may provide a logical starting point. Past research has shown weight stigma to be positively correlated with exercise avoidance (particularly in public) (Vartanian & Novak, 2011; Vartanian & Shaprow, 2008) and negatively correlated with exercise self-efficacy (Pearl et al., 2014). It is possible that one or both of these constructs may mediate the relationship between weight stigma and explicit modeling of physical activity. Additionally, it has been theorized that frequent weight stigma experiences may lead to compensatory behaviors aimed at counteracting stereotypes (e.g., more exercise behavior) (R. Puhl & Brownell, 2003). Conversely, weight bias internalization is believed to produce a "why try" effect in which individuals lose self-efficacy and motivation to manage their weight (Corrigan, Larson, & Rüsch, 2009). In support of these theories, parents who frequently experience stigmatizing situations may seek to explicitly model physical activity in an effort to counteract negative stereotypes associated with being an overweight parent. Moreover, those who report high levels of weight bias internalization may rationalize that any efforts to model physical activity will fail to yield any results on their children's behavior and thus forgo any attempts. However, alternative mechanisms may also be contributing. For instance, in addition to the aforementioned compensatory behavior hypothesis, stigmatized parents may engage in explicit physical activity modeling in an effort to protect their children from experiencing the same discrimination they faced.

## Strengths, Limitations, and Future Directions

There are several key points to consider when interpreting these findings. First, these effects persisted even after adjusting for a number of potentially confounding variables. For example, past research has shown restrictive feeding practices to be positively associated with parent BMI (Gray, Janicke, Wistedt, & Dumont-Driscoll, 2010) which, in turn, is positively associated with weight stigma (R. M. Puhl & Brownell, 2006). Variations in weight stigma and weight-related parenting practices have been observed based on a number of demographic factors (Cardel et al., 2012; Himmelstein, Puhl, & Quinn, 2017; R. M. Puhl, Himmelstein, & Quinn, 2018; Wehrly, Bonilla, Perez, & Liew, 2014). Adjusting for these factors bolsters the conclusion that significant relationships do, in fact, exist between parental weight stigma, restrictive feeding and explicit modeling of eating and physical activity.

While these findings represent an important first step in understanding the intergenerational effects of weight stigma on weight-related parenting behaviors, there are a number of limitations to consider. First and foremost is the fact that this study relies exclusively on self-report data. This may be problematic, as participants may look to alter their responses in an effort to present themselves favorably. While this social desirability bias is always a concern when utilizing self-report methodologies, it is possible this bias may be more pronounced in highly stigmatized parents when assessing weight-related behaviors and outcomes. Specifically, stigmatized parents may view managing their child's weight as a greater contributor to their self-esteem compared to less stigmatized parents and subsequent threats to this domain may elicit greater compensatory responses. Thus, a situation arises where a heightened response bias within this group may lead to a type I, error where results indicate a significant relationship between weight stigma and weight-related parenting practices that does not actually exist. Future studies should look to incorporate more objective measures of weight stigma experiences and parenting behaviors as well as a measure of social desirability in an effort to limit the potential impact of response biases (e.g., Crowne & Marlowe, 1960; Stöber, 2001)

A second limitation of this study lies in its cross-sectional design. The theoretical perspective which this study is based upon proposes that experiences and internalization of weight stigma lead to variations in feeding and physical activity-related parenting behaviors. However, the cross-sectional nature of this study precludes this assertion from being formally tested. It may be very well possible that the more a parent engages in weight-related parenting behaviors, the more they become cognizant of weight-based stigmatization. It is also paramount to keep this limitation in mind when interpreting results of the mediation analyses. While the mediation analyses may provide some insight into how weight stigma affects feeding and physical activity-related parenting practices, they should be interpreted with a high degree of caution. Causal claims require temporal precedence which was not realized in this cross-sectional design. Ultimately, these analyses were exploratory in nature and additional prospective studies are needed to determine the extent of their veracity.

Even when interpreting the present findings cautiously, the fact that concern about child weight consistently emerged as a significant mediator between weight stigma and parental feeding practices warrants further investigation. Specifically, future studies should look to characterize the relationship between weight stigma and concern about child weight in more detail. Previous research has differentiated two types of concern about child weight: 1) health-related concern, which focuses on the chronic comorbidities of obesity (e.g., diabetes, hypertension, etc.), and 2) psychosocial-related concerns stemming from overweight (e.g., bullying, low self-esteem, suicide, inability to find a mate) (Pesch et al., 2016; Styles, Meier, Sutherland, & Campbell, 2007). It is possible that parental weight stigma may exhibit stronger associations with psychosocial-related concern more so than with health-related concern. A quote from a focus group respondent reported by Styles, et al. (2007) offers some support for this claim. Specifically, a parent stated that they, "…identified with their children's situations because they, too, had been teased and ridiculed for being overweight when they were young (and) …did not want their children to endure the same pain" (Styles et al., 2007, p. 567). Based on this quote, one can infer that this parent's concern about their child weight is at least partially explained by the desire to have their child to avoid the same weight-based stigmatization that they experienced in their youth.

In addition to prospective studies, the effects of weight stigma on weight-related parenting practices could be examined in an experimental context. Researchers have successfully manipulated weight stigma in a number of ways. For example, weight stigma has been induced by watching videos (Schvey et al., 2014) or reading news articles (Frederick, Saguy, Sandhu, & Mann, 2016; Major, Hunger, Bunyan, & Miller, 2014) depicting weight-based discrimination or by directly stigmatizing the participant based on their weight (Himmelstein et al., 2015). Future studies could randomly assign parents to either a weight stigma or control condition and then assess their feeding and physical activity-related parenting practices. This could be done using vignettes or even in a mock meal preparation and consumption situation.

The generalizability of these findings are also limited by the strict inclusion criteria employed in this study. As this was the first study of its kind to investigate the relationships between parental weight stigma and weight-related parenting behaviors, it was unclear if such an association would be found in participants who 1) did not perceive themselves to be overweight and thus face minimal stigmatization and 2) who had children outside of our specified age range of 5-10 years old. The rationale was that if a relationship between these constructs does in fact exist, it would most likely be found in this specific population. Additional studies are needed to determine if the findings garnered in the study generalize to parents who do not perceive themselves to be overweight and have children outside of this defined age range. Furthermore, while there was no effort to constrain enrollment based on gender or ethnicity, the sample skewed more female and White/Caucasian than the general population. Although attempts were made to statistically adjust for these characteristics, future studies should look to examine these relationships in a more representative sample.

Beyond participant characteristics, it remains to be determined if any of the associations found in this study will generalize to additional weight-related parenting practices. This is less of a concern for physical activity support behaviors, as measures relating to all key theorized constructs of interest (i.e., motivational, conditional, informational, and instrumental) were included in the current study. In contrast, only two feeding practices were examined in this study - restriction and modeling. Past research has identified a number of additional feeding practices and it is unclear how they may be associated with parental weight stigma. For example, the Comprehensive Feeding Practice Questionnaire (Musher-Eizenman & Holub, 2007) identifies eleven feeding practices including monitoring, food as reward, teaching about nutrition, encouragement, and pressure to eat. More recently, efforts have been undertaken to integrate competing lines of research and resolve inconsistencies in terminology within the study of parental feeding practices. Perhaps the most comprehensive of these efforts was conducted by Vaughn et al. (2016) who combined input from a working group of experts to develop an integrated content map of parental feeding practices (Figure 15). Within this framework, restriction falls under the higher order construct of Coercive Control, while modeling is characterized under Structure. Future research could look to integrate this model to better understand the relationship between weight stigma and parental feeding practices more broadly. For example, parental weight stigma may exhibit stronger associations with particular higher order constructs compared to others. As weight stigma displayed significant relationships to restriction in the current study, one might expect to find similar associations in other Coercive Control-based parenting practices.

A final point of consideration rests in the size of the effects observed within the study. The largest effect observed for weight stigma experiences predicting restriction for weight ($R^2$

Change = .076). Remaining effect sizes were generally much smaller only accounting for between one to two percent of the overall variance in weight-related parenting practices. On one hand, the small size of these effects may limit their applicability. For example, an intervention which aims to change weight-related parenting practices solely by addressing parental experiences with and attitudes about of weight stigma is likely to prove ineffective. However, just because a puzzle piece is small, it does not mean it is not important to the overall picture. As discussed in the introduction, the determinants of child overweight/obesity are both numerous and complex. In fact, it would be surprising if the effect sizes observed in this study were considerable in magnitude. Perhaps findings from this study may best be utilized in the form of a complimentary module focusing on parental weight stigma within a larger parent-centered child weight management intervention. Incorporating a parental weight stigma component may additively enhance the overall effectiveness of the intervention as well as synergistically enhance the efficacy of other components. For example, priming parents to think about their own experiences and attitudes associated with weight stigma may increase the likelihood parents adopt feeding-related lifestyles changes. Moreover, priming weight stigma may also increase concern about their child's weight and lead to may cause parents to pay more attention to subsequent parts of the intervention and even increase motivation to sustain weight-related changes in their household. Moreover, priming parental weight stigma may have applications even in the absence of a formal intervention. For instance, a large number of studies have shown that parents of overweight children frequently underestimate their child's weight (for reviews see (Lundahl, Kidwell, & Nelson, 2014; Parry et al., 2008). This has important implications for action, as parents who fail to categorize their children as overweight or obese are less likely to make changes in their child's lifestyle compared to parents who accurately assess their child's weight (Rhee, De Lago, Arscott-Mills, Mehta, & Davis, 2005). It is possible that priming parental weight stigma may lead parents to more accurately categorize their children as being overweight and thus increase their likelihood of engaging in child feeding modification behaviors.

