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High School Students' Physical Health: Associations With Intrapersonal, Family, Peer, Academic, And Risk Behavior Factors

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HIGH SCHOOL STUDENTS' PHYSICAL HEALTH: ASSOCIATIONS WITH INTRAPERSONAL, FAMILY, PEER, ACADEMIC, AND RISK BEHAVIOR FACTORS

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DEDICATION

This project is dedicated to my husband, Joe, and my four beautiful children, Isabella, Neva, Michael and Shea. This work would not have been possible without your unconditional love, support, and patience. For all of the time you have sacrificed for me for so much of our marriage; for your childhoods spent watching me pursue this goal, I can never say enough how much I love you.

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CHAPTER 1 INTRODUCTION

It has been well established that obesity rates in the United States have reached pandemic magnitude. According to the World Health Organization (WHO), obesity is considered a disease and is defined as the condition of excess body fat to the extent that health is impaired (WHO, 2000). Two-third of U.S. adults is considered overweight and of that population, one-third is obese (Ogden, Carroll, Kit, & Flegal, 2012). The prevalence has more than doubled since the 1970s and continues to rise (Wang & Beydoun, 2007). It is the second leading unnecessary cause of disease and death in the United States, second only to tobacco use (Wang & Beydoun, 2007). Obesity is currently considered the predominant nutritional disorder of children in the United States (Kamath et al., 2008) and worldwide (Taskforce IO, 2010). A multitude of research cites several complications of childhood obesity, including but not limited to, psychosocial effects such as poor self-esteem, depression and eating disorders (e.g., Davison & Birch, 2000; Strauss, 2000), and other serious health consequences, including hypertension, abnormal amount of lipids (e.g., cholesterol and/or fat) in the blood, insulin resistance or diabetes and fatty liver disease (Daniels, 2009). Obesity is even implicated in the accelerated timing of menarche in females (Rosenfield, Lipton, & Drum, 2009) and onset of puberty in males (Mamun, Hayatbakhsh, O'Callaghan, Williams & Najman, 2009).

In the United States, 17% of children and adolescents were obese in 2009–2010 (Ogden, Lamb, Carroll, & Flegal, 2010) and in 2011-2012, 31.8% of youth were overweight or obese (Ogden, Carroll, Kit & Flegal, 2014). Although this problem is said to have increased significantly over time (Han, Lawlor, & Kimm, 2010; Ogden & Carroll, 2010), recent analysis of trends indicate a lack of significant changes in the prevalence of obesity in youth from 2003-2004 through 2011-2012 (Ogden, Carroll, Kit, & Flegal, 2014). That being said, obesity

prevalence amongst America's youth remains high and thus is important to investigate. As highlighted by Ebbeling et al. (2002), childhood obesity can be described as a multisystem disease with substantial consequences for children's health and well-being.

A significant amount of research points towards weight gain as a result of a combination of excess calorie consumption (energy intake) and inadequate physical activity (energy expenditure) especially among low SES families (e.g., Ebbeling et al., 2002; Kamath et al., 2008; Lakshman, Elks, & Ong, 2012; Lee, 2007; Stice, Presnell, Rohde, & Shaw, 2005; Wang & Beydoun, 2007. Further research includes in-utero environments (e.g., Lamb et al. 2010; Lee, 2007), early life exposures (e.g., Lamb et al., 2010), and general life environment, (e.g., parental smoking, infant feeding and child rearing practices) (Lee, 2007). Nonetheless the factors should be considered multifaceted (Centers for Disease Control and Prevention [CDC], 2009; Lakshman, Elks, & Ong, 2012). Those who are overweight are at an increased risk for bullying, teasing, and poor self-esteem (Lee, 2007). Studies have shown that weight-specific socio-environmental, personal, and behavioral variables are strong and consistent predictors of overweight status, binge eating, and extreme weight-control behaviors later in adolescence (Neumark-Sztainer et al., 2007). Thus, the focus of the current study is on psychosocial and intrapersonal correlates of obesity.

The theoretical framework used to help explore variables associated with overweight status/obesity is Bronfenbrenner's ecological systems theory (1979). Bronfenbrenner (1977; 1979; 2005) purported that a person and his/her unique intrapersonal factors are nested within structures (illustrated as a series of concentric circles) of the ecological environment. The original model includes four nested systems: microsystem (family, home and school), mesosystem (interactions between microsystems), exosystem (influential formal and informal

structures), and macrosystem (overarching cultural influence). Ecological models have also been developed specific to weight status, nutrition, and physical activity (Sallis et al., 2013). Through an ecological lens, therefore, it is conceptualized that weight status has a bi-directional interaction with intrapersonal, environmental, and social factors. Intrapersonal, parent/family, and peer factors were of focus in the current study as the most proximal daily influences on children. In each of these contexts, several key variables were selected for inclusion to examine their unique and combined associations with weight status, and the existing literature for each is described below.

Intrapersonal/Self Factors Associated with Weight Status

At the core of an ecological model is the self, which is constantly interacting with factors in the various life contexts (e.g., family, peers). Commonly studied intrapersonal factors related to weight status include physical activity, sedentary behavior, dietary intake, and genetic and physiological factors (Pate et al., 2013). Several studies highlight the association between children's overweight status and variety of mental health problems, including self-esteem, depression, quality of life, body dissatisfaction, and other emotional and behavioral concerns (e.g., Latzer & Stein, 2013; Griffiths, Parsons, & Hill, 2010; Britz, et al., 2000). As noted in Griffiths, Dezateux, and Hill (2011), findings appear inconsistent in relations drawn among obesity and the above factors. There seems to be a greater amount of research on weight status and self-esteem and depression (e.g., Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich & Bryant, 2009; Strauss, 2000). Michael et al. (2014) cite research suggesting that such adolescents are at higher risk for chronic body image problems, which may in turn contribute to such things as depression, eating disorders and obesity. Self-esteem, depression/mood, body image, and self-control for eating were selected as variables of interest in the current study. The Health Belief

Model (e.g., Rosenstock, 1974) was also consulted, as it helps to explain the link between personal beliefs about the self, others, and situations and one's health choices.

Self-esteem. Indeed, research has shown that there is a relationship between one's weight status and self-esteem. However, the association is not straightforward (Latzer & Stein, 2013). Although some studies suggest that youngsters with higher weight status have lower self-esteem (Cole, Bellizzi, Flegal & Dietz, 2000; Wang & Veugelers, 2008), others suggested that there is little difference noted between overweight youngsters and their normal weight peers (e.g., Renman, Engström, Silfverdal, & Åman, 1999). Renman et al. (1999) suggested that the relationship between obesity, mental health, and self-esteem in children and adolescents is not fully understood. Certainly there is conflicting evidence regarding self-esteem in overweight children and adolescents as it pertains to gender (e.g., Nowicka et al., 2009) and socio-cultural status (e.g., Strauss, 2000). Strauss (2000) found that obese Hispanic and White females demonstrated significantly lower levels of self-esteem by early adolescence. Some have found an increasingly strong correlation between lower self-esteem and higher body mass across the elementary school years (Hesketh, Wake, & Waters, 2004).

Depression/mood. Similarly, depression/mood has also been associated with weight. Goodman and Whitaker (2002) examined depressive symptoms and change in body fat. Researchers found that adolescents with depressive symptoms at baseline were at increased risk of being overweight 1 year later, even after controlling for socio-demographics, self-esteem, physical activity, and smoking. Stice, Presnell, Shaw, and Rhode (2005) looked at whether psychological and behavioral risk factors predicted onset of obesity in adolescent girls, and depression was indeed found to predict obesity onset. This was consistent with other studies on adolescents and adults (e.g., Goodman & Whitaker, 2002). Further, Stice et al. (2005) report that

odds ratios suggests that for each additional depressive symptom conveyed by the adolescent, there was more than a fourfold increase in risk for obesity onset. The others suggested that this finding is also clinically very meaningful.

Body image. Eating disorders and body image disturbances are among the most common and debilitating clinical problems among adolescent girls and young women (Thompson & Smolak, 2001), and several studies suggest a relationship between body image and weight related behaviors, such as eating disturbance, peer, parents and media influences (e.g., van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). Body image and perception are inversely correlated with actual weight, and overweight youngsters usually show more body image disturbances and more body-related negative mindsets than their average weight peers (Renman, Engström, Silfverdal, & Åman, 1999; Strauss, 2000; Israel & Avanova, 2002; Phillips & Hill, 1998; Stradmeijer, Bosch, Koops, & Seidell, 2000). Much research on body image surrounds females; however more recent research suggests there are body image concerns within the male population as well (e.g., Kater, Rohwer, & Londre, 2002). Furthermore, although not all research shows an association between obesity/weight and self-esteem, some found an interaction between body image and self-esteem that produces a unique association with weight status (Stice & Shaw, 2002; Shroff & Thompson, 2006) and some posit that the impact of body image on self-esteem is the most key variable (Latzer & Stein, 2013). Thus, both are included in this study, with questions pertaining to each as possible mediators.

Self-control for eating. Bandura (1986), through his Social-Cognitive Theory (SCT), purported belief in one's efficacy to exercise control is a common pathway through which psychosocial influences affect health functioning. An extension of that includes one's sense of self-control in general as well as specifically in regard to eating behavior. Duckworth,

Tsukayama, and Geier (2010) found that higher self-control (i.e., less impulsivity and more delay of gratification) in 5th grade was associated with lower BMI is 8th grade. Others (e.g., Tsukayama, Toomey, Faith, and Duckworth, 2010) found that more self-controlled boys and girls are less likely to become overweight as they enter adolescence. However, no other research was found when conducting this literature review and indeed, others have suggested that loss of control eating among youths has not been fully explored (Tanofsky-Kraff et al., 2007).

Environmental Factors Associated with Weight Status

Socio-Cognitive Theory (SCT; Bandura, 1986) is a universally employed theory in interventions to promote healthy eating among adolescents (Cerin, Barnett, & Baranowski, 2009), and it is used to highlight the importance of personal, socio-environmental, and behavioral factors and the interaction between these factors in influencing behavior (Fitzgerald, Heary, Kelly, Nixon, & Shevlin, 2013). Parents and peers were of interest in the current study.

Family acceptance of overweight status. Parent-child interactions and the home environment can affect behaviors correlated with the risk of obesity (Ebbeling, Pawlak, & Ludwig, 2002; Wen, Simpson, Baur, Rissel, & Flood, 2011). Parents play a valuable role in creating a supportive environment for their children (as cited in Ball et al., 2012), but parent's perceptions of their child's overweight status highly influences the well-being and self-perceptions of obese children (Latzer & Stein, 2013). Various family variables have been studied, including the role of nurturing parenting in healthy body image (Michael et al., 2014) and weight management (Ball et al., 2012), though less is known about the role of family acceptance. Associations have been found between girls' eating and weight-related behaviors/conditions and family members' attitudes and behaviors (e.g., van den Berg et al., 2002) including parental pressure to be thin, (Levine, Smolak, Moodey, & Shuman, 1994),

family teasing about weight (Kanakis & Thelen, 1995), and mothers' own body image (Rieves & Cash, 1996). Davison and Birch (2004) found that girls were more likely to endorse fat stereotypes when their parents fostered them to lose weight. Abraczinskas, Fisak and Barnes (2012) found parental influence both directly and indirectly related to body image, or specifically body shape dissatisfaction, and eating disturbance. However, no other studies on family acceptance were found.

Peer acceptance of overweight status. Peers have been shown to influence body image and eating disturbances (e.g., Rayner, Schniering, Rapee, Taylor & Hutchinson, 2013; Paxton, Schutz, Wertheim, and Muir, 1999; Eisenberg & Neumark-Sztainer, 2010; Hutchinson & Rapee, 2007), body dissatisfaction (e.g., Thompson et al., 2007; Eisenberg, Neumark-Sztainer, Haines & Wall, 2006), and general appearance self-perceptions (Jones, 2004). There is a reasonable amount of research surrounding the relationship between peer influence and body image, as well as weight based teasing (e.g., Eisenberg, Neumark-Sztainer, & Story, 2003; Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Krukowski et al., 2009). However, relative to the media and parents, peer influence on body image has received less attention (Lawler & Nixon, 2011). Some studies focus on both parent and peer factors associated with body image (e.g., Michael et al., 2014), others focus on all three (e.g., Aliyev & Turkmen, 2014; van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). However, less is known simply about peer acceptance of overweight status and obesity.

Academic Performance and Weight Status

It has been established that healthier children learn better (Basch, 2011; Castelli et al., 2014). Children who enter school overweight or become overweight during the first few years of school demonstrate lower academic performance on standardized tests than their normal weight

peers (Datar & Sturm, 2006). Taras and Potts-Datema (2005), in a review of literature, found consistent association between obesity and school performance, and others found that this holds even when controlling for demographic factors such as SES and parent education (as cited in Krukowski et al., 2009). Overall, however, the explanation for this negative association between overweight status and academic performance is considered to be vague (Krukowski et al., 2009). Datar, Sturm, and Magnabosco (2004) suggest that obesity is a marker, not a cause, of low academic performance. Furthermore, variables such as mental health problems, low self-esteem, depression, weight-based teasing have been proposed as having a possible mediating role, although this remains unclear (Krukowski et al., 2009; Taras & Potts-Datema, 2005). In any case, research provides supportive evidence to indicate successful academic functioning is at risk when children are at an overweight status and thus is an important factor included in the current study.

Risk-Taking Behaviors

Associations have also been found between risk-taking behavior and weight status, when comparing overweight and obese youth with their healthy weight peers, including equal or greater engagement in high-risk behaviors (Ratcliff, Jenkins, Reiter-Purtill, Noll, & Zeller, 2011) and less sexual risk-taking in particular (Lowry, Robin, & Kann, 2014). Overweight and obese early-adolescent and mid-adolescent girls were also more likely to be frequent smokers than their normal weight peers (e.g., Farhat, Iannotti, & Simons-Morton, 2010; Polfuss, Liebhart, & Greenley, 2011) and more frequent users of both cigarettes and alcohol (Strauss, 2000). Others found greater increases in smoking with age (Haung, Lanza, Wright-Volel, & Anglin, 2013). Racial differences in these dynamics have also been observed, with greater risk behavior among obese White girls compared to obese Black girls (Leech & Dias, 2012). Others have found that

aside from smoking, no other common risk behaviors were engaged in any more frequently among those who were obese/overweight (Polfuss, Liebhart, & Greenley, 2011). These findings, as well as inconsistencies provide support for further exploring the interrelatedness between risk taking behaviors and overweight status.

Gender, Ethnicity, and SES

Previous studies have suggested varied results between obesity as it relates to gender, ethnicity and SES. However, the complexity and dynamic associations are evident (e.g., Wang & Beydoun, 2007). Obesity prevalence rates by gender and ethnicity are similar, though males overall have slightly greater rates (Ogden et al., 2010) and rates of male obesity have increased more than female obesity rates over time (Odgen et al., 2012). However, Puhl and Latner (2007) cite conflicting results, with some research suggesting that weight-based teasing and victimization takes place more with girls than boys, yet others have found no gender differences in weight-based teasing and victimization. Regarding race/ethnicity, Wang (2002) and Wang and Beydoun (2007) specify that large disparities exist, particularly among women, children, and adolescents in the United States (Kamath et al., 2008; Ogden et al., 2010; Odgen, Carroll, Kit & Flegal, 2013). Ethnic and cultural differences may occur in expressions of weight bias among youth (Puhl & Latner. 2007). Low SES/poverty has been associated with more obesity and overweight status (Schreier & Chen, 2013; Singh, Siahpush, & Kogan, 2010). Others suggest that the association between obesity and SES varies by ethnicity and that ethnic/racial differences in BMI are not fully explained by individual SES (e.g., Wang & Beydoun, 2007; Odgen et al., 2006), but rates of obesity have increased in almost all groups over time (Zhanq & Wang, 2004). In conclusion, taken together the contributions of these demographic variables are undeniable and thus must either be examined explicitly or controlled for in research on this topic.

Therefore, in the current study, it was intended that these demographics would be controlled for and/or analyzed as potential mediators, depending upon the question/analyses.

Limitations of Past Research and Purpose of Current Study

A significant amount of research has resulted in an improved understanding of predictors and outcomes of overweight status. However, prior research has often been conducted with one or a few of the potential contributing variables, and from an ecological perspective it is important to consider myriad interacting variables at once. Thus, the current study will include a sampling of both intrapersonal and environmental/contextual factors hypothesized to affect overweight status either singly or in interaction with other variables. It is a unique and more inclusive combination of factors representing these key aspects of adolescents' lives. Based on the review of literature and perceived limitations of prior research, the following research questions were posed, with demographics controlled for:

1) What intrapersonal level variables (self-esteem, depression/mood, body image, self-control for eating) are most strongly associated with weight status?

2) What microsystem level variables (family and peer acceptance of overweight status) are most strongly associated with overweight status?

3) What is the association between academic achievement and weight status?

4) What is the association between risk-taking behavior and weight status?

5) In a full model, with control variables, intrapersonal variables, microsystem variables, academic achievement, and risk-taking behavior, which variables or combinations best predict weight status?

6) Providing that weight status and achievement are significantly related in this proposed data set, do self-esteem, depression/mood, body image, self-control for eating, and

acceptance by family and peers of overweight status mediate weight status and achievement?

Significance of the Study

It is expected that the results of this study will provide an increased understanding of the predictors of overweight status and obesity among adolescents. As obesity is a multifaceted problem, ecological models consider a wide range of factors and contextual influences on obesity, and thus particularly helpful in understanding underlying relationships of this epidemic. Thus, the above variables were examined for their combined contributions to weight status. It is thus expected that the data gathered from this study will glean a better understanding of the multi-determinants of adolescent overweight status. The ultimate benefit of these findings will be to increase our understanding of how to frame interventions. Some current options occur solely within the school environment (e.g., Hip –Hop to Health Jr.; Fitzgibbon et al., 2004; Planet Health; Gortmaker et al., 1999; APPLES, Sahota et al., 2001), and show that combined diet and physical activity school-based interventions can aid in the prevention of children becoming overweight (Brown & Summerbell, 2008), but others posit mediocre results in producing changes at the school level (Sahota et al., 2001). Still other interventions are designed for the home environment (Parents of Change; Ball et al., 2012). A vast majority is geared for early childhood and elementary aged students and some tailor by gender (Gortmaker et al., 1999). It was the aim of the current study to explore key variables as they relate to adolescent overweight and obesity and thus provides additional data to contribute knowledge to not only preventative measures but insight into how such variables relate at different contextual levels.

CHAPTER 2 LITERATURE REVIEW

It has been well established that obesity rates in the United States have reached pandemic magnitude. According to the World Health Organization (WHO), obesity is considered a disease and is defined as the condition of excess body fat to the extent that health is impaired (WHO, 2000). Perhaps more concerning, the prevalence of obesity and overweight among US children and adults has more than doubled since the 1970s; with the rate continuing to rise (Wang and Beydoun, 2007). In the United States, two-third of U.S. adults is considered overweight and one-third of that group are obese (Ogden, Carroll, Kit, & Flegal, 2012). Ample studies have shown that obesity increases morbidity and mortality (World Health Organization, 2000). Obesity has become the second leading cause of disease and death in the United States (Sharma, 2006) second only to tobacco (Wang & Beydoun, 2007).

Obesity is currently considered the most predominant nutritional disorder of children in the United States (Kamath et al., 2008). Worldwide, the International Obesity Task Force has reported that approximately 155 million school-aged children are overweight or obese (Taskforce IO, 2010). Results from the 2011-2012 National Health and Nutrition Examination Surveys (NHANES), utilizing measured heights and weights, reveal that an estimated 16.9% of U.S. children and adolescents between the ages of 2 and 19 are obese, and another 14.9% are deemed overweight (Fryar, Carroll, & Ogden, 2014).

The problem has escalated over time. From 1976 to 2008, the prevalence of obesity in children ages 2 to 5 increased from 5% to 10.4% and for ages 6 to 11, from 6.5% to 19.6% (Ogden & Carroll, 2010). The prevalence of overweight and obesity in adolescents has more than tripled in the past three decades (Ogden, Carroll, Kit, & Flegal, 2014). Between 1988 and 1994 as well as 2007 and 2008, the prevalence of childhood obesity increased at all income and

education levels (Ogden et al., 2010). In Michigan specifically, the 2007 Youth Risk Behavior Survey revealed that more than 16% of Michigan youth (9th–12th grades) are considered overweight and another 12% obese. According to this same survey, only 44% of the youth in these grade levels were meeting current physical activity recommendation levels, and 17% were reported to eat fruits and vegetables five or more times a day.

The increase prevalence of overweight and obese children has raised substantial concern regarding the impact on children's health and well-being (Reilly et al., 2005). Medical conditions related to obesity are multi-systemic (Barlow, 2007). A multitude of research cites several complications of childhood obesity, including but not limited to, psychosocial effects such as poor self-esteem, depression and eating disorders (e.g., Davison & Birch, 2001; Strauss, 2000), and other serious health consequences, including hypertension, abnormal amount of lipids (e.g., cholesterol and/or fat) in the blood, insulin resistance or diabetes and fatty liver disease (Daniels, 2009), in pulmonary complications such as sleep apnea (Barlow, 2007), asthma (Ford, 2005), and polycystic ovarian syndrome (Lewy, Danadian, Witchel & Arslanian, 2001), and even is implicated in the accelerated timing of menarche in females (Rosenfield, Lipton, & Drum, 2009) and the onset of puberty in males (Mamun, Hayatbakhsh, O'Callaghan, Williams & Najman, 2009). Finally, childhood obesity has been connected to psychosocial concerns and reduced quality of life (Schwimmer, Burwinkle, & Varni, 2003), and those who are overweight are at an increased risk for bullying, teasing and poor self-esteem (Lee, 2007). Barlow (2007) recommends that clinicians be aware of flat affect, anxiety, body dissatisfaction, excess eating, fatigue, and difficulty sleeping due to the often comorbid condition of depression.

A myriad of studies have reviewed the copious risk factors associated with childhood and adolescent obesity. According to Neumark-Sztainer et al. (2007), weight-specific, socio-

environmental, personal and behavioral variables are strong and consistent predictors of overweight status, binge eating, and extreme weight-control behaviors later in adolescence. Although obesity is caused by several factors, in most people weight gain results from a combination of excess calorie consumption /energy intake and inadequate physical activity/energy expenditure (Wang & Beydoun, 2007; Lakshman, Elks, & Ong, 2012). Nonetheless, the factors behind this should be considered multifaceted (Lakshman, Elks, & Ong, 2012), including environmental factors, but clearly there are others (Center for Disease Control and Prevention [CDC], 2009). Recent research has postulated that childhood obesity may be influenced as early on as in the womb (Lee, 2007). Research surrounding in-utero environments has provided important insight into the role of genetic (e.g., single gene mutations) and epigenetic differences in future obesity. Evidence suggests that during adiposity rebound weight gain is associated with more rapid deposition of fat than lean tissue (Wofford, 2008). When adiposity rebound occurs earlier than it normally does, there is an increased risk for obesity in later years (Taylor, Grant, Goudling, & Williams, 2005). The age of adiposity rebound denotes to the age after infancy at which the individuals BMI is lowest and after which begin to increase to adult levels (Lee, 2007).

Further research by Lamb et al. (2010) suggest that while early life risk factors for high childhood BMI have been identified, the pathways that link such risk factors are not fully comprehended. Lamb et al. (2010) found that gender, diabetes exposure in utero, and size for total breastfeeding duration showed significant association with higher childhood BMI. Specifically, Lamb and colleagues suggest that infants who are breastfed for a shorter period of time tend to gain weight faster during the first year of life, and are consequently more likely to

have higher childhood BMI. Similarly, larger birth size may partially mediate the relationship between diabetes exposure in utero and higher childhood BMI (Lamb et al., 2010).

Several other factors have been associated with childhood obesity and the escalation in recent years. Experts have implicated physical activity (PA), or the lack thereof (sedentary behavior), and dietary behavior (diet- including fat consumption, carbohydrates, energy density, portion size and the rise in consumption of fast food) in the underlying pathway to obesity (Kamath et al., 2008; Ebbling et al., 2002). Research thoroughly established that sedentary behaviors in particular (e.g., television viewing) are commonly associated with childhood obesity (Ebbling, 2002). For evident reasons, physical activity plays an important role in childhood weight status and moreover, several associated variables. Further, there is well-known conjecture that television viewing demonstrates a causal relationship with childhood obesity. Two prime mechanisms that television viewing contributes to obesity have been postulated: reduced energy expenditure from lack of physical activity and increased dietary energy intake during and/or resulting from food advertising (Robinson, 1999). In an experimental study, Robinson (1999) demonstrated a direct association between television/video watching and video gaming with increased overweight status.

According to Wang and Beydoun (2007), however, social environmental factors may have a more profound influence on individuals' body weight status than do individuals' characteristics such as SES and that there may be growing consensus that environmental factors have played a fundamental role in influencing people's lifestyles and increasing obesity prevalence in the United States and worldwide. Thus, the focus of the current study is on psychosocial and intrapersonal correlates of obesity.

Theoretical Models

The Health Belief Model and social learning theory (social cognitive theory), self-efficacy, and locus of control have all been applied with fluctuating success to problems of explaining, predicting, and influencing behavior (Rosenstock, Strecher & Becker, 1988). While the aforementioned will be highlighted to some degree here within, the theoretical framework that served as a guide in the exploration of variables associated with overweight /obesity (hereafter referred to as "weight status") is Bronfenbrenner's ecological systems theory (1979) in conjunction with the Health Belief Model and Tripartite Theory. Bronfenbrenner, (1977; 1979; 2005) purported that a person and his/her unique intrapersonal factors are nested within structures (illustrated as a series of concentric circles) of the ecological environment. Others have described this as both the family and neighborhood environments, which shape and are shaped by a person (Schreier & Chen, 2013). The original model includes four nested systems: microsystem (family, home and school), mesosystem (interactions between microsystems), exosystem (influential formal and informal structures) and macrosystems (overarching cultural influence).

Ecological models have further been developed specific to weight status, nutrition, and physical activity (Sallis et al., 2013). As shown through previous research, the development of childhood overweight involves a complex set of factors from multiple contexts that interact with each other that can place a child at risk of overweight; this system can be conceptualized through the Ecological Systems Theory (Davison & Birch, 2001). Through an ecological lens, therefore, it was conceptualized that weight status has a bi-directional interaction with intrapersonal, environmental, and social factors. Ecological System Theory highlights the importance of considering the context(s), or ecological niche, in which a child is located in order to grasp the

development of a particular characteristic (Davison & Birch, 2001). This system as outlined by Bronfenbrenner (1979, 1989) suggests that change at one level can affect the other levels and could influence a child's developmental outcomes directly or indirectly through several contextual changes. Intrapersonal, parent/family, and peer factors were of focus in the current study as the most proximal daily influences on children. In each of these contexts, several key variables were selected for inclusion to examine their unique and combined associations with weight status, and the existing literature for each is described below.