When discussing how findings from this study can best be utilized to improve the lives of parents and children, it is important to note that not all of the relationships found between weight stigma and weight-related parenting practices were positive in nature. Although weight stigma experiences were positively associated with explicit modeling of physical activity, weight bias internalization exhibited a negative relationship. Due to these opposing forces, priming parental weight stigma may at best produce a null effect on explicit modeling and at worst, lead to lower modeling behaviors and worse intervention outcomes. When incorporating these findings into future interventions, special care should be taken to ensure the toxic effects of weight stigma are minimized. For example, studies have shown that presenting individuals with counter-stereotypical exemplars and providing strategies to override biases can reduce implicit racial preferences (Lai et al., 2014). It is possible a similar approach could lower levels of weight bias internalization and subsequently lead to higher levels of explicit modeling of physical activity.

Lastly, even if results gleaned from this study fail to directly inform novel child obesity interventions, the impact of these findings may be observed more indirectly. For example, there is currently a dearth of research examining the intergenerational effects of stigma, prejudice, and discrimination on health-related parenting practices. The current study may encourage future efforts to more fully investigate these relationships.

## Conclusion

This study represents the first known investigation into the relationship between parental weight stigma and weight-related parenting practices. After adjusting for relevant covariates, significant associations were found between level of weight-based stigmatization and restrictive feeding practices, explicit modeling of healthy eating, and explicit modeling of physical activity. Moreover, exploratory analysis points to concern about child weight as a potential mechanism linking parental weight stigma to parental feeding practices. Parents play a critical role in determining their child's weight status and understanding the psychosocial factors that promote or inhibit specific weight-related parenting practices may prove useful in the development of the next generation of child overweight and obesity interventions.

TABLES

Table 1

*List of primary dependent variables and the measures used to assess these constructs*

| | **Primary Dependent Variables** | **Measure Used to Assess Construct** |
|---|---|---|
| **Feeding Practices** | Restrictive Feeding | Restriction for Health Subscale from CFPQ<br>Restriction for Weight Subscale from CFPQ |
| | Explicit Modeling of Eating Behaviors | Verbal Modeling Subscale from PARM<br>Behavioral Consequences Subscale from PARM |
| **Physical Activity Practices** | Parental Logistic Support Behaviors | Logistic Support Subscale from ACTS-MG |
| | Explicit Modeling of Physical Activity Behaviors | Modeling Subscale from ACTS-MG |

Table 2

*Parent level descriptive statistics of select demographic variables for the pilot study*

| Variable | Descriptive Statistics |
|---|---|
| Participants; *n* | 39 |
| Parent Age; *M (SD)* | 35.10 (6.00) |
| Number of children age 5-11; *M (SD)* | 1.33 (0.58) |
| Parent Gender; *n* (%) | |
| Male | 14 (35.90%) |
| Female | 25 (64.10%) |
| Education; *n* (%) | |
| Less than college degree | 20 (51.30%) |
| College Degree or higher | 19 (48.70%) |
| Marital Status; *n* (%) | |
| Married | 30 (76.90%) |
| Not Married | 9 (23.10%) |
| Race/Ethnicity; *n* (%) | |
| White/Caucasian | 27 (69.20%) |
| Non-White | 12 (30.8%) |
| BMI; *M (SD)* | 28.17 (6.58) |
| Weight Classification; *n* (%) | |
| Underweight | 1 (2.8%) |
| Healthy weight | 14 (38.9%) |
| Overweight | 7 (19.4%) |
| Obese | 14 (38.9%) |

Table 3

*Parent reported child level descriptive statistics of select demographic variables for the pilot study*

| Variable | Descriptive Statistics |
|---|---|
| Child Age; *M (SD)* | 8.09 (2.28) |
| Child Gender; *n* (%) | |
| Male | 23 (59%) |
| Female | 16 (41%) |
| BMI-for-age percentile; *M (SD)* | .70 (.31) |
| Weight Classification; *n* (%) | |
| Underweight | 2 (6.1%) |
| Healthy weight | 14 (42.4%) |
| Overweight | 7 (21.2%) |
| Obese | 9 (27.3) |
| Parent perceived weight status; *n* (%) | |
| Underweight | 4 (12.1%) |
| About the right weight | 24 (72.7%) |
| Overweight | 4 (12.1%) |
| Very overweight | 1 (3%) |

Table 4

*Descriptive statistics of select independent, dependent, and exploratory variables for the pilot study*

| Variable | Descriptive Statistics |
|---|---|
| Weight stigma; *M (SD)* | |
| SSI-B | 1.26 (2.03) |
| WBIS-M | 3.68 (1.44) |
| Restriction; *M (SD)* | |
| Restriction for health | 3.61 (0.94) |
| Restriction for weight | 2.23 (0.78) |
| Explicit modeling; *M (SD)* | |
| Verbal modeling | 4.67 (1.60) |
| Behavioral control | 4.85 (1.55) |
| Exploratory variables; *M (SD)* | |
| Unintentional modeling | 3.68 (1.55) |
| Child daily SSB intake | 0.45 (0.45) |
| Child daily unhealthy snack intake | 1.81 (1.06) |

Table 5

*Reliability coefficients for select measures for the pilot study*

| | Cronbach's Alpha | |
|---|---|---|
| Variable | Previous Studies | Current Pilot |
| Independent Variables | | |
| WBIS | .93 | .90 |
| SSI-B | .84-.91 | .98 |
| Dependent Variables | | |
| Restriction-health | .70-.82 | .73 |
| Restriction-weight | .70-.79 | .81 |
| Verbal modeling | .81 | .93 |
| Behavioral control | .85 | .92 |
| Exploratory Variables | | |
| Unintentional modeling | .63 | .75 |

Table 6

*Pearson correlations between independent, dependent, and exploratory variables for the pilot study*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. SSI-B | - | | | | | | | | |
| 2. WBIS | .290 | - | | | | | | | |
| 3. Restriction-Health | -.037 | .026 | - | | | | | | |
| 4. Restriction-Weight | **.396*** | -.052 | .399* | - | | | | | |
| 5. Verbal Modeling | .069 | -.169 | .274 | .261 | - | | | | |
| 6. Behavioral Consequences | .095 | -.291 | -.002 | .173 | **.371*** | - | | | |
| 7. Unintentional Modeling | .267 | -.015 | -.188 | .191 | .224 | **.368*** | - | | |
| 8. Parent BMI | .176 | **.441**** | .161 | .011 | -.219 | -.235 | .030 | - | |
| 9. Daily Sugary Beverages | .068 | .236 | -.080 | -.054 | -.223 | -.046 | .282 | **.370*** | - |
| 10. Daily Unhealthy Snack | .255 | .066 | .294 | .188 | -.009 | .094 | .097 | .042 | .240 |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 7

*Participant demographics*

| Demographic Variable | Descriptive Statistics |
|---|---|
| Participants; *n* | 406 |
| Parent Age; *M (SD)* | 36.9 (7.1) |
| Parent Gender; *n* (%) | |
| Male | 101 (24.9%) |
| Female | 304 (74.9%) |
| Education; *n* (%) | |
| Less than college degree | 214 (51.3%) |
| College Degree or higher | 198 (48.70%) |
| Household Income | |
| <$60,000 | 187 (46.1%) |
| >$60,000 | 219 (53.9%) |
| Race/Ethnicity; n (%) | |
| White/Caucasian | 326 (80.3%) |
| Non-White | 80 (19.7%) |
| BMI; *M (SD)* | 33.8 (7.22) |

Table 8

*Parent reported child demographics*

| Variable | Descriptive Statistics |
|---|---|
| Child Age; M (SD) | 7.52 (1.7) |
| Child Gender; n (%) | |
| Male | 195 (48.0%) |
| Female | 211 (52.0%) |
| BMI-for-age percentile; M (SD) | .65 (.34) |
| Child overweight (85th - 94th percentile); *n* (%) | 59 (15.5%) |
| Child obese (≥ 95th percentile); *n* (%) | 109 (28.7%) |

Table 9

*Reliability statistics*

| | Chronbach's Alpha | |
|---|---|---|
| Variable | Previous Studies | Current Study |
| Independent Variables | | |
| **WBIS** | **.93** | **.89** |
| **SSI-B** | **.84-.91** | **.89** |
| Feeding Variables | | |
| **Restriction-health** | **.70-.82** | **.76** |
| **Restriction-weight** | **.70-.79** | **.87** |
| **Verbal modeling** | **.81** | **.85** |
| **Behavioral control** | **.85** | **.81** |
| Unintentional modeling | .63 | .72 |
| Physical Activity Variables | | |
| **Logistic Support** | **.71** | **.78** |
| **Modeling** | **.83** | **.78** |
| **Explicit Modeling Only** | **N/A** | **.62** |
| Use Community Resources | .71 | .62 |
| Reduce Sedentary Activities | .73 | .87 |
| Encouragement for PA | | .65 |
| Other Variables | | |
| Positive Parenting | .79 | .81 |
| Inconsistent discipline | .72 | .75 |
| Poor Supervision | .60 | .73 |
| CFQ Responsibility | .88 | .84 |
| CFQ Concern | .75 | .91 |
| Self-Shame | N/A | .92 |