Bandura's social cognitive theory (SCT; Bandura, 1986) holds that behavior is determined by expectancies and incentives (Rosenstock et al., 1988). Expectancies are said to be divided into three types: about environmental cues (or how events are connected), expectancies about the consequences of owns own actions (outcome expectations) and expectancies about one's competencies to perform the behavior needed to influence outcome (i.e., self-efficacy). Incentives are simply described as the value of a certain object or outcome (Rosenstock et al., 1988). The Health Belief Model is easily the theory most often adhered to in health education and health promotion (Glanz, Rimer, & Lewis, 2002). The Health Belief Model suggests that one's health behavior is determined by personal beliefs or experiences about a disease and the strategies available to decrease its existence (Hochbaum, 1958). This depends on the person's perception of four critical areas: the severity of a potential illness, the person's susceptibility to that illness, the benefits of taking a preventive action, and the barriers to taking that action. The model suggests that health-seeking behavior is influenced by a person's perception of a threat posed by a health problem and the value associated with actions aimed at reducing the threat. Thus, the Health Belief Model speaks to the relationship between a person's beliefs and their behaviors. As it relates to the focus of this research, this model can be applied to how an

adolescent perceives whether or not they are overweight, the severity of that, their own susceptibility to overweight, prevention of such and whether barriers exist to that.

The Tripartite influence model of body image and eating disturbance is a current theoretical approach that embraces a set of direct (peer, parental, and media factors) and mediational links (internalization of societal appearance standards, appearance comparison processes) as influences potentially leading to body dissatisfaction and eating disturbance (Shroff & Thompson, 2006). This model, proposed by Thompson, Coovert, and Stormer (1999) incorporates many of the factors found in various studies into a single model (Shroff & Thompson, 2006). In this particular model, the three above mentioned influences (peers, parents, and media) are thought to have a direct effect on body image and dissatisfaction. While the media influence is not an interest of this study, certainly the peer and parent aspects are highlighted within.

Intrapersonal/Self Factors Associated with Weight Status

At the core of an ecological model is the self, which is continuously interacting with factors in the assorted life contexts (e.g., family, peers). Frequently studied intrapersonal factors related to weight status include physical activity, sedentary behavior, dietary intake, and genetic and physiological factors (Pate et al., 2013). Numerous studies highlight the association between children's overweight status and variety of mental health problems, including self-esteem, depression, quality of life, body dissatisfaction and other emotional and behavioral problems (e.g., Latzer & Stein, 2013; Griffiths, Parsons & Hill, 2010; Britz et al., 2000). Conclusions appear inconsistent in relatedness between obesity and the above factors (Griffiths, Dezateux & Hill, 2011). There seems to be a greater amount of research on overweight/obesity and self-esteem and depression (e.g. Martyn-Nemeth, Penckofer, Gulanick, Velsor-Friedrich & Bryangt,

2009; Strauss, 2000). Michael et al., (2014) cite research suggesting that such adolescents are a higher risk for chronic body image problems, which may in turn contribute to such things as depression, eating disorders and obesity. Self-esteem, depression/mood, body image, and self-control were selected as variables of interest in the current study. The Health Belief Model (e.g., Rosenstock, 1974), was also consulted, as it helps explain the relationship between personal beliefs about the self, others, and situations and one's health choices. The Tripartite influence model of body image and eating disturbance was further referred to, particularly as it relates to the direct influence of peers and parents, both constructs of interest in this study.

Self-esteem. Clearly research suggests that children who are overweight or obese are at risk for depression (Armstrong, Westen, & Janicke, 2014). Research proposes that many children who are overweight or obese have impaired psychological health (i.e., Depression, self-esteem and quality of life (Armstrong et al., 2014). However, the association is not always so straightforward (Latzer & Stein, 2013). While some studies suggest that youngsters with higher weight status have lower self-esteem (Cole, Bellizzi, Flegal & Dietz, 2000; Wang & Veugelers, 2008), others suggested that there is little difference noted between overweight youngsters and their normal weight peers (e.g., Renman et al., 2000; Friedman & Brownell, 1995). Renman et al. (2000) suggested that the relationship between obesity, mental health, and self-esteem in children and adolescents is not fully understood. Moreover, there is conflicting evidence regarding self-esteem in overweight children and adolescents as it pertains to gender (e.g., Nowicka et al., 2009) and socio-cultural status (e.g. Strauss, 2000). Strauss, (2000) found that obese Hispanic and White females demonstrated significantly lower levels of self-esteem than among Black females by early adolescence.

Others have looked at association between self-esteem on the development of overweight status. For instance, Hesketh, Wake and Waters (2004) concluded an increasingly strong correlation between lower self-esteem and higher body mass across the elementary school years. Further noting overweight/obesity precedes low self-esteem in many children, suggesting what they all a causal relationship. Authors concluded that prevention and management strategies for childhood overweight/obesity need to begin early to curtail the impact on self-esteem (Hesketh, et al., 2004). Even after controlling for body mass index, others have found low self-esteem associated with adolescent overweight and over eating (Ackard, Neumark-Sztainer, Story, & Perry, 2003).

Depression/mood. Depression/mood has also been associated with weight. According to Barlow (2007), depression is often comorbid with obesity, and each may result from the other. Goodman and Whitaker (2002) inspected depressive symptoms and change in body fat. Researchers found that adolescents with depressive symptoms at baseline were at increased risk of being overweight 1 year later, even after controlling for socio-demographics, self-esteem, physical activity, and smoking. Stice, Presnell, Shaw and Rohde (2005) looked at whether psychological and behavioral risk factors predicted onset of obesity in adolescent girls. Researchers found that symptoms of depression are a predictor of obesity onset. Their findings converge with outcomes from other prospective studies with adolescents and adults (e.g., Goodman & Whitaker, 2002). Moreover, Stice et al. (2005) postulate that for each additional depressive symptom reported by the adolescent, there was more than a four times increase in risk for obesity onset, suggesting the effect is clinically meaningful.

In a separate study, Armstrong et al. (2013) found that depressive symptoms mediate the relationship between child perception of overweight and engagement in greater unhealthy

weight control behaviors (e.g., skipping meals, use of diet pills, purging, fasting, use of laxatives or diuretics, and cigarette smoking). This study further sheds light on the important role that a child perception of weight may play in psychosocial outcomes and health behaviors. Similarly, Lawler and Nixon (2011) concur that depression can result from body image dissatisfaction.

Body image. Body image is a multifaceted construct that refers to individuals' perceptions of and attitudes toward their own body, especially its appearance. Adolescence has been characterized as a pivotal period in the development of body image (Lawler & Nixon, 2011). Body image has also been linked to one's weight. The significant social, cognitive and physical changes that take place during this time contribute to the intensified awareness of body and weight worries among both adolescent males and females (Ata, Ludden, & Lally, 2007). Several measures exist to assess various components of this construct (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). For example, the Multidimensional Body Self-Relations Questionnaire (MBSRQ: Brown, Cash, & Mikula, 1990; Cash, 2000) assesses attitudes toward the body and body image.

As previously indicated body image dissatisfaction is a significant risk factor in the onset of depression as well as eating pathology (Lawler & Nixon, 2011). Eating disorders and body image disturbances are unfortunately common clinical problems grappled with by adolescent females and young women (Thompson & Smolak, 2001). Several studies suggest a relationship between body image and weight related behaviors, such as eating disturbance, peer, parents and media influences (e.g., van den Berg et al., 2002). Specifically, research suggests that favorable body image and perception are inversely correlated with actual weight, and overweight youth usually show more body image disturbances and more body-related negative mindsets than their

average weight peers (Renman, Engström, Silfverdal, & Åman, 1999; Strauss, 2000; Israel & Avanova, 2002; Phillips & Hill, 1998; Stradmeijer, Bosch, Koops, & Seidell, 2000).

While much research on body image surrounds females, more recent research suggests there are body image concerns within the male population a well (e.g., Kater, Rohwer, & Londre, 2002; Lawler & Nixon, 2011; Knauss, Paxton, & Alsaker, 2007). In particular, socio-cultural norms are thought to have been prominent in the development of poor body image amongst adolescents (Lawler & Nixon, 2011). Suggested is promotion of physical attractiveness and beauty for both males and females (Thompson et al. 1999; Keery et al. 2004). While these cultural ideals affect both sexes, it is plausible that females respond with more intensity to such ideals, and thus experience greater body dissatisfaction than their male counterparts (Knauss et al., 2007). In a study of both male and female adolescents, Lawler and Nixon (2011) found that for both sexes, body mass, appearance conversations with friends, peer appearance criticism and internalized appearance ideals occurred as important predictors of body dissatisfaction. According to authors, gender was found to moderate the effect of body mass on body dissatisfaction, while internalization mediated the relationship between peer appearance conversations, criticism, and body dissatisfaction. As such, findings implicate internalization as an important psychological process that reinforces body dissatisfaction for both males and females, even though body mass wields a differential risk for body dissatisfaction among both sexes (Lawler & Nixon, 2011).

Furthermore, although not all research shows an association between obesity/weight and self-esteem, some found an interaction between body image and self-esteem that produces a unique association with weight status (Stice & Shaw, 2002; Shroff & Thompson, 2006) and some

posit that the impact of body image on self-esteem is the most key variable (Latzer & Stein, 2013). Thus, both were included in this study, with questions surrounding each as mediators.

Research on body image also suggests that self-esteem and body image interact in some way in their relationship with weight status. For instance, research posits an association with poor body image, eating disturbance and a direct effect on self-esteem (Stice & Shaw, 2002; Shroff & Thompson, 2006). Latzer and Stein (2013) suggest that there is an even stronger correlation between body image and overweight status than there is between self-esteem and overweight status, which was discussed earlier in this paper. Additionally, young adolescents with a discrepancy between their ideal and actual body size are at a higher risk for low self-esteem and poor self-concept (Ata, Ludden, & Lally, 2007; Marsh, Hau, Sung & Yu, 2007). Thus, inclusion of body image as well as self-esteem appears to be well-justified. In some studies, body dissatisfaction is indicated as a mediator in the relationship between obesity and self-esteem, with obese children with greater body dissatisfaction having significantly lower self-esteem (e.g., Shin & Shin, 2008; Pesa, Syre & Jones, 2000) while others show no such relationship (Marsh et al., 2007). As suggested by Lawler and Nixon (2011), given the negative consequences of body image dissatisfaction, it was considered imperative that factors related with and contributing to body image be explored.

Self-control for eating. Previously identified risk/protective factors for excessive weight in adolescence include pubertal development, ethnicity, and socioeconomic status; however less well studied, but important to consider, is the psychological variable of level of self-control (Tsukayama, Toomey, Faith, and Duckworth, 2010). Self-control is the ability to override impulses to achieve goals and maintain standards (Tsukayama et al., 20110). Bandura's Social-Cognitive Theory (SCT; Bandura, 1986) proposes that a multifaceted causal structure in which

self-efficacy beliefs operate together with goals, outcome expectations, and perceived environmental impediments and facilitators in the regulation of human motivation, behavior, and well-being. Hence, belief in one's efficacy to exercise control is a common pathway through which psychosocial influences affect health functioning; an extension of that includes one's sense of self-control in general as well as specifically with eating.

Notwithstanding the considerable prevalence of loss of control eating episodes and a literature indicating accompanying psychosocial problems, the conceptualization of loss of control eating among youths has not been fully explained (Tanofsky-Kraff et al., 2007). Duckworth, Tsukayama, and Geier (2010) investigated the effects of self-control (i.e. impulsivity and delay of gratification) in 5th graders, finding those with higher self-control in 5th grade had lower BMI is 8th grade. Others have looked at whether more self-controlled children are protected from weight gain as they enter adolescence (e.g., Tsukayama et al., 2010). Tsukayama et al. (2010) found that more self-controlled boys and girls are less likely to become overweight as they enter adolescence. A literature review has revealed a lack of research as it pertains to this matter and indeed, others have suggested that loss of control eating among youths has not been fully explored (Tanofsky-Kraff et al., 2007).

Environmental Factors Associated with Weight Status

As highlighted above, Bandura's Socio-Cognitive Theory (SCT; Bandura, 1986) is a universally employed theory in interventions to promote healthy eating among adolescents (Cerin, Barnett, & Baranowski, 2009). Socio-cognitive theory highlights the importance of personal, socio-environmental and behavioral factors and the interaction between these factors in influencing behavior (Fitzgerald, Heary, Kelly, Nixon, & Shevlin, 2013). One of the key notions of SCT is 'reciprocal determinism' which states that the environment, the person and the

behavior continuously influence each other. Perceptions of one's environment may interact with the intrapersonal variables noted above to produce different outcomes in teens. Similarly, the Tripartite Influence Model of body dissatisfaction (Thompson et al., 1999) identifies the media, peers and parents as the three formative socio-cultural influences on body image (Lawler & Nixon, 2011; Keery, van den Berg, & Thompson, 2004; van den Berg et al., 2002). These three primary influence variables are those which area said to provide the underpinnings of later body image and eating dysfunction (van den Berg et al., 2002). While many have studied the influence of media on body image in particular (e.g., Dunkley, Wertheim, & Paxton, 2001), variables within teens' family and peer contexts were of interest in this study.

Family acceptance of overweight status. Several studies have looked at the influence of social factors, and parents in particular, in the development and maintenance of body image and eating disturbance both directly and indirectly (Abraczinskas, Fisak, & Barnes, 2012). Parent-child interactions and the home environment can affect behaviors correlated with the risk of obesity (Ebbeling et al., 2002; Wen, Simpson, Baur, Rissel, & Flood, 2011). Parents can act as role models to shape their children's eating and activity habits (Barlow, 2007), however parent's perceptions of their child's overweight status highly influences the well-being of obese children and the way by which they perceive themselves (Latzer & Stein, 2013).