*Note.* Variables in bold represent primary independent and dependent variables

Table 10

*Correlations for weight stigma and feeding-related variables and outcomes*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. SSI-B | - | | | | | | | |
| 2. WBIS-M | .374** | - | | | | | | |
| 3. Restriction-Health | .048 | .125* | - | | | | | |
| 4. Restriction-Weight | .242** | .115* | .443** | - | | | | |
| 5. Verbal Modeling | .127* | .120* | .202** | .281** | - | | | |
| 6. Behavioral Consequences | .072 | .071 | .106* | .163** | .393** | - | | |
| 7. Unintentional Modeling | .277** | .261** | .138** | .277** | .363** | .507** | - | |
| 8. Daily Unhealthy Snacks | .153** | .082 | .003 | -.045 | -.104* | -.132** | -.001 | - |
| 9. Daily Sugary Beverages | .059 | .074 | .093 | .126* | -.009** | -.058 | -.109* | .396** |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 11

*Correlations for physical activity-related variables and outcomes*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. SSI-B | - | | | | | | | | |
| 2. WBIS-M | **.374**** | - | | | | | | | |
| 3. Logistic Support | .023 | .016 | - | | | | | | |
| 4. Explicit Modeling of Physical Activity | .047 | -.096 | **.386**** | - | | | | | |
| 5. Use of Community Resources | .078 | -.011 | **.561**** | **.426**** | - | | | | |
| 6. Restricting Sedentary Activities | .009 | -.046 | **.264**** | **.367**** | **.304**** | - | | | |
| 7. Encouragement | .030 | .004 | **.511**** | **.572**** | **.543**** | **.350**** | - | | |
| 8. Child Physical Activity | -.045 | -.056 | **.258**** | **.210**** | **.185**** | **.117*** | **.253**** | - | |
| 9. TV/Video Screen Time | .001 | .059 | **-.102*** | **-.138**** | -.083 | **-.225**** | **-.176**** | -.037 | - |
| 10. Video Game Time | .022 | .072 | -.060 | -.051 | -.021 | **-.264**** | -.069 | **-.131**** | **.460**** |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 12

*Correlations for weight stigma, general parenting, responsibility/concern of child overweight, and shame of child overweight*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. SSI-B | - | | | | | | | |
| 2. WBIS | **.374**** | - | | | | | | |
| 3. Positive Parenting | **-.104*** | .050 | - | | | | | |
| 4. Inconsistent Discipline | **.185**** | **.166**** | -.034 | - | | | | |
| 5. Poor Supervision | **.339**** | .023 | **-.318**** | **.159**** | - | | | |
| 6. Responsibility | -.004 | **.150**** | **.251**** | -.012 | **-.107*** | - | | |
| 7. Concern | **.291**** | **.201**** | **-.100*** | .011 | **.185**** | -.056 | - | |
| 8. Shame of Child Overweight | **.107*** | **.257**** | **-.209**** | **.121*** | **.124*** | **-.102*** | **.187**** | - |
| 9. Child BMI Percentile | -.002 | -.005 | -.055 | -.014 | -.036 | **-.127*** | **.335**** | .038 |

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 13

*$R^2$ Change, unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for the weight stigma interaction across all feeding and physical activity-related variables*

| Variables | $R^2$ Change | B | SE | β |
|---|---|---|---|---|
| Restriction for Weight | .004 | -.031 | .024 | -.248 |
| Restriction for Health | <.001 | .001 | .028 | .010 |
| Verbal Modeling | <.001 | .010 | .035 | .060 |
| Behavioral Control | .001 | .015 | .033 | .094 |
| Unintentional Modeling | .002 | .030 | .038 | .163 |
| Unhealthy Snack Consumption | .007 | .054 | .034 | .336 |
| SSB Consumption | .001 | -.008 | .012 | -.137 |
| Logistic Support | <.001 | -.008 | .019 | -.087 |
| Explicit Modeling of Physical Activity | <.001 | -.004 | .015 | -.055 |
| Use of Community Resources | .001 | .024 | .018 | .282 |
| Restricting of Sedentary Activities | <.001 | .003 | .020 | .037 |
| Encouragement | .001 | -.010 | .016 | -.133 |
| Child Physical Activity | <.001 | .008 | .025 | .068 |
| Child TV/Video Time | <.001 | .016 | .042 | .083 |
| Child Videogame Time | <.001 | -.008 | .050 | -.031 |

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

Table 14

Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for restriction for health scores

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | **.071**** | | | **.074**** | | | **.093**** |
| $R^2$ Change | | | | | | .003 | | | **.019**** |
| Parent Age | -.015 | .008 | **-.110*** | -.015 | .008 | -.105 | -.011 | .008 | -.080 |
| Parent Sex | -.149 | .119 | -.065 | -.148 | .119 | -.064 | -.197 | .119 | -.086 |
| Parent BMI | .004 | .007 | .028 | .002 | .007 | .013 | -.002 | .007 | -.018 |
| Education | .007 | .043 | .009 | -.001 | .043 | -.001 | <.001 | .043 | <.001 |
| Income | .044 | .018 | .138* | .047 | .019 | .149* | .046 | .019 | **.144*** |
| Ethnicity | .200 | .126 | .080 | .204 | .126 | .082 | .256 | .127 | **.102*** |
| Child Age | .001 | .032 | .002 | .002 | .032 | .003 | -.001 | .031 | -.002 |
| Child Sex | -.119 | .101 | -.060 | -.120 | .101 | -.060 | -.129 | .100 | -.065 |
| Child BMI | .563 | .149 | **.194**** | .568 | .149 | **.196**** | .566 | .148 | **.195**** |
| SSI | | | | .047 | .041 | .061 | .009 | .043 | .012 |
| WBIS | | | | | | | .106 | .039 | **.156**** |

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

Table 15

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for restriction for weight scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | **.127**** | | | **.204**** | | | **.216**** |
| $R^2$ Change | | | | | | **.076**** | | | **.013*** |
| Parent Age | -.005 | .007 | -.038 | -.002 | .007 | -.015 | .001 | .007 | .006 |
| Parent Sex | -.390 | .105 | **-.186**** | -.385 | .100 | **-.184**** | -.422 | .101 | **-.201**** |
| Parent BMI | -.009 | .006 | -.075 | -.019 | .006 | **-.151**** | -.022 | .006 | **-.176**** |
| Education | .070 | .038 | .103 | .036 | .037 | .052 | .036 | .036 | .053 |
| Income | -.002 | .016 | -.006 | .014 | .016 | .049 | .013 | .016 | .045 |
| Ethnicity | .260 | .112 | **.114*** | .278 | .107 | **.122**** | .316 | .107 | **.139**** |
| Child Age | .043 | .028 | .078 | .046 | .027 | .083 | .043 | .027 | .079 |
| Child Sex | -.131 | .090 | -.072 | -.132 | .086 | -.073 | -.139 | .085 | -.077 |
| Child BMI | .600 | .132 | **.227**** | .622 | .126 | **.235**** | .621 | .126 | **.235**** |
| SSI | | | | .204 | .034 | **.293**** | .176 | .036 | **.253**** |
| WBIS | | | | | | | .080 | .033 | **.128*** |

Table 16

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for verbal modeling scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .011 | | | .032 | | | .042 |
| $R^2$ Change | | | | | | .021 | | | .010 |
| Parent Age | -.005 | .010 | -.028 | -.003 | .010 | -.015 | .001 | .010 | .003 |
| Parent Sex | -.058 | .148 | -.021 | -.054 | .146 | -.020 | -.097 | .147 | -.035 |
| Parent BMI | -.009 | .009 | -.057 | -.016 | .009 | -.097 | -.020 | .009 | -.119 |
| Education | -.025 | .053 | -.028 | -.049 | .053 | -.054 | -.048 | .053 | -.053 |
| Income | -.005 | .023 | -.013 | .006 | .023 | .016 | .004 | .023 | .012 |
| Ethnicity | -.046 | .157 | -.015 | -.034 | .156 | -.011 | .011 | .157 | .004 |
| Child Age | -.002 | .039 | -.003 | <.001 | .039 | <.001 | -.003 | .039 | -.004 |
| Child Sex | -.170 | .126 | -.071 | -.171 | .125 | -.071 | -.179 | .125 | -.074 |
| Child BMI | .076 | .186 | .022 | .092 | .184 | .026 | .090 | .184 | .026 |
| SSI | | | | .142 | .050 | **.154**** | .109 | .053 | **.118*** |
| WBIS | | | | | | | .093 | .048 | .113 |

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

Table 17

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for behavioral control scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .028 | | | .036 | | | .038 |
| $R^2$ Change | | | | | | .008 | | | .002 |
| Parent Age | -.015 | .009 | -.095 | -.014 | .009 | -.088 | -.013 | .009 | -.080 |
| Parent Sex | -.002 | .139 | -.001 | <.001 | .139 | <.001 | -.018 | .140 | -.007 |
| Parent BMI | -.007 | .008 | -.043 | -.011 | .009 | -.067 | -.012 | .009 | -.077 |
| Education | -.098 | .050 | -.114 | -.111 | .051 | **-.130*** | -.111 | .051 | **-.129*** |
| Income | .005 | .022 | .013 | .011 | .022 | .030 | .010 | .022 | .028 |
| Ethnicity | .077 | .148 | .027 | .084 | .148 | .029 | .103 | .149 | .036 |
| Child Age | .005 | .037 | .008 | .006 | .037 | .009 | .005 | .037 | .008 |
| Child Sex | .067 | .119 | .029 | .067 | .118 | .029 | .063 | .118 | .028 |
| Child BMI | -.006 | .175 | -.002 | .003 | .175 | .001 | .003 | .175 | .001 |
| SSI | | | | .082 | .048 | .093 | .068 | .050 | .078 |
| WBIS | | | | | | | .038 | .046 | .049 |

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

Table 18

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for unintentional modeling scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .040 | | | **.103**** | | | **.134**** |
| $R^2$ Change | | | | | | **.063**** | | | **.031**** |
| Parent Age | -.028 | .011 | **-.143*** | -.024 | .011 | **-.122*** | -.017 | .011 | -.090 |
| Parent Sex | -.149 | .166 | -.047 | -.141 | .161 | -.045 | -.228 | .160 | -.072 |
| Parent BMI | .005 | .010 | .028 | -.008 | .010 | -.041 | -.015 | .010 | -.081 |
| Education | .077 | .060 | .075 | .030 | .059 | .029 | .031 | .058 | .030 |
| Income | -.057 | .026 | **-.130*** | -.035 | .025 | -.080 | -.038 | .025 | -.087 |
| Ethnicity | .014 | .177 | .004 | .037 | .172 | .011 | .128 | .171 | .037 |
| Child Age | .065 | .044 | .078 | .069 | .043 | .083 | .063 | .042 | .077 |
| Child Sex | -.068 | .142 | -.025 | -.070 | .137 | -.025 | -.086 | .135 | -.031 |
| Child BMI | .031 | .210 | .008 | .062 | .203 | .015 | .058 | .200 | .015 |
| SSI | | | | .282 | .055 | **.267**** | .216 | .057 | **.204**** |
| WBIS | | | | | | | .188 | .052 | **.200**** |

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

Table 19

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for unhealthy snack consumption*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .039 | | | **.057*** | | | **.058*** |
| $R^2$ Change | | | | | | **.019**** | | | <.001 |
| Parent Age | -.010 | .010 | -.062 | -.008 | .010 | -.050 | -.008 | .010 | -.046 |
| Parent Sex | -.071 | .144 | -.026 | -.067 | .143 | -.025 | -.077 | .145 | -.028 |
| Parent BMI | .013 | .009 | .077 | .006 | .009 | .040 | .006 | .009 | .035 |
| Education | <.001 | .052 | <.001 | -.023 | .052 | -.025 | -.022 | .052 | -.025 |
| Income | .012 | .023 | .031 | .022 | .023 | .058 | .022 | .023 | .057 |
| Ethnicity | .071 | .154 | .024 | .082 | .153 | .028 | .091 | .155 | .031 |
| Child Age | -.096 | .038 | **-.135*** | -.094 | .038 | **-.132*** | -.095 | .038 | **-.133*** |
| Child Sex | .034 | .123 | .014 | .033 | .122 | .014 | .031 | .122 | .013 |
| Child BMI | .314 | .182 | .091 | .328 | .180 | .095 | .328 | .181 | .095 |
| SSI | | | | .133 | .049 | **.146**** | .126 | .052 | **.138*** |
| WBIS | | | | | | | .020 | .047 | .024 |

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

Table 20

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for sugar sweetened beverage consumption*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .044 | | | .045 | | | .048 |
| $R^2$ Change | | | | | | .001 | | | .002 |
| Parent Age | -.005 | .003 | -.080 | -.004 | .003 | -.077 | -.004 | .003 | -.068 |
| Parent Sex | -.081 | .049 | -.086 | -.080 | .049 | -.086 | -.087 | .050 | -.093 |
| Parent BMI | .003 | .003 | .045 | .002 | .003 | .035 | .001 | .003 | .024 |
| Education | -.024 | .018 | -.080 | -.027 | .018 | -.087 | -.026 | .018 | -.086 |
| Income | -.008 | .008 | -.066 | -.008 | .008 | -.058 | -.008 | .008 | -.060 |
| Ethnicity | .015 | .052 | .015 | .016 | .052 | .016 | .023 | .053 | .023 |
| Child Age | .008 | .013 | .033 | .008 | .013 | .034 | .008 | .013 | .032 |
| Child Sex | -.070 | .042 | -.086 | -.070 | .042 | -.086 | -.072 | .042 | -.088 |
| Child BMI | .055 | .062 | .046 | .056 | .062 | .048 | .056 | .062 | .047 |
| SSI | | | | .012 | .017 | .040 | .007 | .018 | .023 |
| WBIS | | | | | | | .015 | .016 | .056 |

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

Table 21

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for logistic support for physical activity scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .085 | | | .089 | | | .090 |
| $R^2$ Change | | | | | | .004 | | | .001 |
| Parent Age | -.003 | .005 | -.027 | -.002 | .005 | -.022 | -.001 | .005 | -.015 |
| Parent Sex | -.102 | .080 | -.065 | -.101 | .080 | -.064 | -.111 | .081 | -.070 |
| Parent BMI | -.005 | .005 | -.057 | -.007 | .005 | -.075 | -.008 | .005 | -.083 |
| Education | .047 | .029 | .092 | .041 | .029 | .080 | .041 | .029 | .081 |
| Income | .041 | .013 | **.189*** | .044 | .013 | **.201*** | .043 | .013 | **.200*** |
| Ethnicity | -.170 | .086 | **-.099*** | -.167 | .086 | -.098 | -.157 | .087 | -.092 |
| Child Age | -.010 | .021 | -.024 | -.009 | .021 | -.023 | -.010 | .021 | -.024 |
| Child Sex | -.076 | .069 | -.056 | -.076 | .069 | -.056 | -.078 | .069 | -.057 |
| Child BMI | .111 | .101 | .056 | .115 | .101 | .058 | .115 | .101 | .058 |
| SSI | | | | .035 | .028 | .067 | .028 | .029 | .053 |
| WBIS | | | | | | | .020 | .026 | .044 |

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

Table 22

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for explicit modeling of physical activity scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .056 | | | .064 | | | .076 |
| $R^2$ Change | | | | | | .008 | | | **.012*** |
| Parent Age | -.008 | .004 | -.108 | -.007 | .004 | -.100 | -.009 | .004 | -.120 |
| Parent Sex | -.054 | .062 | -.046 | -.053 | .062 | -.045 | -.033 | .062 | -.028 |
| Parent BMI | -.013 | .004 | **-.179*** | -.014 | .004 | **-.203**** | -.013 | .004 | **-.179*** |
| Education | .003 | .022 | .008 | -.003 | .022 | -.009 | -.004 | .022 | -.009 |
| Income | -.002 | .010 | -.015 | <.001 | .010 | .002 | .001 | .010 | .007 |
| Ethnicity | -.105 | .066 | -.081 | -.102 | .066 | -.079 | -.123 | .066 | -.095 |
| Child Age | .024 | .016 | .076 | .024 | .016 | .078 | .025 | .016 | .082 |
| Child Sex | <.001 | .053 | <.001 | <.001 | .053 | <.001 | .004 | .052 | .004 |
| Child BMI | -.041 | .078 | -.028 | -.037 | .078 | -.025 | -.036 | .077 | -.024 |
| SSI | | | | .037 | .021 | .094 | .052 | .022 | **.133*** |
| WBIS | | | | | | | -.044 | .020 | **-.124*** |

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

Table 23

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for informational support for physical activity scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .044 | | | .045 | | | .048 |
| $R^2$ Change | | | | | | .001 | | | .002 |
| Parent Age | -.006 | .005 | -.072 | -.006 | .005 | -.064 | -.006 | .005 | -.069 |
| Parent Sex | -.136 | .074 | -.095 | -.134 | .074 | -.094 | -.129 | .075 | -.090 |
| Parent BMI | -.001 | .004 | -.017 | -.004 | .005 | -.042 | -.003 | .005 | -.036 |
| Education | .072 | .027 | **.154*** | .064 | .027 | **.137*** | .064 | .027 | **.137*** |
| Income | .016 | .012 | .081 | .020 | .012 | .100 | .020 | .012 | .101 |
| Ethnicity | -.140 | .079 | -.090 | -.136 | .079 | -.087 | -.142 | .080 | -.091 |
| Child Age | .038 | .020 | .101 | .038 | .020 | .102 | .039 | .020 | .103 |
| Child Sex | -.038 | .063 | -.031 | -.039 | .063 | -.031 | -.038 | .063 | -.030 |
| Child BMI | -.015 | .093 | -.008 | -.010 | .093 | -.006 | -.010 | .093 | -.005 |
| SSI | | | | .047 | .025 | .098 | .051 | .027 | .107 |
| WBIS | | | | | | | -.012 | .024 | -.029 |