A lot has been done with family behaviors and weight/obesity, e.g., with eating patterns/habits (Stein, Raynor, Kilanowksi, & Paluch, 2005; Francis & Birch, 2005), sedentary behaviors (Prentice-Dunn & Prentice-Dunn, 2012), and family support for physical activity (Story, 1999; Heitzler, Duke, & Huhman, 2006). The International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE) looked at the relationship between lifestyle behaviors and obesity in a multi-national study of children from diverse cultural and socio-economic

backgrounds, to explore the influence of higher-order qualities such as behavioral settings, and the physical, social and policy environments (Katzmarzyk et al., 2012). Various family variables have been studied, e.g., the role of nurturing parenting in healthy body image (Michael et al., 2014) and weight management (Ball et al., 2012), though less is known about family acceptance. Associations have been found between girls' eating and weight-related behaviors/conditions and family members' attitudes and behaviors (e.g., van den berg et al., 2002) including parental pressure to be thin, (Levine, Smolak, Moodey, Shuman, & Hessen, 1994), family teasing about weight (Kanakis & Thelen, 1995), and mothers' own body image (Rieves & Cash, 1996). Davison and Birch (2004) found that girls were more likely to endorse fat stereotypes when their parents fostered them to lose weight. However, no other studies on family acceptance were found.

Research extends beyond Baumrind's classical description of parents styles (Baumrind, 1967) by suggesting children of parents who exhibit controlling restrictive behaviors display less healthy dietary behaviors and are at increased risk of obesity versus children of parents who express more supportive authoritative practices (e.g., Stein, Epstein, Raynor, Kilanowski, & Paluch, 2005). Davison and Birch (2004) looked at fat stereotypes among 9-year-old girls and their parents, assessing girls' perceptions of parental concern about weight. Results suggest that girls were more likely to endorse fat stereotypes when their parents fostered them to lose weight and when interactions with peers surrounded weight and body shape, thus suggesting that girls may learn to embrace negative attitudes about obesity and obese people as a result of interactions with parents and peers that promote thinness. Although the findings are not undisputed, there have been plentiful studies documenting the relationship between family members' attitudes and behaviors and girls eating and weight-related behaviors (van den Berg et al., 2002). For example,

Levine, Smolak, Moodey, and Shuman (1994) indicate that perceived parental pressure to be thin predicted eating disturbance. Kanakis and Thelen (1995) found that bulimics and those with eating disorders reported being teased by their families more frequently than those in a control group. Similarly, Rieves, and Cash (1996) found that participant's body image dissatisfaction was considerably related to participants' view of their mothers' body dissatisfaction. While evident that families play an important role in children and adolescent perceptions of overweight status, minimal research surrounds familial acceptance of obesity and thus, it is an important inclusion in the current study.

Peer acceptance of overweight. Peers have shown to influence the development of body image and eating disturbances (e.g., Rayner, Schniering, Rapee, Taylor & Hutchinson, 2013; Paxton, Schutz, Wertheim, and Muir, 1999; Hutchinson & Rapee, 2007), body dissatisfaction (e.g., Thompson et al., 2007; Eisenberg, Neumark-Sztainer, Haines & Wall, 2006), and general appearance self-perceptions (Jones, 2004). However, relative to the media and parents, peer influences on body image have received less attention (Lawler & Nixon, 2011). Some studies focus on both parent and peer factors associated with body image (e.g. Michael et al., 2014), others focus on all three (e.g., Aliyev & Turkmen, 2014; van den Berg et al., 2002).

Paxton et al. (1999) found that high school girls who reported higher levels of dieting had been teased more by friends about their weight and shape, indicating that friends had influenced their decisions to diet, and found their friends to be more preoccupied with eating and weight-related issues. As such, Lawler and Nixon (2011) focused on peer influence on body image dissatisfaction, citing experiences as an important social context in which appearance norms and ideal are communicated, modelled and reinforced. Adolescents are said to partake in "appearance training" with peers during everyday interactions surrounding looks, image and

attractiveness (Jones, 2004). Further, research points to the positive relationship between weight-based teasing and body dissatisfaction among adolescents (e.g., Thomson et al., 2007; Eisenberg, Neumark-Sztainer, Haines & Wall, 2006). As evident, there is a considerable amount of research surrounding the relationship between peer influence and body image, as well as weight based teasing (e.g., Eisenberg, Neumark-Sztainer & Story, 2003; Eisenberg et al., 2006; Krukowski, West, Perez, Bursac, Phillips & Raczynski, 2009). However, less is known merely about peer acceptance and hence an importance variable included in this study.

Academic Performance and Weight Status

It has been established that healthier children demonstrate higher capacity to learn (Basch, 2011). According to Castelli et al. (2014) if children are engaged in unhealthy behaviors such as poor eating habits, insufficient sleep, significant television viewing or other such sedentary behaviors they are less likely to engage in developmentally appropriate learning. According to research, children who enter in to school overweight or become overweight during the first few years of school demonstrate lower academic performance on standardized tests than their normal weight peers (Datar & Sturm, 2006). In a review of literature, Taras and Potts-Datema (2005) found consistent correlation between obesity and school performance, and others found that this hold even when controlling for demographic factors. Collectively, these studies established an adverse outcome in school performance for children who were overweight or obese (Taras & Potts-Datema, 2005), and this academic deficit continues even when demographic factors such as SES and parent education status are controlled for (as cited in Krukowski et al., 2009). Overall, the explanation for this negative association between overweight status and academic performance is considered to be ambiguous (Krukowski et al., 2009). Datar, Sturm, and Magnabosco (2004) suggest that obesity is a marker, not a cause, of

low academic performance. Furthermore, variables such as mental health problems, low self-esteem, depression, weight-based teasing have been proposed as having a possible mediating role, although they remain generally unknown (Krukowski et al., 2009; Taras & Potts-Datema, 2005). In any case, research provides supportive evidence to indicate successful academic functioning is at risk when children are at an overweight status and thus is an important factor included in the current study.

Risk-Taking Behaviors

Associations have also been found between risk-taking behavior and weight status, including equal or greater engagement in high-risk behaviors (Ratcliff et al., 2011) and less sexual risk-taking in particular (Lowry, Robin, Kann & Galuska, 2014). Overweight and obese early-adolescent and mid-adolescent girls were also more likely to be frequent smokers than their normal weight peers (e.g., Farhat, Iannotti, & Simons-Morton, 2010; Polfuss, Liebhart, & Greenley, 2011) and more frequent users of both cigarettes and alcohol (Strauss, 2000). Others found greater increases in smoking with age (Haung, Lanza, Wright-Volel, & Anglin, 2013). Racial differences in these dynamics have also been observed, with greater risk behavior among obese White girls compared to Black girls (Leech & Dias, 2012). Others have found that aside from smoking, no other common risk behaviors were engaged in any more frequently among those who were obese/overweight (Polfuss, Liebhart, & Greenley, 2011). These findings, as well as the inconsistencies provide support for further exploration of the interrelatedness between risk taking behaviors and overweight status.

Cheng and Landale, (2010) posit that overweight status in adolescence yields significantly later onset of first sex and more likelihood of entering early adulthood with little experience with intimate relationships. Similarly, Lowry et al. (2014) utilized data from the

National Risk Youth Behavior Surveillance System (YRBSS) to propose a relationship between BMI with sexual risk-taking among sexually active high school students. Findings infer that among both male and female students both underweight (BMI<5th percentile) and obesity (BMI≥95th percentile) were associated with decreased odds of being sexually active. While Wang (2002) posits that though a relationship exists between weight status and sexual maturation in both boys and girls, the association differs, noting a positive association in girls, but a negative one in boys.

Literature review revealed further studies that look at the relationship between body weight and sexual behaviors among adolescents. For example, Akers et al. (2008) suggest that such behaviors may be more common among girls at the weight extremes, noting additional studies are necessary. Others look at the relationship between overweight/obesity and smoking (e.g., Farhat et al., 2010) finding that overweight and obese early-adolescent and mid-adolescent girls were more likely to be frequent smokers than their normal weight peers. Similarly, Haung et al. (2013) found that chronically obese adolescents showed a greater increase in cigarette smoking over time compared to other trajectories (alcohol use marijuana use or delinquency). Others concur; Strauss (2000) observed that obese White and Hispanic females are more likely to engage in high-risk behaviors such as smoking and consuming alcohol.

Similarly, Polfuss, Liebhart, and Greenley (2011) highlight findings that overweight/obese youth have higher rates of such behaviors as cigarettes and tobacco, while are no more likely to engage in alcohol use, smoke marijuana, sexual intercourse, lack of birth control use, drive with a drunk driver or disregard a bike helmet. Similar to Strauss (2000), Leech and Dias (2012) investigated a race-specific connection between obesity and risky sexual behavior among adolescent girls. Findings suggests that in contrast to their non-obese White

peers, obese White girls exhibited greater rates of multiple sex partners as well as sex with older partners, with less likelihood of condom use. However, none of these factors were found significantly related to high BMI within the Black sample (Leech & Dias, 2012).

Rayner et al. (2013) suggest that while friendships provide can often provide such benefits as increased self-esteem, emotional and practical support and a sense of belonging, peers can also be influential in adolescents embracing of risky and harmful attitudes and behaviors including substance use (Curran, Stice & Chassin, 1997) and delinquency (e.g Dishion, Spracklen, Andrews, & Paterson, 1996).

In light of the above, it is evident, that while there are plentiful studies that show that weight status is associated with a variety of RTBs, including the aforementioned (e.g., risky sexual behavior, tobacco use, and drinking), there are other studies that show partial or inconsistent associations (e.g., Leech & Dias, 2012). In a nutshell, the findings above, as well as some of the inconsistencies in existing literature provide support for this study's further exploration of the interrelatedness between risk taking behaviors and overweight status.

Gender, Ethnicity, and SES

Previous studies have suggested varied results between obesity as it relates to gender, ethnicity and socioeconomic status however the complexity and dynamic associations are noted in the literature as very clear (e.g., Wang & Beydoun, 2007). Regardless, the roles of such variables are undeniable and thus must either be examined explicitly or controlled for in research on this topic. Obesity prevalence rates by gender and ethnicity are similar, though males have slightly greater rates (Ogden et al., 2010) which have also increased more than for females over time (Odgen et al., 2012). However, Puhl and Latner (2007) cite conflicting results, indicating that while some research suggests that weight-based teasing and victimization takes place more

with girls than boys, others have found no differences between boys and girls as it pertains to weight-based teasing and victimization. Regarding race/ethnicity, Wang (2002) and Wang and Beydoun (2007) specify that large disparities exist, particular among women, children, and adolescents in the United States, but in other groups as well (Kamath et al., 2008; Ogden et al., 2010; Odgen, Carroll, Kit & Flegal, 2013).

Ethnic and cultural differences may occur in expressions of weight bias among youth (Puhl & Latner. 2007). Low SES/poverty is also associated with more obesity and overweight status (Schreier & Chen, 2013; Singh, Siahpush, & Kogan, 2010). Others suggest that the association between obesity and SES varies by ethnicity and that ethnic/racial differences in BMI are not fully explained by individual SES (e.g. Wang & Beydoun, 2007; Odgen, Carroll, Curtin et al., 2006), but most all groups have increased over time (Zhanq & Wang, 2004). In conclusion, taken together the contributions of these demographic variables are undeniable and thus must either be examined explicitly or controlled for in research on this topic. Therefore, in the current study, these demographics were controlled for and/or analyzed as potential moderators, depending upon the question/analyses.

It has been of great interest to explain the ethnical discrepancies in obesity prevalence in the United States (Wang, 2002). Puhl and Latner (2007) suggest that a limited number of studies have considered whether children from different ethnic and cultural backgrounds are more or less likely to endorse biased attitudes or have increased vulnerability to weight stigmatization. Some work proposes that ethnic and cultural differences may occur in expressions of weight bias among youth (Puhl & Latner. 2007). Ogden et al., (2010) report the highest number of obese boys as Mexican American, whereas for girls the prevalence was found much higher in non-Hispanic African Americans. Likewise, Wang (2002) found that Mexican American boys

remained at a higher risk of being obese than other race/ethnic groups even after controlling for covariates, citing the need for additional investigation. Further research finds the burden of obesity is notably higher among minorities (Odgen, Carroll, Kit & Flegal, 2013). Wang and Beydoun (2007) utilize the National Health and Nutrition Examination Surveys (NHANES) data to suggest considerable racial/ethnic discrepancies in obesity amid youngsters within the United States. According to their research, large racial/ethnic differences emerge at very young ages and occur even in homogeneous socioeconomic status (SES) groups (Wang and Beydoun, 2007). Other research postulates that the highest prevalence of obesity in children is noted in the African-American population (Kamath et al., 2008).

Previous research has clearly established relationships between low SES and poor youth physical health outcomes (Schreier & Chen, 2013). As is evident, the influence of SES on health starts early in life with long-lasting influence well into adulthood (as cited in Schreier & Chen, 2013). Singh, Siahpush and Kogan (2010) examined the impact of neighborhood SES conditions and "built environment" on obesity and overweight status among us children and adolescents, finding the chances of a child being obese or overweight were much greater for those in neighborhoods of less favorable conditions (lower SES) than those in more favorable conditions. Others suggest that the association between obesity and SES varies by ethnicity and that ethnic/racial differences in BMI are not fully explained by individual SES (e.g., Wang & Beydoun, 2007; Odgen et al., 2006).

Analysis of NHANES data collected between 1971 and 2002 have shown that overweight status has increased in all SES groups cross-classified by gender-age-race/ethnicity (non-Hispanic White, non-Hispanic Black, Mexican American) aside from low-SES Mexican American girls aged 2-9 years (Zhanq & Wang, 2004). As indicated for the most part, studies

have highlighted a fairly strong relationship between low SES and obesity. In studies within the last decade, prevalence rates suggest more than one third of US children and adolescents are overweight or obese, large racial/ethnic disparities exist among women, children and adolescents, and some minority and low-SES groups area disproportionally affected (Wang & Beydoun, 2007). Therefore, in the current study, these demographics were controlled for and/or analyzed as potential moderators, depending upon the question and analyses.

Lee (2007) suggests that pediatric obesity results from persistent adverse changes in food intake, lifestyle, and energy expenditure. Furthermore, children who reside in urban areas are less likely to engage in safe, affordable and accessible recreational activities (Lee, 2007). While physical activity is related to many health benefits, most students do not succeed in meeting national recommendations (as cited in Metcalf, Henley, & Wilkin, 2012). The prevention of obesity is said to be one of the benefits of to being more active, and thus most interventions targets at reducing childhood obesity include a physical activity component (Metcalf et al., 2012); however, not many interventions have shown success in improving BMI levels in children (as cited in Metcalf et al., 2012).

For several risk factors, evidence is weak and, although important advances have been made, how to incorporate the information in an efficient and cost-effective manner into prevention programs for children is unclear (Han et al., 2010). Ogden et al. (2014) highlight how this has been the focus of several public health efforts in the United States (e.g. Let's Move, 2011; National Collaborative on Childhood Obesity, 2014). Moreover there have been several reports, recommendations and initiatives issued from the Institute of Medicine (Accelerating Progress on Obesity Prevention. Solving the Weight of the Nation), the US Surgeon General (The Surgeon General's Vision for a Health and Fit Nation), and the White House (Let's Move,

2011). While most programs focus on specific target behaviors, primarily: increased physical activity, decreased sedentary activity, increased healthy, increased healthy dietary habits, and decreased unhealthy dietary habits. Some take place solely within the school environment (e.g., Hip –Hop to Health Jr.; Fitzgibbon et al., 2004; Planet Health; Gortmaker et al., 1999; APPLES, Sahota, et al., 2001), others take place in the home environment (Parents of Change; Ball et al., 2012). Such school-based programs primarily focus on energy intake (e.g. cafeteria food pans) and physical activity, and/or consumption of carbonated beverages; home programs including decreasing sedentary behavior, including decreasing television/gaming time, and increasing amount of fruits and vegetables. Noting the key role parents play in youth weight management, parents as agent of change (PAC), intervenes with parents exclusively (Ball et al., 2012).

Whereas various research suggest the efficacy of programs in reducing subsequent increase in BMI (e.g., Fitzgibbon et al., 2004) selected research implies positive results specific to gender (Gortmaker et al., 199); still others posit mediocre results in producing changes at the school level (Sahota, Rudolf, Dixey, et al., 2001). That being said, several meta-analyses of randomized trials of prevention programs suggest varying results. While various research suggests little change in target behaviors and no significant effect on BMI (Kamath, Vickers, Ehrlich, et al., 2008), several systematic reviews find mixed results with some interventions being more effective than others (e.g., Connelly, Duaso & Butler, 2007; Stice, Shaw & Marti, 2006). Several studies cite inconsistent findings, however the take away message is that combined diet and physical activity school-based interventions may aide in the prevention of children becoming overweight (Brown & Summerbell, 2008). However, while much research is important and provides significant insight into interventions, the current study explored key

variables as they relate to adolescent weight status and thus provides data to support not only preventative measures but insight into how such variables relate at different contextual levels.

In summary, several of the studies previously mentioned focused upon only one or two variables that are associated with adolescents' weight status. While several of the aforementioned studies have shown an association between childhood overweight status and biological and environmental predictors, few studies establish the relationship of multiple contexts simultaneously influencing obesity in children. Upon reviewing this literature, there was a need to explore the complexity of the relationship between the aforementioned variables and adolescent weight status within the peer, parent and school contexts. Given that adolescent weight status is often assumed to be correlated with these variables, it was considered interesting to investigate how strongly these variables are related, not only within the given contexts, but also when gender, SES, and race are taken into consideration. The ways in which academic achievement, social-emotional functioning, risk tasking behaviors and self-control for eating, are associated with overweight or obesity clearly demands further exploration. The current study intends to provide a better understanding of the way in which the combination of the aforementioned factors explains variance in adolescent weight status beyond what can be explained by the individual or contextual variables alone.

CHAPTER 3 METHOD

Participants

Participants included students from a large urban high school in Michigan, grades 9-12. All students were enrolled in a Physical Education (PE) class in the fall semester of the 2015-2016 school year. The community is very heavily based in manufacturing. The high school is a Title I school and 60% of students receive free and reduced lunch. A total of 246 students were asked to participate in this study, with a final sample of 201. Two parents declined study participation for three adolescents. Approximately 10 students declined to participate on the day of data collection. Four students were unable to complete the questionnaires due to language barriers. Approximately twenty five students were absent on the day of data collection, thus resulting in a final sample of 201 students (136 male; 67.7%; 65 female; 32.3%) in 9th grade (*n* = 57, 28.4%), 10th grade (*n*=31, 15.4 %), 11th grade (*n*=31, 15.4%), and12th grade (*n*= 82, 40.8%).Participant age ranged from 13 years old through 19 years old, with the majority being 14 to 17 years old; 17 (*n* =67, 33.3%), 16 (*n* = 37 18.4%), 15 (n= 33, 16.4%), and 14 (n= 33, 16.4%) years of age. The majority of the participants identified themselves as either Caucasian (*n* = 75, 37.3%) or Middle Eastern (*n* = 61, 30.3%), with the remaining identifying as African-American (*n* = 17, 8.5%), Asian (*n* = 19, 9.5%), Multi race (*n* = 12, 6.0%), Indian, Pakistani, Afghani, India subcontinent origin (n = 6, 3%), Hispanic (*n* = 3, 1.5%), Native American (*n* = 1, .5%) and other (*n* = 7, 3.5%). Demographic information is included in Table 1.

Table 1
Demographics of participants – age, gender, race, grade, education level

Demographic	Frequency	Percent
Age		
13	1	.5
14	33	16.4
15	33	16.4
16	37	18.4
17	67	33.3
18	26	12.9
19	4	2.0
Total	201	
Gender		
Male	136	67.7
Female	65	32.3
Total	201	
Race/Ethnicity		
Hispanic	3	1.5
African American	17	8.5
Caucasian	75	37.3
Middle Eastern	61	30.3
Native American Indian	1	3.0
Asian	19	9.5
Indian, Pakistani, Afghani	6	3.0
Multi-Racial	12	6.0
Other	7	3.5
Total	201	
Grade		
Ninth Grade	57	28.4
Tenth Grade	31	15.4
Eleventh Grade	31	15.4
Twelfth Grade	82	40.8
Total	201	

Measures

Demographics. A demographics instrument was administered that asked participants to report on age, grade, biological sex, ethnic/racial background, and basic familial make up, including parents in the household, number of siblings and place in sibship (number of older and younger siblings). In addition to a demographic survey, all participants completed self-perception survey measures of the following constructs: Socioeconomic status, family

acceptance, peer acceptance, self-esteem, depression/mood, body image, self-control, risk taking behaviors and academics. Weight status was measured with physical markers. All measures are included in Appendices A through I.

Socioeconomic status. The Hollingshead (1975) two-factor index of social status was selected used. The two factors are type of job that the parent holds (there are 9 levels ranging from jobs such as janitor, dishwasher, and farm laborer at the level of 1 and physician, lawyer and dentist at the level of 9) and amount of education that each parent completed (there are seven response options from "some grade school" through "graduate school after college"). Unfortunately, due to a data collection error, parent education level was inadvertently omitted when copies were made and survey packets assembled. Thus, a one-factor index (parent job level) was used as an approximation of family SES by computing mother plus father job levels.

Weight status. Among both children and adults, Body Mass Index (BMI) is now largely used to measure obesity. A restructured BMI reference is provided in the 2000 Centers for Disease Control and Prevention Growth Charts developed for all US children aged 2–19 years; BMI at 85th and 95th percentiles are recommended by the Centers for Disease Control and Prevention for screening overweight and obese persons (Kuczmarski et al., 2000). Therefore, for the purposes of this study, height and weight measurements were taken and BMI was subsequently was computed as weight (kilograms) divided by height (meters squared) (CDC, 2008). If using cut points, a BMI below 18.5 is considered underweight, 18.5-24.9 is normal, 25.0-29.9 is overweight and 30.0 and greater is obese (CDC, 2008). These data were obtained per standard procedure by the PE teacher who recorded height, weight and BMI in the designated area on each participant's survey. The student name was not included in the data provided to the researcher; each questionnaire was uniquely number coded.

Self-esteem. The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1979) was given to all participants. The RSE is a 10 item measure of general self-esteem. Sample items include "On the whole, I am satisfied with myself" and "I feel that I'm a person of worth". Participants rated their agreement to items on a 4 point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). After reverse-scoring the negatively worded items, scores across the 10 items are summed whereby higher scores reflect better overall self-esteem. The RSE has demonstrated a Guttman scale coefficient of reproducibility of .92 (Rosenberg, 1979). More recently, the RSE has demonstrated a Cronbach's alpha of .86 to .89 (Kerry et al., 2005; van den Berg, et al., 2002), both suggesting excellent internal consistency. It has demonstrated adequate test-retest reliability of .85 (Rosenberg, 1979; van den Berg et al., 2002) to excellent stability of .88 (Rosenberg, 1979; Ciarrochi & Bilich, 2006). The RSE has also been shown to be a valid measure of self-esteem in that it demonstrates concurrent, predictive, and construct validity using known groups, e.g., it correlates significantly with other measures of self-esteem, including the Coopersmith Self-Esteem Inventory (Demo, 1985; Ciarrochi & Bilich, 2006). In addition, the RSE correlates in the predicted direction with measures of depression and anxiety (Ciarrochi & Bilich, 2006). In the current sample, the following Cronbach's alphas were found: $\alpha = .86$ for a total RSE, $\alpha = .88$ for males and $\alpha = .82$ for females.

Depression/mood. In order to assess students' feelings/emotions, the Positive and Negative Affect Scale for Children (PANAS-C-Short; Ebustani et al., 2012) scale was administered. The PANAS-C-short is a 10 item scale that yields two subscales: positive affect (PA) and negative affect (NA), which are clinically useful for identifying youth with anxiety and mood problems. This scale measures students' feelings and emotions experienced during the past few weeks (e.g., "joyful", "sad", etc.). Students respond using a 5-point Likert scale ranging

from 1=Very slightly or not at all to 5=Very much/Extremely/Very often. Authors report Cronbach's alpha coefficients were .86 for the reduced 5-item PA subscale, .82 for the 5-item NA subscale. The average inter-item correlations were .55 for the PA subscale and .47 for the NA subscale. According to Ebesutani (2012), together both sets of results for the NA and PA scales indicate acceptable internal consistency estimates for both shorted scales. Cronbach's alpha for the current study was as follows: a total PANAS positive (PA) α= .84, α= .85 for PA subscale male, α=.81 for PA subscale females, a total PANAS negative (NA) α= .75, .72 for NA subscale males, and α= .78 for NA subscale females.

Body image. The Multidimensional Body-Self Relations Questionnaire (MBSRQ; Brown, Cash, & Mikulka, 1990; Cash & Pruzinsky, 1990) is a 69-item self-report inventory containing 10 subscales that evaluates numerous elements of the body image construct and is often utilized in research related to body image (Worrell & Trevino, 2007). For the purposes of this study, the following subscales were administered: *body areas satisfaction* (BAS: items 61-68), *subjective weight* (SW: items 59 and 60), and *weight preoccupation* (WP: items 10, 28, 57 and 58). Examples of questions on these subscales, respectively, are as follows: "I constantly worry about being or becoming fat", "I am on a weight-loss diet", "I think I am (very underweight to very overweight)". Participants rate their level of agreement with the items on a Likert-type scale of one (definitely disagree/very dissatisfied/very underweight) to five (definitely agree/very satisfied/very overweight). Responses are summed within each subscale and higher overall mean scores indicates greater investment or satisfaction within the specific domains of the subscales (Worrell & Trevino, 2007).

Previous research has supported the psychometric properties of this instrument. Cronbach's alpha coefficients of internal consistency of reliabilities across all subscales range

from 0.71 to 0.89 (Worrell & Trevino, 2007; van den Berg et al., 2002). According to Cash and Pruzinsky (1990) the first seven factors of the MBSRQ, including the BAS, SW, and WP, have very good internal consistency, with alphas that range from .75 to .90. All subscales have excellent stability, with test-retest correlations that range from .49 to .91. Further, the MBSRQ is reported to have demonstrated its validity in numerous studies in which subscales have been correlated with a number of other health and body instruments (Cash & Pruzinsky, 1990).

However, data gathered in the current sample revealed that these items did not combine well in terms of internal consistency reliability for one of the three subscales used. Specifically, for WP (weight preoccupation) in the current sample, this subscale was changed to reflect two rather than the four original items and thus renamed *Weight Dieting* (WD). Those two questions are as follows: "I am on a weight-loss diet" and "I have tried to lose weight by fasting or going on crash diets". As such, in this sample Cornbach's alpha internal consistency was as follows: WD total α= .59, WD males α=.61, WD females α=.54. The question, "I constantly worry about being or becoming fat" appeared to reflect weight worry and is coded as a single item scale *Weight Worry* (WW). Item analysis revealed that this question did not combine well with the above questions. It is important to note that dieting behaviors were adequately captured in the self-control for eating measure below. On the other hand, the other two subscales were utilized as established in prior literature. The BAS contained the same items, and as such the following Cronbach's alpha coefficient of internal consistency in the current sample was as follows: BAS total α = .87, BAS for males α=.88 and BAS for females α = .82. In the current study, BAS is referred to as "body satisfaction". Similarly, the SW (subective weight) items remained the same, and as such the following Cronbach's alphas were found: SW total α = .64, SW for males α = .64 and SW α = .64 for females.