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

Table 24

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for parenting practices to limit sedentary behavior scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .029 | | | .031 | | | .031 |
| $R^2$ Change | | | | | | .002 | | | <.001 |
| Parent Age | -.003 | .006 | -.026 | -.002 | .006 | -.022 | -.002 | .006 | -.025 |
| Parent Sex | -.090 | .085 | -.056 | -.090 | .085 | -.056 | -.086 | .086 | -.054 |
| Parent BMI | -.013 | .005 | **-.132*** | -.014 | .005 | **-.144*** | -.014 | .005 | **-.141*** |
| Education | -.001 | .031 | -.001 | -.005 | .031 | -.009 | -.005 | .031 | -.009 |
| Income | -.005 | .013 | -.024 | -.003 | .013 | -.015 | -.003 | .013 | -.015 |
| Ethnicity | .129 | .090 | .074 | .131 | .090 | .075 | .128 | .092 | .073 |
| Child Age | -.003 | .023 | -.008 | -.003 | .023 | -.007 | -.003 | .023 | -.007 |
| Child Sex | -.027 | .072 | -.019 | -.027 | .072 | -.019 | -.026 | .073 | -.019 |
| Child BMI | -.077 | .107 | -.038 | -.074 | .107 | -.037 | -.074 | .107 | -.037 |
| SSI | | | | .023 | .029 | .044 | .026 | .031 | .049 |
| WBIS | | | | | | | -.008 | .028 | -.016 |

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

Table 25

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for encouragement of physical activity scores*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .018 | | | .021 | | | .021 |
| $R^2$ Change | | | | | | .003 | | | <.001 |
| Parent Age | .002 | .004 | .021 | .002 | .004 | .026 | .002 | .004 | .028 |
| Parent Sex | -.022 | .065 | -.017 | -.021 | .065 | -.017 | -.023 | .066 | -.019 |
| Parent BMI | -.006 | .004 | -.088 | -.008 | .004 | -.103 | -.008 | .004 | -.105 |
| Education | .003 | .024 | .008 | -.001 | .024 | -.003 | -.001 | .024 | -.002 |
| Income | -.003 | .010 | -.020 | -.001 | .010 | -.009 | -.002 | .010 | -.009 |
| Ethnicity | -.088 | .070 | -.066 | -.086 | .070 | -.064 | -.084 | .070 | -.063 |
| Child Age | .019 | .017 | .060 | .020 | .017 | .062 | .020 | .017 | .061 |
| Child Sex | -.027 | .056 | -.025 | -.027 | .056 | -.025 | -.027 | .056 | -.026 |
| Child BMI | -.043 | .082 | -.028 | -.040 | .082 | -.026 | -.040 | .082 | -.026 |
| SSI | | | | .024 | .022 | .058 | .022 | .024 | .055 |
| WBIS | | | | | | | .004 | .022 | .012 |

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

Table 26

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for parent reported child physical activity*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .056 | | | .060 | | | .062 |
| $R^2$ Change | | | | | | .004 | | | .002 |
| Parent Age | .001 | .007 | .010 | .001 | .007 | .005 | -.001 | .007 | -.004 |
| Parent Sex | .042 | .106 | .021 | .041 | .106 | .020 | .057 | .108 | .028 |
| Parent BMI | -.005 | .006 | -.038 | -.003 | .007 | -.022 | -.001 | .007 | -.011 |
| Education | .019 | .038 | .029 | .027 | .039 | .040 | .026 | .039 | .040 |
| Income | -.021 | .017 | -.073 | -.024 | .017 | -.085 | -.023 | .017 | -.083 |
| Ethnicity | -.098 | .113 | -.044 | -.102 | .113 | -.046 | -.119 | .115 | -.053 |
| Child Age | -.097 | .028 | **-.183*** | -.098 | .028 | **-.184*** | -.097 | .028 | **-.182*** |
| Child Sex | -.094 | .091 | -.053 | -.094 | .091 | -.053 | -.091 | .091 | -.051 |
| Child BMI | -.221 | .134 | -.086 | -.226 | .134 | -.088 | -.225 | .134 | -.087 |
| SSI | | | | -.043 | .037 | -.063 | -.031 | .039 | -.045 |
| WBIS | | | | | | | -.034 | .035 | -.056 |

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

Table 27

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for parent reported child TV/video time*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .028 | | | .028 | | | .031 |
| $R^2$ Change | | | | | | <.001 | | | .003 |
| Parent Age | -.014 | .012 | -.070 | -.015 | .012 | -.071 | -.013 | .012 | -.061 |
| Parent Sex | -.039 | .177 | -.012 | -.039 | .178 | -.012 | -.068 | .180 | -.020 |
| Parent BMI | .009 | .011 | .042 | .009 | .011 | .046 | .007 | .011 | .034 |
| Education | -.087 | .064 | -.080 | -.085 | .065 | -.077 | -.084 | .065 | -.077 |
| Income | -.004 | .028 | -.009 | -.005 | .028 | -.011 | -.006 | .028 | -.014 |
| Ethnicity | .381 | .189 | **.104*** | .380 | .189 | **.104*** | .410 | .191 | **.112*** |
| Child Age | .014 | .047 | .016 | .013 | .047 | .015 | .012 | .047 | .013 |
| Child Sex | -.023 | .151 | -.008 | -.023 | .152 | -.008 | -.028 | .152 | -.010 |
| Child BMI | .105 | .223 | .025 | .103 | .224 | .024 | .102 | .224 | .024 |
| SSI | | | | -.015 | .061 | -.013 | -.036 | .064 | -.033 |
| WBIS | | | | | | | .062 | .059 | .062 |

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

Table 28

*Regression models reporting unstandardized coefficients (B), standard errors (SE), and standardized coefficients (β) for parent reported child videogame time*

| Variables | Block 0 | | | Block 1 | | | Block 2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | B | SE | β | B | SE | β |
| $R^2$ | | | .088 | | | .088 | | | .091 |
| $R^2$ Change | | | | | | <.001 | | | .003 |
| Parent Age | -.008 | .014 | -.034 | -.008 | .014 | -.033 | -.006 | .014 | -.023 |
| Parent Sex | .172 | .208 | .042 | .172 | .208 | .042 | .135 | .211 | .033 |
| Parent BMI | .015 | .012 | .061 | .014 | .013 | .058 | .011 | .013 | .045 |
| Education | -.014 | .075 | -.010 | -.016 | .076 | -.012 | -.015 | .076 | -.011 |
| Income | .011 | .032 | .019 | .011 | .033 | .020 | .010 | .033 | .018 |
| Ethnicity | .129 | .222 | .029 | .130 | .222 | .029 | .169 | .224 | .038 |
| Child Age | .172 | .055 | **.162*** | .173 | .055 | **.163*** | .170 | .055 | **.160*** |
| Child Sex | -.568 | .178 | **-.161*** | -.568 | .178 | **-.161*** | -.576 | .178 | **-.163*** |
| Child BMI | .982 | .262 | **.191**** | .983 | .263 | **.192**** | .982 | .262 | **.191**** |
| SSI | | | | .012 | .072 | .009 | -.017 | .075 | -.012 |
| WBIS | | | | | | | .081 | .069 | .067 |

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

FIGURES

Figure 1

*Parental levels of influence on child weight-related behaviors and weight (Rhee et al., 2015)*

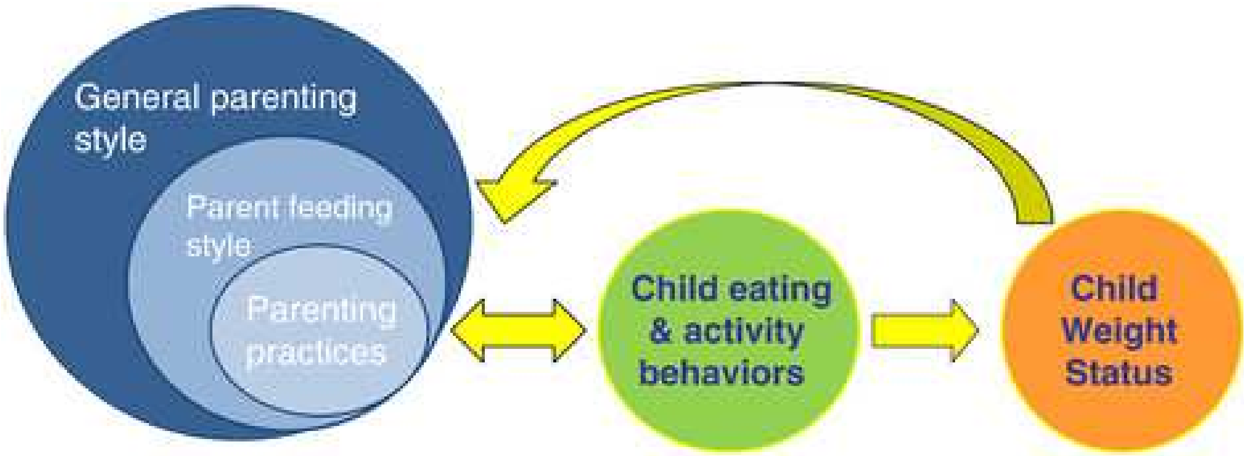


Figure 2

*Conceptualization of parental support for physical activity (Beets, Cardinal, & Alderman, 2010)*