Self-control for eating. Eating behavior was measured using the Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al., 1986). The DEBQ is a self-report measure that contains 33 items answered on a 5-point Likert scale ranging from 1 (seldom) to 5 (very often). The questionnaire contains subscales for three different types of eating behaviors: (1) restrained (10 items, e.g., "When you put on weight, do you eat less than you usually do?"), (2) emotional (13 items, e.g., "Do you have a desire to eat when you are depressed or discouraged?") and (3) external (10 items, e.g., "If food tastes good to you, do you eat more than usual?"). Item scores for each subscale are added to obtain an overall subscale score; the overall subscale score is then divided by the number of subscale items to calculate a score per subscale. Higher scores indicate a greater tendency to exhibit the subscale behavior.

The DEBQ has demonstrated good psychometric properties-internal consistency, factorial validity, and predictive validity (van Strien, Herman, & Verheijden, 2012). van Strien, et al. (2012), report for emotional, external, and restrained eating reliabilities(Cronbach's alpha) of .96, .85, and .93, respectively. Others have concurred (Bailly, Maitre, Amanda, Herve, & Alaphilippe, 2012). The English version of the DEBQ (Wardle, 1987) has been translated into many languages, all showing good factorial validity and reliability, and also satisfactory internal consistency (Bailly et al., 2012). Mason and Lewis (2014) cite Cronbach's alpha for the emotional eating and external eating subscales as .94 ad .82 respectively. In younger populations the following were found: restrained eating Cronbach's alpha of .81, emotional eating Cronbach's alpha of .80, and external eating: Cronbach's alpha of .74 (van Strien & Oosterveld, 2008).

In the current sample, the Cronbach's alphas were: restrained eating total α =.92, restrained eating males α = .92, restrained eating females α =.89. For the emotional eating

subscale, the following alphas were obtained: emotional eating total α= .94, emotional eating males α =.95, and emotional eating females α =.91. Finally for the external eating scale, Cronbach's alphas were as follows: external eating total α = .86, external eating males α =.88, and external eating females α = .80.

Family acceptance. Due to limited measurement availability in existing research explicitly measuring acceptance of obesity/overweight status, three items were developed for the purposes of this study. The three items were: 1) Do your parents accept people who are overweight? 2) Do your parents make negative comments about people who are overweight? 3). Do your parents make negative comments about you being overweight? Analysis of items revealed item one as the best description of overall acceptance, directly measuring acceptance of people who are overweight, while item two is specified as parent's tendency to make negative weight comments (general) and item three as negative comments towards participant (individual). The above is reflected in data analyses.

The Perceptions of Teasing Scale (POTS) was also utilized to assess the frequency of remembered childhood teasing and its effect on the participant using the Weight Teasing (WT) subscale of this instrument (Thompson, Cattarin, Fowler, & Fisher, 1995). It includes six Likert items rated on a scale from never (1) to very often (5), e.g., "People have made fun of you because you were heavy". The original POTS was altered to assess teasing specifically by one's parents by replacing "People" with "Parents". This is similar to the research conducted by van den Berg et al. (2002) whereby "people" was replaced with "members of your family". For this measure, questions were prefaced by written instructions with regard to the time period when they were between 5 and 16 years old. Confining the period of retrospective recall to a circumscribed time is a strategy that has been utilized in previous research (e.g., Thompson,

Coovert, & Stormer, 1999), in an attempt to index the level of influence during the formative years of childhood through adolescence (van den Berg et al., 2002). This same approach was utilized for the purposes of this study. The POTS- WT subscale has demonstrated internal consistency (Cronbach's alpha) coefficients of .88 (Thompson et al., 1995), .95 in a sample of 12-15 year-old girls (Shutz, Paxton & Wertheim, 2002), and .87 for the family version indicated above (van den Berg et al., 2002). Thompson et al. (1995) report test-retest reliabilities of .90 for the WT subscale. For the current sample, the Cronbach's alpha estimates were as follow: POTS parent total $\alpha = .89$, POTS parent for males $\alpha = .90$ and POTS parent for females $\alpha = .87$.

Peer acceptance. Again, due to limited measurement availability in existing research, three additional items were developed for the purposes of this study. The three items were: 1) Do your peers accept people who are overweight? 2) Do your peers make negative comments about people who are overweight? 3). Do your peers make negative comments about you being overweight"? Similarly to parent acceptance, after data analysis, items are identified as overall acceptance, negative weight comments towards others (general) and towards participant (individual).

Perceptions of peer concern about weight were also assessed through the POTS (Thompson et al., 1995), as describe above for parent concern about weight. The items asked the participants to answer whether these events occurred between the ages of 5 and 16 years old. "People" in the original scale will be similarly replaced with "Peers". The Cronbach's alpha for this scale has been indicated as .90 (van den Berg et al., 2002). In the current student the following Cronbach's alphas were found: POTS peer total $\alpha = .95$, POTS peer for males $\alpha = .96$, and POTS peer for females $\alpha = .91$.

Academic achievement. For the purposes of this study, participants reported what grades they receive most often (e.g. "mostly As, mostly As and Bs, mostly Bs, mostly Bs and Cs, mostly Cs, mostly Cs and Ds, mostly Ds, mostly Ds and Es,and mostly Es) resulting in 9 response options, and what their most recent grades were at last card marking in each of the four core academic areas (English/Language Arts, Math, Science, and Social Studies).

Risk-taking behaviors. The Adolescent Risk Questionnaire (ARQ) was utilized to measure adolescent risk-taking behavior (Gullone, Moore, Moss, & Boyd, 2000)**.** The ARQ consists of 22 questions which are rated on a 5-point Likert scale ranging from 1=Never to 5=Very often that a student chooses how frequently they engage in a particular behavior (e.g. "underage drinking"). The ARQ consists of four subscales: 1) Thrill seeking behaviors (7 items, i.e., inline skating); 2) Rebellious behaviors (5 items, i.e., taking drugs); 3) Reckless behaviors (5 items, i.e., having unprotected sex); and 4) Antisocial behaviors (5 items; i.e., cheating). Adolescents are asked to rate the frequency that they engage in each particular behavior. An average score across all items was used to reflect overall risk taking behavior for the purposes of this study.

In developing the ARQ, Gullone et al. (2000) found that Cronbach's alpha internal consistency coefficients exceeded .8 with the exception of the coefficients for antisocial behaviors in girls (.66) and antisocial perceptions in older adolescents (.67) (Gullone et al., 2000). The ARQ has exhibited adequate test-retest reliability of .78 over a one-week period suggesting that the subscales are stable (Gullone et al., 2000). Additionally, the ARQ has been demonstrated to have convergent validity, established through examining correlations with the parent and peer factors of the Inventory of Parent and Peer Attachment (IPPA; Gullone et al., 2000). The parent trust and communication factors of the IPPA significantly correlated

negatively with all risk behavior factors of the ARQ except the thrill-seeking factor in nondelinquent adolescents (rebellious risk behavior r = -.23 and -.20, p<.01; antisocial risk behaviors r = -.33 and -.30, p<.001; reckless risk behaviors r = -.24, p<.001 and -.24, p<.01; and thrill-seeking risk behaviors r = .04 and -.01). Discriminant validity of the ARQ was shown through significant differences between the two groups on risk beliefs and behaviors. In the current sample Cronbach's alpha internal consistency coefficients were total ARQ α =.92 (α =.93 for males; α =.89 for females).

Procedure

Approval to conduct the study was obtained from the central office and building office administration in the school district, followed by the Wayne State University Institutional Review Board. In order to obtain student consent, an information sheet was mailed to the students' parents two weeks prior to data collection. This sheet outlined the purpose of the study, procedures, risks and benefits, as well informing them of confidentiality. It was noted that if parents had further questions, they could contact the principal investigator at the designated contact information provided on the sheet. The last page included a tear-off sheet that permitted parents the option to refuse consent of their child's participation in the study.

In addition, students whose parents did not opt them out were recruited via participation is physical education. A script was read aloud during the class. Procedures for assent, basic survey information and completion procedures were explained to the students in each of five physical education classes. Parents and students were informed that participation was voluntary and they could opt out of the study at any time without any negative consequences. In order to guarantee participant confidentiality, all student forms were number coded. Following the necessary BMI data collected as standard in the PE class, each student's identifying information

will solely be made available to the PE teacher; the PE teacher transferred the height/weight/BMI information to designated area on each participant survey, before the survey was placed in the completed survey bin. The participant name was not included in this packet.

CHAPTER 4 RESULTS

The purpose of this study was to expand the current understanding of factors that predict adolescent weight status, utilizing variables carefully selected through the lens of ecological theory. SPSS (version 21) was utilized to analyze data. Preliminary analyses involved a series of Analyses of Variance (ANOVA) tests for gender and race differences in the study variables. Results revealed many differences, confirming the need to control for them. However, the SES variable used in this study was not significantly correlated with most study variables. Thus, only race and gender were controlled for in analyses. The distribution was normal. While there was little missing data, what was missing was handled by the use of mean substitution. In all analyses, a criterion alpha level of .05 was used to determine statistical significance. Means and Standard Deviations for the study variables are included in Table 2. A correlation matrix among the primary study variables is included in Table 3.

Table 2
Descriptive Statistics for Study Variables

	Minimum	Maximum	Mean	Standard Deviation
Grades	1.00	9.00	6.71	1.81
ELA	1.00	5.00	3.66	1.18
Math	1.00	5.00	3.87	1.10
Science	1.00	5.00	3.86	1.06
Social Studies	1.00	5.00	3.97	1.14
Dad Job	.00	9.00	3.16	2.42
Mom Job	.00	9.00	2.53	2.59
Parent Acceptance	1.00	5.00	4.24	1.19
Parent Acceptance gen	1.00	5.00	2.02	1.30
Parent Acceptance indv	1.00	5.00	1.53	1.03
Peer Acceptance	1.00	5.00	3.46	1.30
Peer Acceptance gen	1.00	5.00	2.80	1.38
Peer Acceptance indv	1.00	5.00	1.82	1.20

BMI	15.45	59.60	24.42	5.38
Self Esteem	1.00	4.00	3.04	.61
Body Satisfaction	1.00	5.00	3.46	.87
Subjective Weight	1.00	5.00	3.08	.77
Perception of Weight	1.00	5.00	3.17	.88
Others Perception Weight	1.00	5.00	3.00	.92
Weight Worry	1.00	5.00	2.72	1.47
Weight Dieting	1.00	5.00	2.00	1.08
Restrained Eating	1.00	4.90	2.39	.93
Emotional Eating	1.00	5.00	2.19	.93
External Eating	1.00	5.00	3.04	.80
POTS parents	1.00	5.00	1.44	.75
POTS peers	1.00	5.00	1.47	.85
ARQ Total	1.00	4.38	1.63	.67
PANAS positive	1.00	5.00	3.60	.93
PANAS negative	1.00	5.00	2.08	.79

Note. N= 201; ELA= English Language Arts; Parent Acceptance gen= Parent Acceptance general Parent Acceptance indv= Parent Acceptance individual Peer Acceptance gen= Peer Acceptance general Peer Acceptance indv= Peer Acceptance individual; BMI= Body Mass Index; POTS= Perception of Teasing Scale; PANAS= Positive and Negative Affect Scale; ARQ= Adolescent Risk Questionnaire

Table 3
Correlations among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Grades	--															
2. Parent Accept	-.01	--														
3. Peer Accept	.04	.34**	--													
4. Self Esteem	.19**	.12	.02	--												
5. Percv Weight	.08	.10	-.03	-.07	--											
6. Subjective Weight	.07	.07	-.04	-.07	.85**	--										
7. Body Sat	.03	.12	.01	.42**	-.25**	-.21**	--									
8. Restrained Eating	-.07	-.04	-.05	-.25**	.29**	.27**	-.19**	--								
9.EmotionalEating	-.06	-.05	-.04	-.17*	.09	.08	-.18**	.33**	--							
10. External Eating	.10	.07	-.10	-.03	.06	.00	.09	.09	.41**	--						
11. Pots Parents	-.10	-.18**	-.08	-.21**	.05	.07	-.25**	.21**	.29**	.02	--					
12. Pots Peers	-.12	-.13	-.14	-.23**	.10	.15*	-.24**	.29**	.21**	.01	.75**	--				
13.PANAS pos	.10	.08	-.03	.45**	-.02	-.04	.39**	-.14	-.12	.06	-.14*	-.15*	--			
14.PANAS neg	-.17*	-.03	-.03	-.47**	.03	.13	-.20**	.26**	.30**	.07	.15*	.28**	-.30**	--		
15. ARQ	-.13	-.20**	-.06	-.10	-.08	-.06	-.01	.08	.24**	.21**	.26**	.30**	-.04	.17*	--	
16. BMI	-.05	.10	-.01	-.11	.45**	.54**	-.17*	.21**	-.08	-.06	-.02	.14	-.13	.07	-.07	--

Note. Peer Accept= Peer Acceptance; Percv Weight= Perceived Weight; Body Sat= Body Satisfaction; POTS= Perception of Teasing Scale; PANAS pos= PANAS positive; PANAS neg=PANAS negative; ARQ = Adolescent Risk Questionnaire

Research Question 1**: **What intrapersonal variables (self-esteem, depression/mood, body image, self-control for eating) are most strongly associated with weight status?

To answer this question, a hierarchical linear regression analysis was run with race and gender entered at step one as control variables and the intrapersonal variables at step 2. Six intrapersonal variables were entered, reflecting four constructs: body image (body satisfaction, subjective weight), self-esteem, depression/mood (positive, negative), and self-

control for eating. At step one, gender and race were not significant (R= .05, F =.25, df = 2, 198, p=.78). At step two, the model was significant (R=.56, F= 10.96, df= 8, 192, p<.001), with only one variable significantly predicting BMI. Specifically, subjective weight was the contributing variable (β= .53, p<.001), indicating a positive relationship between this variable and weight status. None of the other intrapersonal variables significantly explained variance in BMI. In this regression, both types of body image (body satisfaction and subjective weight) were included, as they are only mildly correlated with each other (r=-.21), thus allowing for both to be included in the same analysis. When together in an analysis, it is subjective weight that overrides all other variables in predicting BMI. See full results in Table 4.