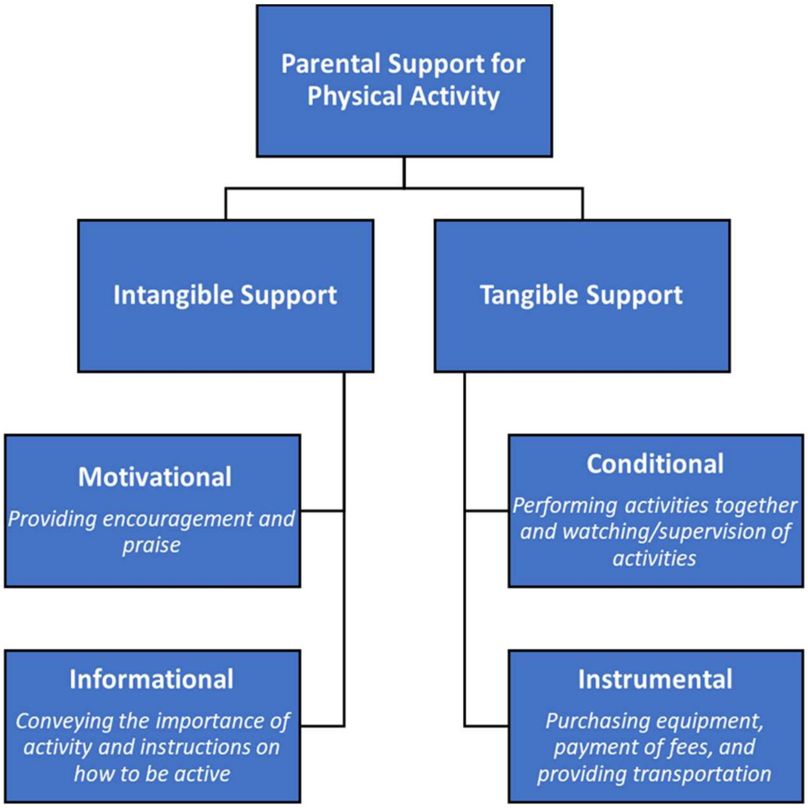


Figure 3

*Model of Stigma-Induced Identity Threat (Major & O'Brien, 2005)*

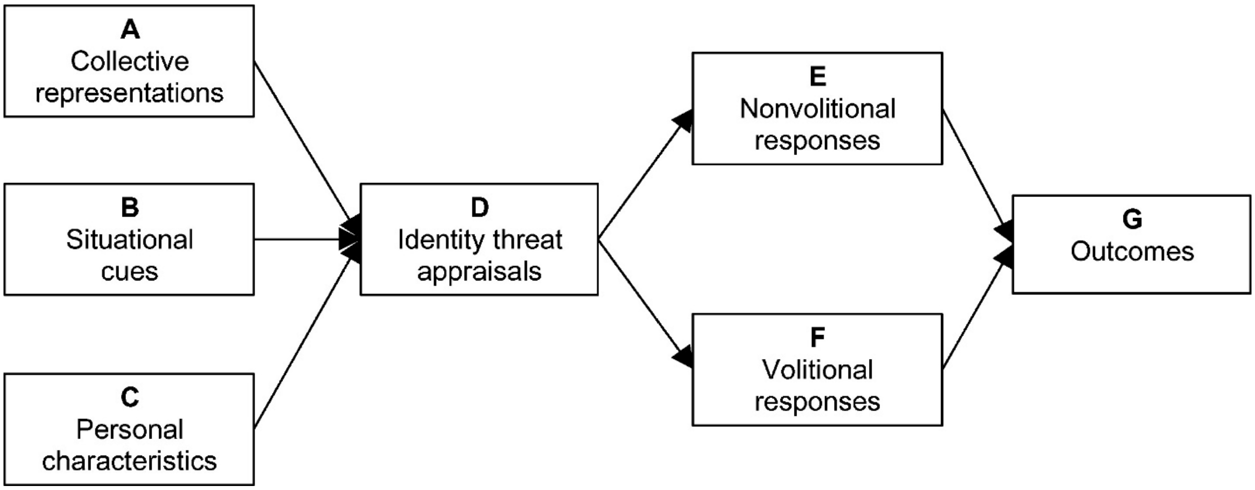


Figure 4

*Proposed model of parental weight stigma on restrictive feeding practices*

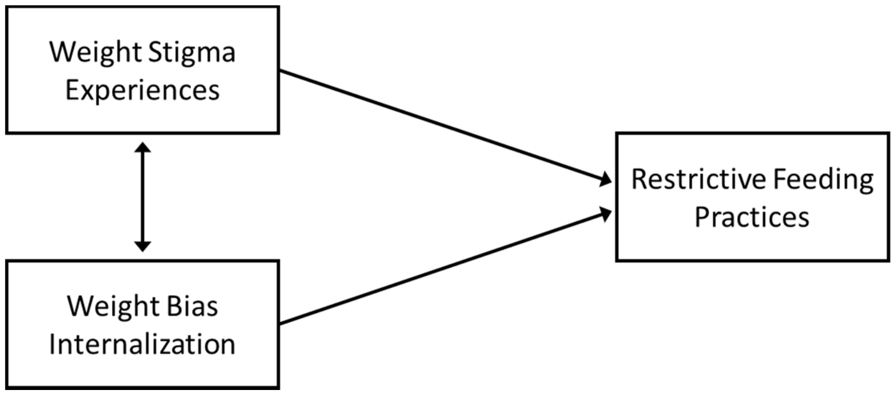


Figure 5

*Proposed model of parental weight stigma on explicit modeling of eating behaviors*

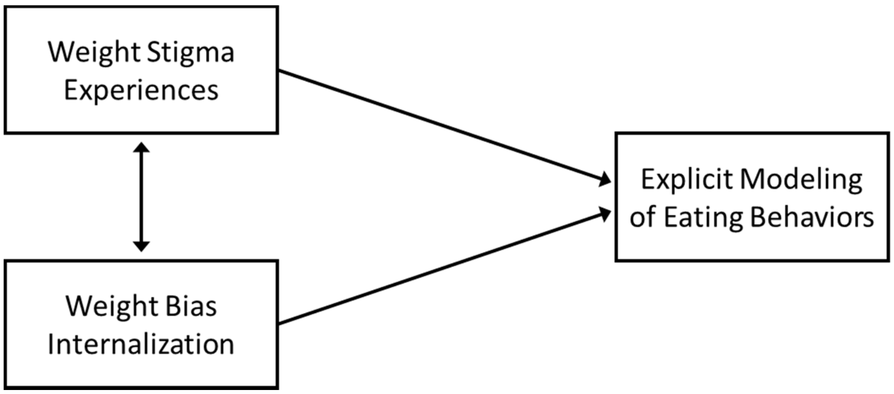


Figure 6

*Proposed model of parental weight stigma on logistic support for physical activity*

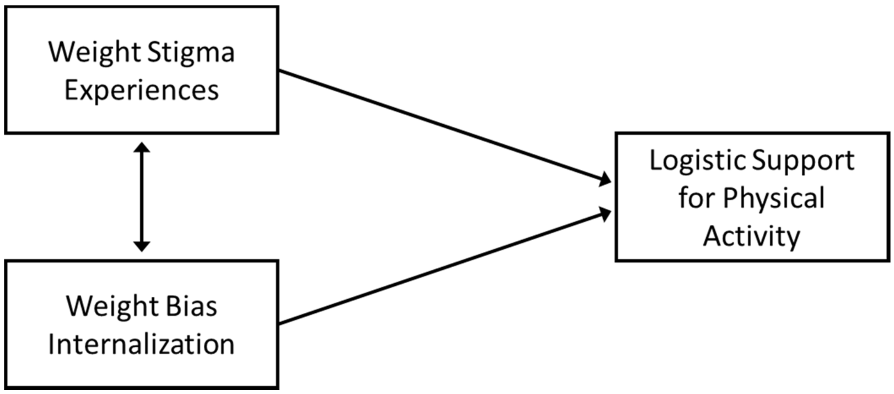


Figure 7

*Proposed model of parental weight stigma on explicit physical activity modeling*

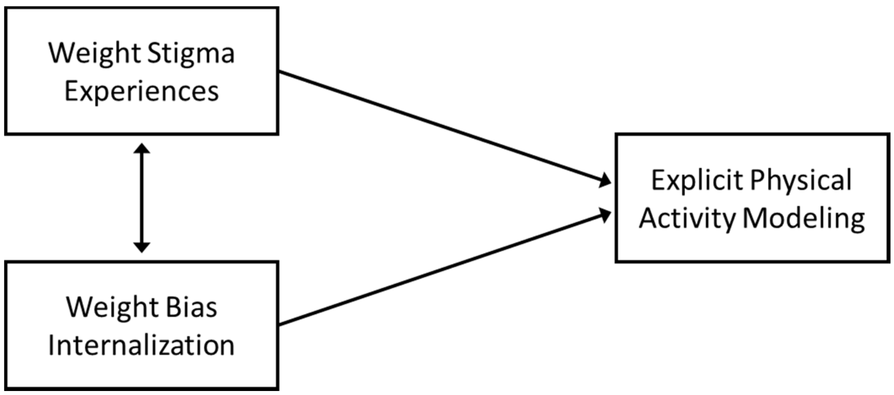


Figure 8

*Hypothesized model testing the indirect effects of weight stigma on sugar sweetened beverage (SSB) consumption mediated through restrictive feeding practices*