Table 4
Hierarchical Multiple Regression Analysis- Weight Status Predicted by Intrapersonal Variables

Model		B	SE B	β	T	P
1	(Constant)	24.35	1.43		17.00	.00
	Gender	.39	.82	.03	.48	.63
	Race	-.11	.21	-.04	-.51	.61
2	(Constant)	17.89	3.40		5.27	.00
	Gender	-.53	.71	-.05	-.75	.46
	Race	-.13	.18	-.04	-.69	.49
	Self Esteem	-.41	.68	-.05	-.60	.55
	PANAS positive	-.63	.41	-.11	-1.56	.12
	PANAS negative	-.42	.47	-.06	-.89	.37
	Restrained Eating	.37	.38	.07	.99	.32
	Body Satisfaction	-.03	.43	-.01	-.08	.94
	Subjective Weight	3.68	.45	.53	8.23	.00

Note. Model 1 (R= .05, R^2 =.002, ΔR^2 =.002, F =.25, df = 2, 198, p=.78); Model 2 (R=.56, R^2 =.31, ΔR^2 =.31, F= 10.96, df= 8, 192, p<.001)

Research Question 2: What microsystem level variables (family and peer acceptance of overweight status) are most strongly associated with overweight status?

A hierarchical linear regression analysis was run to answer this question. After the control variables were entered at step one, parent and peer general acceptance of overweight people in general was entered at step two. Results were not significant (R= .12, F =.68, df = 4, 196, p=.61). However, in a second regression analysis, when parent and peer tendency to make negative weight comments about others and directly to the study participants were entered at step two instead, the overall analysis was significant (R=.26, F= 2.35, df= 6, 194, p<.05). Parent negative weight comments about others was the significantly contributing variable (β= -.18, p<.05) suggesting a negative relationship between parent negative comments and weight status. See full results in Table 5.

Table 5
Hierarchical Multiple Regression Analysis- BMI predicted by Microsystem Level Variables (family and peer acceptance of overweight status)

Model		B	SE B	β	t	P
	(Constant)	24.35	1.43		17.00	.00
1	Gender	.39	.82	.03	.48	.63
	Race	-.11	.21	-.04	-.51	.61
	(Constant)	22.42	1.68		13.36	.00
	Gender	.41	.81	.04	.50	.62
	Race	-.06	.21	-.02	-.29	.77
2	Parent Accept gen	-.76	.36	-.18	-2.09	.04
	Parent Accept indv	.65	.48	.12	1.34	.18
	Peer Accept gen	.43	.34	.11	1.25	.21
	Peer Accept indv	.59	.40	.13	1.46	.15

Note. Model 1 (R= .05, R^2 =.002, ΔR^2 =.002, F =.25, df = 2, 198, p=.78); Model 2 (R=.26, R^2 =.07, ΔR^2 =.07, F= 2.35, df= 6, 194, p<.05); Parent Accept gen= Parent Acceptance general; Parent Accept indv= Parent acceptance individual; Peer accept gen= Peer Acceptance general; Peer Accept indv= Peer acceptance individual.

Research Question 3: What is the association between achievement and weight status?

A Pearson correlation coefficient was computed between academic performance and BMI. They were not significantly correlated (see Table 3).

Research Question 4: What is the association between risk-taking behavior and weight status?

A Pearson correlation coefficient was also run between Risk Taking Behavior and BMI and also revealed no significant association (See Table 3).

Research Question 5: In a full model, with control variables, intrapersonal variables, microsystem variables, academic achievement, and risk-taking behavior, which variables or combinations best predict weight status?

A hierarchical linear regression analysis was used to test a full model including variables selected from all levels of the ecological model proposed in this study. Race and gender were entered as covariates at step one again, the intrapersonal variables were entered at step two, the microsystem variables (using parent and peer negative weight comments about others and the participant) at step three, and grades and risk behavior at step four. The model became significant at step two and held at each step thereafter, but throughout, it was only subjective weight that significantly explained variance in BMI ($R= .58$, $F=6.76$, $df= 14, 186$, $p<.001$; $\beta= .51$, $p<.001$). Thus a positive relationship was noted between subjective weight and weight status. Full results are presented in Table 6.

Table 6
Hierarchical Multiple Regression Analysis- Weight Status Predicted by Variables

	Model	B	SE B	B	t	P
	(Constant)	24.35	1.43		17.00	.00
1	Gender	.39	.82	.03	.48	.63
	Race	-.11	.21	-.04	-.51	.61

	(Constant)	17.89	3.40		5.27	.00
	Gender	-.53	.71	-.05	-.75	.46
	Race	-.13	.18	-.04	-.69	.49
	Self Esteem	-.41	.68	-.05	-.60	.55
	Body Satisfaction	-.03	.43	-.01	-.08	.94
2	Subjective Weight	3.68	.45	.53	8.23	.00
	Restrained Eating	.37	.38	.07	.99	.32
	PANAS positive	-.63	.41	-.11	-1.56	.12
	PANAS negative	-.42	.47	-.06	-.89	.38
	(Constant)	16.39	3.57		4.60	.00
	Gender	-.44	.72	-.04	-.61	.54
	Race	-.06	.19	-.02	-.33	.74
	Self Esteem	-.17	.69	-.02	-.24	.81
	Body Satisfaction	-.01	.43	.00	-.03	.98
	Subjective Weight	3.52	.46	.50	7.72	.00
3	Restrained Eating	.41	.38	.07	1.08	.28
	PANAS positive	-.64	.41	-.11	-1.55	.12
	PANAS negative	-.44	.47	-.07	-.93	.35
	Parent Accept gen	-.34	.32	-.08	-1.06	.29
	Parent Accept indv	-.02	.43	.00	-.05	.96
	Peer Accept gen	.27	.30	.07	.91	.37
	Peer Accept indv	.41	.36	.09	1.16	.25
	(Constant)	17.64	3.69		4.78	.00
	Gender	-.19	.75	-1.02	-.26	.80
	Race	-.06	.19	-.02	-.30	.77
	Self Esteem	-.04	.70	-.01	-.06	.95
	Body Satisfaction	-.02	.43	.00	-.05	.96
	Subjective Weight	3.53	.46	.51	7.68	.00
	Restrained Eating	.40	.38	.07	1.06	.29
4	PANAS positive	-.63	.41	-.11	-1.53	.13
	PANAS negative	-.46	.48	-.07	-.95	.34
	Parent Accept gen	-.25	.32	-.06	-.78	.44
	Parent Accept indv	-.05	.43	-.01	-.11	.92
	Peer Accept gen	.28	.30	.07	.94	.35
	Peer Accept indv	.44	.36	.10	1.23	.22
	Grades	-.23	.19	-.08	-1.21	.23
	ARQ	-.43	.59	-.05	-.73	.47

Note. Model 1 (R= .05, R^2=.002, ΔR^2 =.002, F =.245, df = 2, 198, p= .78); Model 2 (R=.56, R^2 =.31, ΔR^2 =.31, F= 10.96, df= 8, 192, p<.001); Model 3 (R= .58, R^2=.33, ΔR^2 =.02, F=7.74, df= 12, 188, p<.001); Model 4 (R= .58, R^2 =.34, ΔR^2 =.01, F= 6.76, df=14, 186, p<.001); Parent Accept gen= Parent Acceptance general; Parent Accept indv= Parent Acceptance individual; Peer Accept gen= Peer Acceptance general; Peer Accept indv= Peer Acceptance individual; ARQ= Adolescent Risk Questionnaire.

As a follow up exploratory analysis, the regression was repeated with subjective weight removed and only body satisfaction entered as representing "body image". The goal was to observe the dynamics of that construct alone when subjective weight was removed from the model. Results indicated continued statistical significance at steps two through four, but this time, with the variables not constrained by subjective weight, it was self-control for eating that significantly explained variance in BMI through step four (R= .36, F= 2.10, df= 13, 187, p<.05; β= .19, p<.05). Thus, when self-control for eating increased, so too did weight status. Table 7 contains these results.

Table 7
Hierarchical Multiple Regression Analysis- Subjective Weight Removed

	Model	B	SE B	β	t	P
	(Constant)	24.35	1.43		17.00	.00
1	Gender	.39	.82	.03	.48	.63
	Race	-.11	.21	-.04	-.51	.61
	(Constant)	27.47	3.70		7.42	.00
	Gender	-.14	.82	-.01	-.17	.87
	Race	-.25	.21	-.09	-1.20	.23
	Self Esteem Total	.04	.79	.01	.05	.96
2	Body Satisfaction	-.77	.49	-.12	-1.55	.12
	Restrained Eating	1.10	.43	.19	2.58	.01
	PANAS positive	-.46	.47	-.08	-.98	.33
	PANAS negative	-.15	.55	-.02	-.27	.79
	(Constant)	24.15	3.92		6.17	.00
	Gender	-.01	.82	.00	-.01	.99

	Race	-.16	.22	-.06	-.76	.45
	Self Esteem Total	.36	.79	.04	.46	.65
3	Body Satisfaction	-.63	.49	-.10	-1.30	.20
	Restrained Eat	1.07	.43	.18	2.52	.01
	PANAS positive	-.44	.47	-.08	-.95	.34
	PANAS negative	-.21	.54	-.03	-.40	.69
	Parent Accept gen	-.61	.36	-.15	-1.71	.09
	Parent Accept indv	.36	.49	.07	.75	.46
	Peer Accept gen	.41	.34	.11	1.21	.23
	Peer Accept indv	.59	.41	.13	1.46	.15
	(Constant)	25.22	4.07		6.20	.00
	Gender	.14	.85	.01	.16	.87
	Race	-.15	.22	-.05	-.71	.48
	Self Esteem Total	.42	.80	.05	.52	.60
	Body Satisfaction	-.61	.49	-.10	-1.26	.21
	Restrained Eating	1.09	.43	.19	2.55	.01
4	PANAS positive	-.44	.47	-.08	-.94	.35
	PANAS negative	-.16	.55	-.02	-.29	.77
	Parent Accept gen	-.50	.37	-.12	-1.35	.18
	Parent Accept indv	.36	.49	.07	.73	.47
	Peer Accept gen	.45	.34	.12	1.32	.19
	Peer Accept indv	.61	.41	.14	1.49	.14
	Grades	-.13	.22	-.04	-.59	.55
	ARQ Total	-.86	.67	-.09	-1.28	.20

Note. Model 1 (R= .05, R^2=.002, ΔR^2 =.002, F =.26, df = 2, 198, p= .78); Model 2 (R=.27, R^2 =.07, ΔR^2 =.07, F= 2.11, df= 7, 193, p<.05); Model 3 (R= .34, R^2 =. 12, ΔR^2 =.05, F=2.31, df= 11, 189, p<.05); Model 4 (R= .36, R^2 =.13, ΔR^2 =.01, F=2.09, df= 13, 187, p< .05); Parent Accept gen= Parent Acceptance general; Parent Accept indv= Parent Acceptance Individual; Peer Accept gen= Peer Acceptance general; Peer Accept indv= Peer Acceptance Individual; ARQ= Adolescent Risk Questionnaire.

One additional follow up exploratory regression analysis was run, with one substitution--perceived teasing by parents and peers (measured by the POTS instrument) were entered at Step 3 instead of the parent and peer negative comment items that were created for this research. Results indicated continued statistical significance through step four (R = .35, F= 2.42, df= 11, 189, p<.01). It was self-control for eating (β= .17, p<.05), perceived teasing by parents (β= -.30,

p< .01), and perceived teasing by peers (β= .31, p<.01) that significantly contributed to explaining variance in weight status. Hence results reveal a positive relationship between both self-control for eating and perceived teasing by peers and weight status, while a negative relationship was found between perceived teasing by parents and weight status. See table 8 for these results.

Table 8
Hierarchical Linear Regression Analysis- Subjective Weight Removed, POTS included

	Model	B	SE B	β	T	P
1	(Constant)	24.35	1.43		17.00	.00
	Gender	.39	.82	.03	.48	.63
	Race	-.11	.21	-.04	-.51	.61
2	(Constant)	27.47	3.70		7.42	.00
	Gender	-.14	.82	-.01	-.17	.87
	Race	-.25	.21	-.09	-1.20	.23
	Body Satisfaction	-.76	.49	-.12	-1.55	.12
	Restrained Eat	1.10	.43	.19	2.58	.01
	PANAS pos	-.46	.47	-.08	-.98	.33
	PANAS neg	-.15	.55	-.02	-.27	.79
	Self Esteem	.04	.79	.01	.05	.96
3	(Constant)	28.91	3.78		7.66	.00
	Gender	.17	.81	.02	.21	.84
	Race	-.25	.21	-.08	-1.19	.24
	Body Satisfaction	-.81	.49	-.13	-1.65	.10
	Restrained Eat	.99	.43	.17	2.31	.02
	PANAS pos	-.49	.46	-.08	-1.06	.29
	PANAS neg	-.43	.55	-.06	-.78	.44
	Self Esteem	-.05	.77	-.01	-.07	.95
	POTS parents	-2.21	.75	-.31	-2.95	.00
	POTS peers	1.84	.68	.29	2.68	.01
4	(Constant)	30.20	3.96		7.62	.00
	Gender	.41	.85	.04	.49	.63
	Race	-.24	.21	-.08	-1.19	.24
	Body Satisfaction	-.78	.49	-.13	-1.58	.12
	Restrained Eat	.96	.43	.17	2.22	.03

PANAS pos	-.48	.46	-.08	-1.04	.30
PANAS neg	-.41	.55	-.06	-.73	.47
Self Esteem	.02	.78	.00	.02	.98
POTS parents	-2.16	.75	-.30	-2.88	.00
POTS peers	1.97	.69	.31	2.85	.01
ARQ	-.83	.66	-.09	-1.26	.21
Grades	-.15	.22	-.05	-.71	.48

Note. Model 1 (R= .05, R^2=.002, ΔR^2 =.002, F =.26, df = 2, 198, p=.78); Model 2 (R= .27, *R2*=.07, ΔR^2 =.07, F =2.11, df = 7, 193, p<.05); Model 3 (R= .34, R^2=.11, ΔR^2 =.04, F =2.74, df = 9, 191, p<.01); Model 4 (R= .35, R^2=.12, ΔR^2 =.01, F =2.42, df = 11, 198, p<.01); Restrained Eat= Restrained Eating; POTS= Perception of teasing Scale; ARQ= Adolescent Risk Questionnaire

Research Question 6: Providing that weight status and achievement are significantly related in this proposed data set, do self-esteem depression/mood, body image, self-control for eating, and acceptance by family and peers of overweight status mediate weight status and achievement?