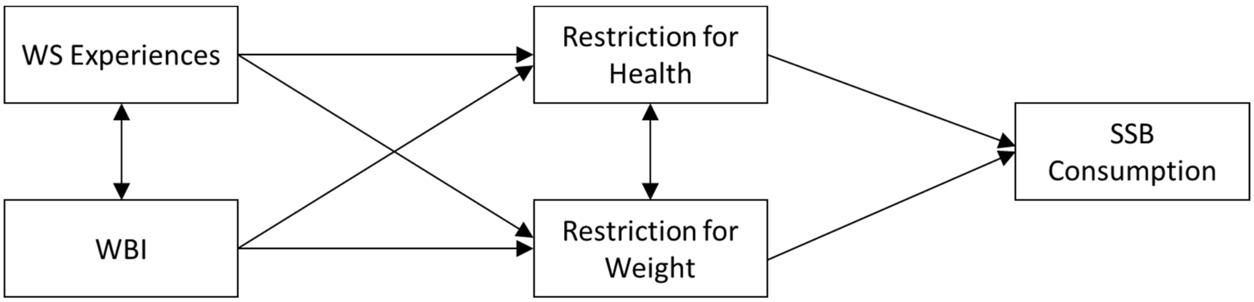


Figure 9

*Hypothesized model testing the indirect effects of weight stigma on parent reported child physical activity mediated through logistic support*

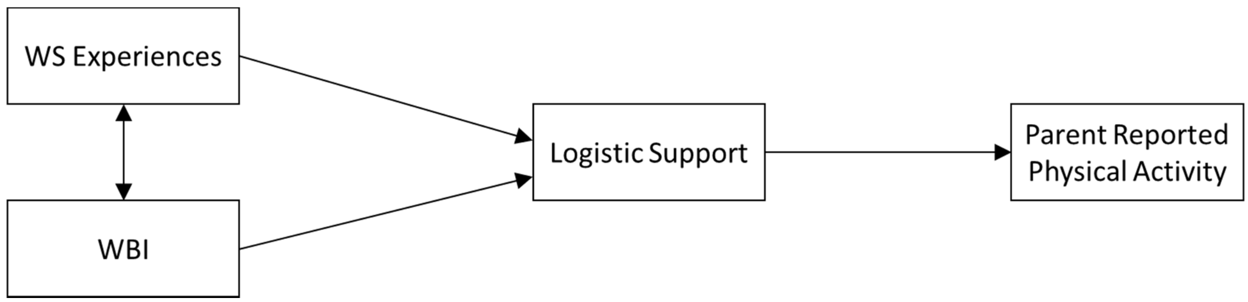


Figure 10

*Concern about child weight mediating the relationship between weight bias internalization and restriction for health*

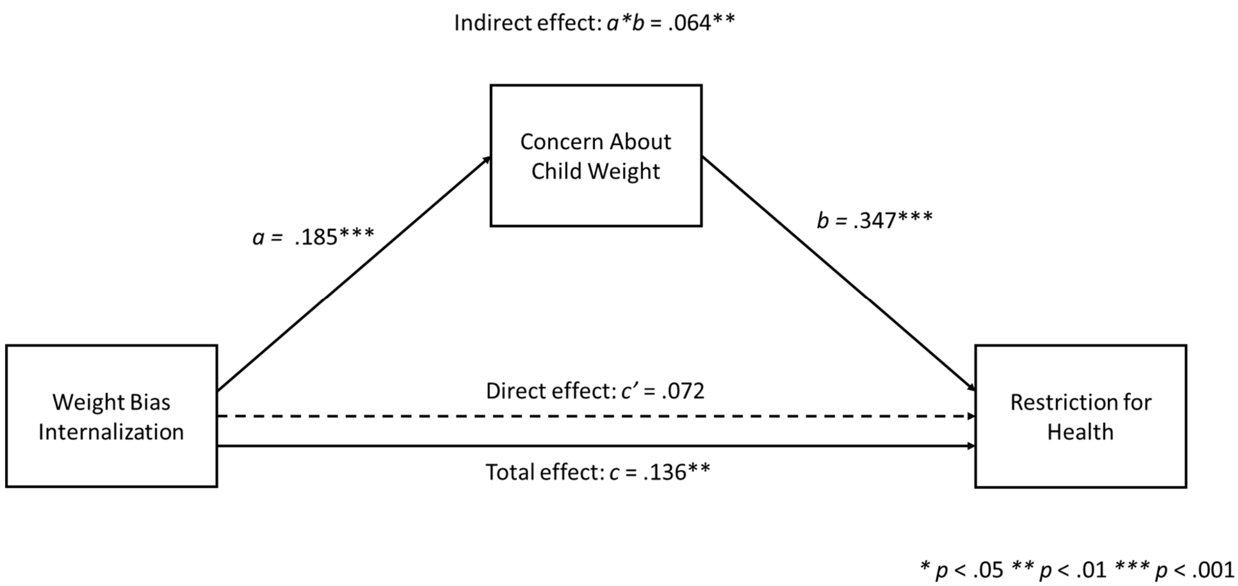


Figure 11

*Concern about child weight mediating the relationship between weight stigma experiences and restriction for weight*

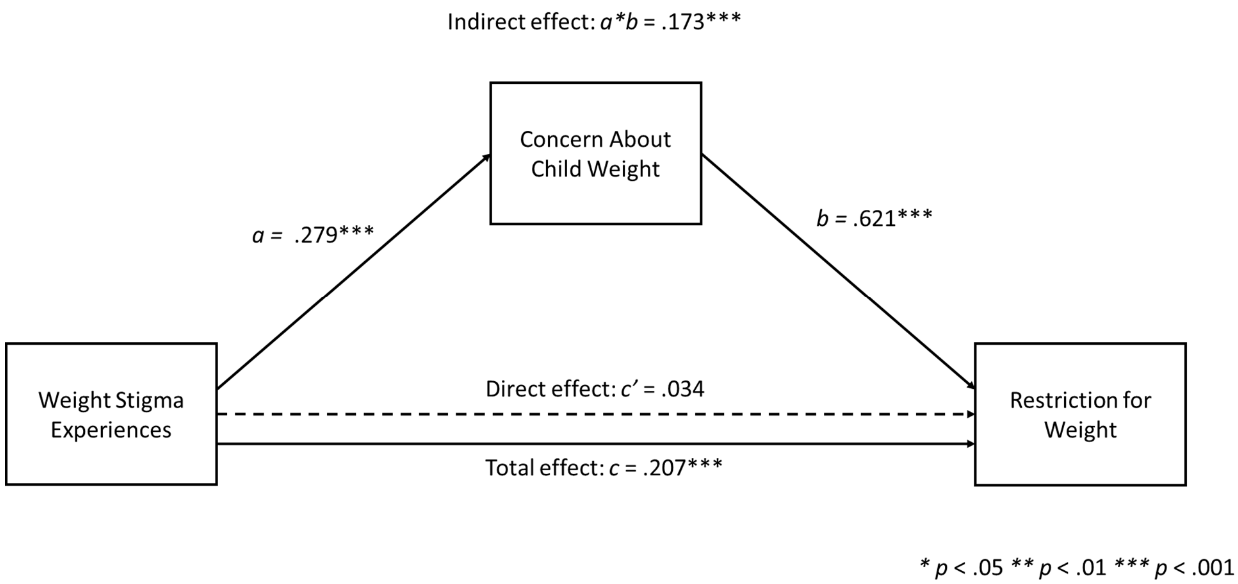


Figure 12

*Concern about child weight mediating the relationship between weight stigma experiences and verbal modeling*

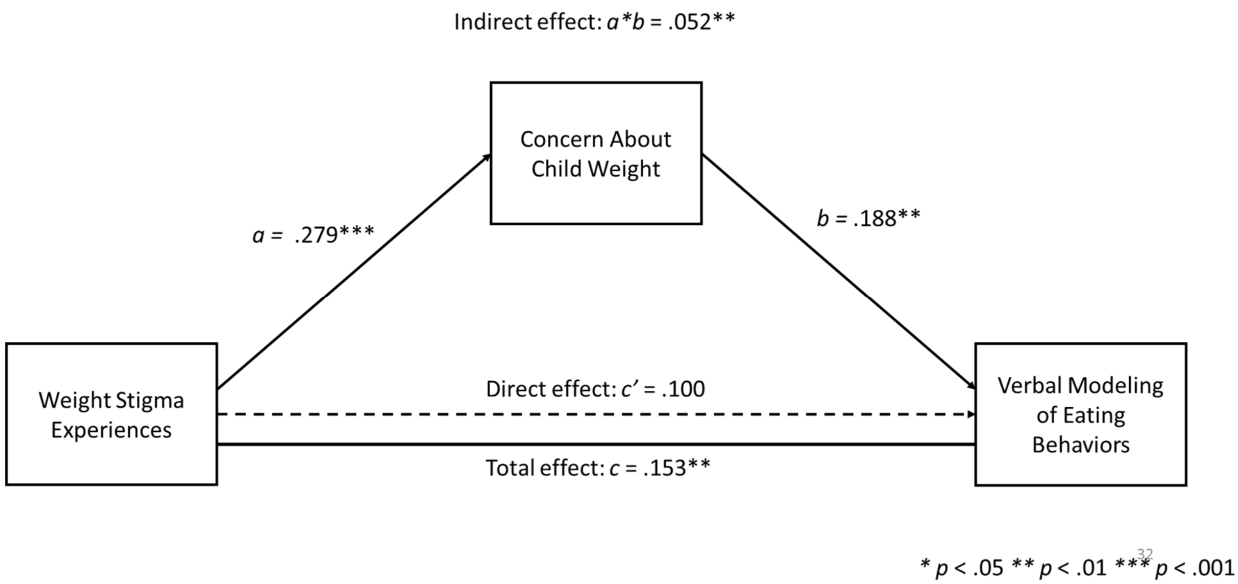


Figure 13

*Explicit modeling of physical activity mediating the relationship between weight stigma experiences and child physical activity*

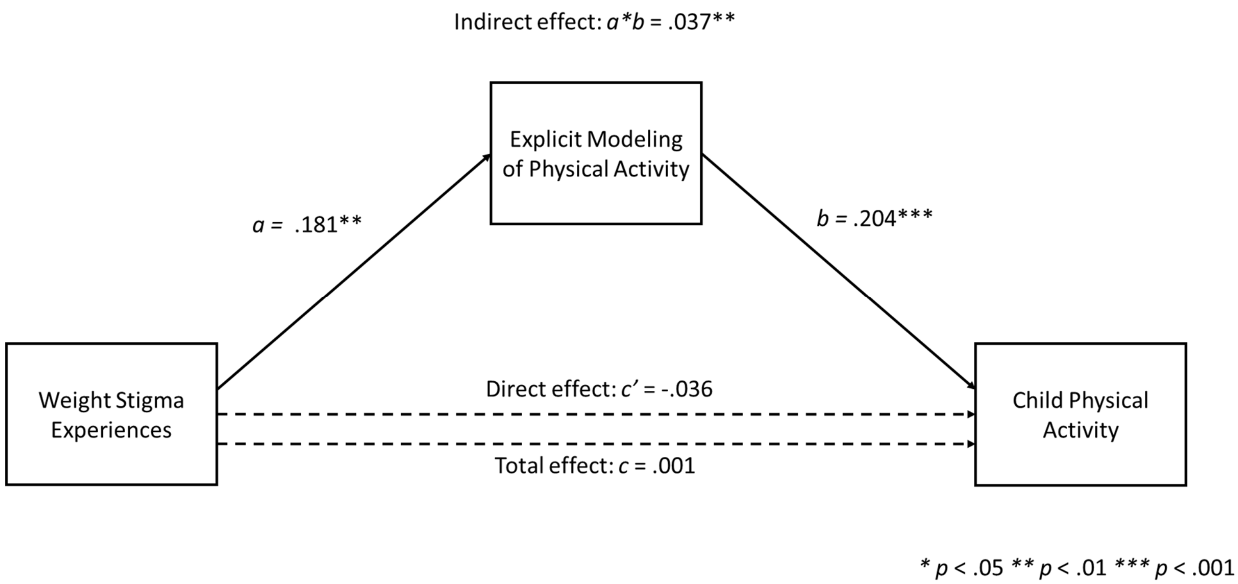


Figure 14

*Explicit modeling of physical activity mediating the relationship between weight bias internalization and child physical activity*

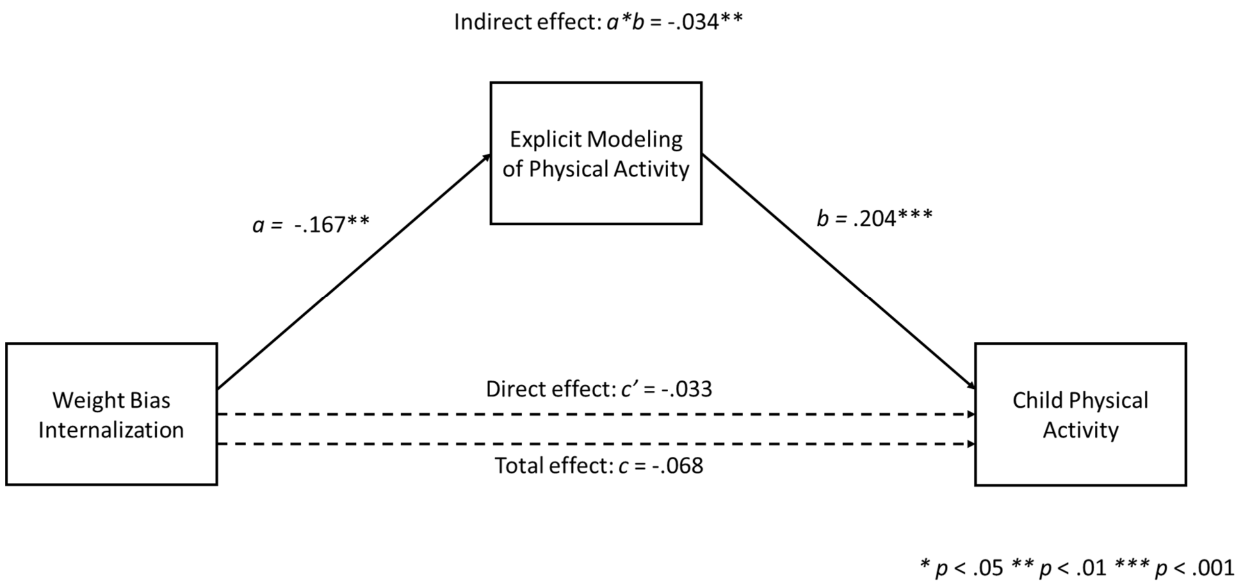
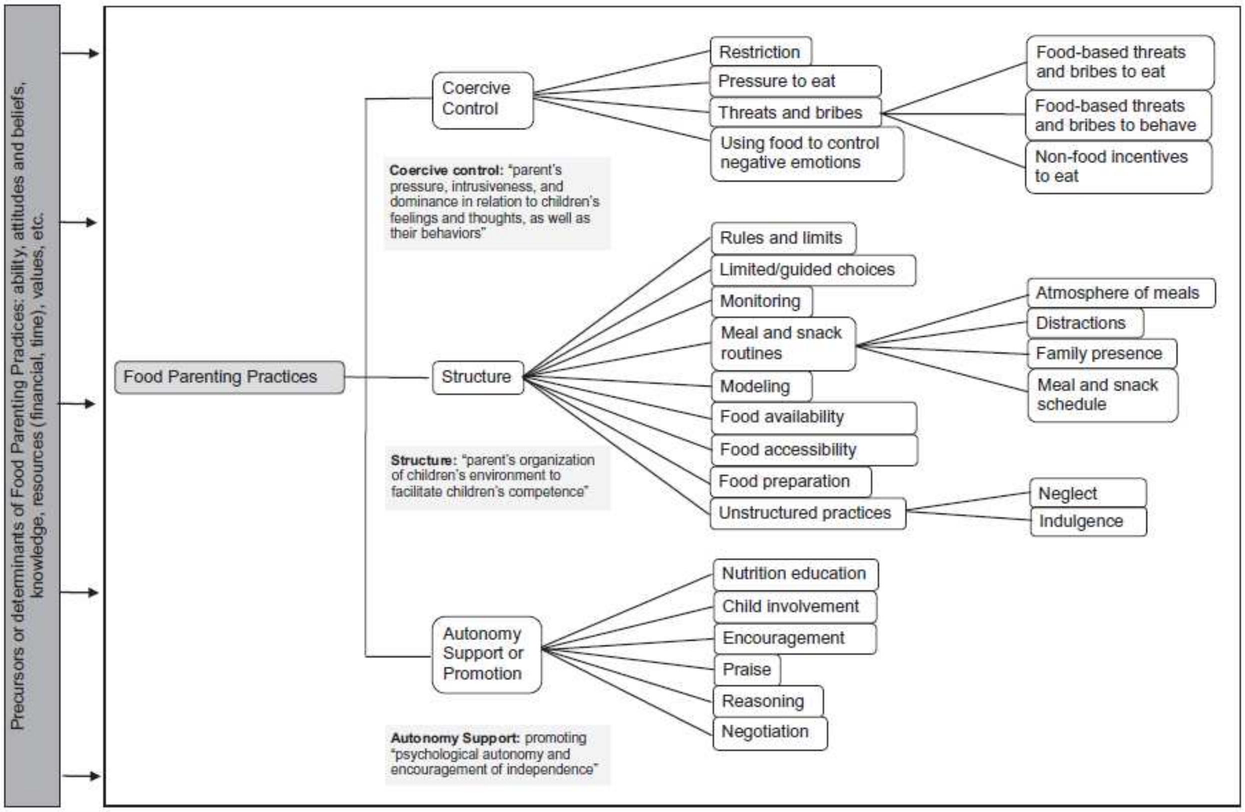


Figure 15

*Content map of parental feeding practices (Vaughn et al., 2016)*



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