It was a goal of this study to be able to examine whether self-esteem, depression/mood, body image, self-control for eating, and acceptance by family and peers of overweight status) mediate weight status and achievement given weight status and achievement were significantly related. However, as there was no significant relationship found between weight status and achievement, this question could not be analyzed with this data set.

CHAPTER 5 DISCUSSION

Adolescence is clearly an important period of development to study not only because during adolescence physiological changes are taking place, but also changes in social and emotional and behavioral functioning. Weight status plays an important role in both childhood and adolescence. Prior research has implicated to varying degrees the relationship between overweight status and a variety of complications. The impact of obesity on children's health and wellbeing is clear (e.g., Reilley et al., 2005). The purpose of the current study was to explore the relationships among weight status (represented in the current study by BMI), key environmental contexts that adolescents are concurrently exposed to, including family and peer relationships, and intrapersonal variables, including self-esteem, body image, mood, and self-control for eating, peer and parent acceptance, along with risk taking behavior and academic achievement among high school age students. This research was conducted in order to obtain a better understanding of the strength of relationship between such variables.

Although child and adolescent weight status has been the highlight of a plethora of research and societal attention, previous research has often focused on one or a few of the above variables in isolation as they relate to weight status. In contrast, ecological systems theory (Bronfenbrenner, 1977; 1979; 2005) provided the framework for a more complex exploration of the aforementioned variables. Keeping in mind this theoretical framework, the purpose of this study was to further explore these key variables as they relate to adolescent weight status. These variables were selected in accordance with research and theory. Rather than examine each factor individually, a more holistic approach consistent with ecological theory was utilized to guide a combined analysis as well as examine individual contributions of each factor to weight status. It was expected that all variables included in this study would relate to weight status at some level.

However, whether or not one or more of the independent variables predicted weight status above and beyond the others was of further interest. Presented next is a discussion of the results of each research question.

The first analyses involved examining what intrapersonal variables (self-esteem, depression/mood, body image, self-control for eating) were most strongly related to weight status. It was noteworthy to find that subjective weight was above all else most strongly positively related associated with weight status. This finding provides interesting insight into adolesent intrapersonal behaviors. Previously discussed findings suggest body image and perception are inversely correlated with actual weight, and overweight children and adolescents typically show more body image disturbance and poorer body-related mindsets than their average weight peers (e.g., Strauss, 200), this research adds subjective weight as an important intrapersonal variable to consider. Future validation studies may wish to delve further into this finding as it lays important foundation for further research. It is plausible, however, that given that all of the rating scales were self-report and answered within a large group setting, this may have influenced how participants answered, but overall the finding is noteworthy and indicates that these adolescents were generally likely holding fairly accurate body perceptions.

Further examined were the roles of several microsystem level variables (specifically family and peer acceptance of overweight status) and the strength of their association with overweight status. While results were not significant, when parent and peer tendency to make negative weight comments about others and directly to the study participants was included, parent negative weight comments about others was the significantly contributing variable, indicating a negative relationship between this predictor variable and weight status. Thus, when only parents and peers making negative comments toward others and to their kids directly, what

appears to matter most among these variables is parents making negative comments about weight regarding others. Specifically, the greater the parent tendency to make negative comments about others weight, the lower the subjects weight status. This outcome leads to the question of potential impact of a parent's negative comments about others on their adolescents' weight status. It is interesting that this variable rose above the others and stood out as the strongest predictor of weight status in this sample. While directionality cannot be explained, it may be that when parents do not feel comfortable addressing overweight status among their own children they instead make negative comments about others, possibly to diffuse the potentially difficult or painful conversation. Research has noted a relationship between weight-related behaviors and family member's attitudes and behaviors (e.g., van den berg et al., 2002), including parents' pressure to be thin (Levine et al., 1994) and family teasing about weight (Kanakis & Thelen, 1995); as such, the current study lends further support to the latter finding.

Another purpose of this study was to examine associations between peer acceptance and weight status. This was hypothesized because research has shown an influential relationship in the development of body image and eating disturbance (e.g., Rayner et al., 2013), body dissatisfaction (e.g., Thompson et al., 2007) and general appearance self-perceptions (Jones, 2004). Further findings showed that girls who reported higher levels of dieting had been teased more about their weight and shape (Paxton et al., 1999). Other research has highlighted the positive relationship between weight-based teasing and body dissatisfaction among adolescents (e.g., Thompson et al., 2007; Eisenberg et al., 2006). While such studies do not seem to have explicitly studied peer acceptance, one can infer a reasonable relationship. That being said, however, the current results did not find a relationship between peer acceptance and weight status. Although there simply may not be a relationship, it is also possible in part because of

participants' potential reluctance to disclose their true feelings about their peers' behaviors in order to avoid any negative social consequences, despite assurance of confidentiality and anonymity. Moreover, questions surrounded sensitive content and, hence, students may be hesitant or even embarrassed to report accurately.

While previous research has suggested an unfavorable consequence between overweight status and school performance (Taras & Potts-Datema, 2005), others suggest the relationship is vague (Krukowski et al., 2009). Contrary to expectations, the current research yielded no significant relationship. Again, it is plausible that participants were not completely honest with their current grades or merely guessed. Alternatively, however, it could be that there truly is no relationship between overall academic achievement and weight status. It could be the case that overweight youth perform at levels consistent with their average weight peers.

The connection between risk taking behavior and weight status was also examined and the results similarly indicated no significant relationship. While there have been inconsistencies in research surrounding the association between risk-taking behavior and weight status, it is clear that there is enough research to suggest that a relationship exists with some behaviors to varying degrees. For instance, Farahat et al. (2010), Haung et al. (2013), and Strauss (2000) all suggested a relationship between overweight status and cigarette smoking in various adolescent populations. Interestingly, research has posited an association between risk-taking behavior and weight status including equal or greater participation in high-risk behaviors (Ratcliff et al., 2011). Further, research has suggested a relationship between weight status and sexual risk-taking behaviors among sexually active high school students, suggesting decreased likelihood of sexual activity among the underweight (BMI $<5^{th}$) and obese (BMI $\geq 95^{th}$ percentile) across genders (Lowry, et al., 2014).

Similarly, others have reported that overweight status yielded significantly later onset of first sexual experiences (Cheng & Landale, 2010). In contrast, Leech and Dias (2012) reported a race-specific connection between obesity and risky sexual behavior among adolescent White females. Others have found higher rates risk taking behaviors, including sexual intercourse, but also cigarette, alcohol and marijuana use (Polfuss, Liebhart & Greenley, 2011). It was unexpected, therefore, that there was no relationship in this sample. It is again plausible that students did not respond honestly to all items and chose to respond in a consistently positive or prosocial pattern. Once more, this is sensitive material that participants may have struggled to answer frankly. Regardless, it leads to the question of whether weight plays any role in risk taking behavior. It may be necessary to conduct mixed-methods and qualitative research to delve more deeply into these potential associations, as well as their origins and outcomes.

Further considered was a full ecological theory-driven model to better understand a range of variables or combinations of variables that best predicted weight status. As indicated, within a full model hypothesized a priori it was only subjective weight that positively predicted weight status. Among all of those predictors, it was the adolescents' self-perceptions of their physical body that was a critical variable explaining weight status in this equation. This is not a surprising association, though the fact that it overrides other variables so strongly is noteworthy and further research should attempt to explore this further. As previously mentioned, adolescence has been portrayed as a critical phase in the development of body image (Lawler & Nixon. 2011). Consistent with previously cited findings suggesting that positive body image and perception are inversely correlated with actual weight, and overweight youths have a tendency to show more body image disturbances and body-related negative attitudes than their average weight peers (e.g., Renman et al., 1999), the current findings highlight that one's personal beliefs about their

own weight reliably predict weight status above all else included here.

Because the above association was not surprising, as a follow up exploratory analysis the same full model was run replacing subjective weight with self-control for eating. Interestingly, when subjective weight is not included, self-control for eating was the variable that contributed to the overall model explaining a significant variance in weight status above all the other hypothesized predictors. Such results indicate the greater the tendency to control eating, the greater the overall weight status; suggesting overweight youth are more likely to restrain their eating. Future research is needed to better understand why this is so, but at first glance it may simply be that those with greater weight status are more likely to restrain their eating. Again, this is not surprising.

Importantly, in this study, gender and race were controlled for because of notable differences in the primary study variables. Although the variables were covaried, the differences in themselves were interesting. For example, males and females differed on a number of different variables including weight worry, restrained eating, emotional eating, PANAS negative, and self-esteem, thus confirming the need to control for gender in subsequent analyses. While the prevalence of obesity by gender and ethnicity are similar, with males having slightly greater rates (Ogden et al., 2010), this does not explain the difference noted in the above variables, however. Puhl and Latner (2007) cite research suggesting that weight-based teasing and victimization takes place more with girls than boys, which could be compared to the results noted above in terms of how those behaviors may lead to weight worry, lower self-esteem, retrained eating, and negative/depressed mood. However, Puhl and Latner (2007) also noted that other research has found no differences between boys and girls as it pertains to weight-based teasing and victimization. Nonetheless, it is interesting to consider the difference noted, and how adolescent

males and females at least in this sample differed in these intrapersonal constructs. In all, it would suggest an important variable to control for, and future studies may also wish to investigate this difference more in-depth.

While little varied by race aside from overall risk taking behaviors and emotional eating as well as body satisfaction approaching significance, results still indicated statistically significant variation by race, and thus the need to control for it. It is interesting to consider why risk taking behaviors, body satisfaction, and emotional eating would be endorsed more for some races than others. As indicated above, a race-specific connection has been drawn between obesity and risky sexual behavior among adolescent White females (Leech & Dias, 2012). These results would certainly lend to further inquiry surrounding this discrepancy. It would behoove future research to expand upon Puhl and Latner's (2007) work emphasizing the limited number of studies considering whether youth from diverse ethnic and cultural backgrounds vary in the likelihood to endorse biased attitudes or have increased vulnerability to weight stigmatization.

In light of a significant body of research surrounding the substantial role that adolescent peer relationships play in body image and weight based teasing (e.g. Eisenberg et al., 2006; Krukowski et al., 2009), it was expected that an association would have been found between the variable of peer acceptance and weight status. More specifically, upon review of the existing literature, it was anticipated that overweight or obese participants would have endorsed more of a negative response pattern surrounding peer acceptance. However, this was not the case in the current data set. Perhaps this should be viewed as a promising result, rather than a lack thereof. Alternatively, the results may suggest that peers serve as a protective factor for overweight or obese adolescents. Moreover, while depression and mood did not emerge as significant in the current data set, this still could be a relationship that should be explored in other samples. Also, a

larger sample size may show a significant relationship, and worthy of further investigation.

Limitations of the Study and Directions for Future Research

The current study was designed to explore the complex relationship between weight status and several key intrapersonal variables, family and peer acceptance, academic achievement, and risk taking behaviors in a sample of high school students, through the lens of an ecological systems theory. As future researchers and educational professionals review this information, however, limitations of the current study need to be considered. While the primary aim of this study was to examine how well a unique combination of variables was associated with weight status, one potential limitation, perhaps, could be that the choice of variables was too broad for the current study. More specifically, it may be that the number of questionnaires given to participants, measuring a large variety of factors, was too much for participants to process at one time. It may be of benefit for future research to decrease the variables, yet increase the depth. For example, the relationship between body image and overweight status could be further investigated through further measurement. Perhaps a construct like risk taking behavior would be more appropriately investigated in future studies as a sole factor with more depth into each different type of risk taking behavior (e.g., reckless types of behavior).

Moreover, the microsystem variables of family and peer acceptance could be delved into further by including questions that specifically target current feelings of acceptance and perhaps more with how well they relate to their peers, particularly in terms of peers' perceptions of their weight status and peers' own weight statuses. For instance, are overweight peers generally accepted by their average weight peers, and are they accepted by other overweight peers? There also may be a weakness in the actual measurement of the acceptance construct. Perhaps, the measurements included did not adequately capture the overall concept of parent and peer

acceptance, or at least not in enough depth. Additionally, the sample could be expanded. For example, given that this study's sample included high-school age adolescents, results may not appropriately generalize to younger age groups. Further limitation for this study can be considered the relatively small sample size. Also, future studies may also wish to include all students, and not just those enrolled in a particular class. Moreover, the sample included more males than females; even though gender was controlled for a more evenly dispersed sample would be beneficial in future research to provide for more generalization of results.

Another possible limitation was that participants may not have been completely honest in their responses. For example, many participants provided all answers of 1 "never" on all questions on the ARQ. This is a risk in all self-report research, but when such personal questions as risk behavior are included it is more of a potential weakness, even though it is often the only way to achieve report of such private behavior. Additionally, some results were left blank and quite plausible that some questions were completed incorrectly (e.g., grades, parent job). Future research may wish to make the items even more clear regarding how to complete the survey items. The possibility of computerized versions of questionnaires could be explored. Additionally, a parent component to questionnaires to ensure accurate description of parent education, and job status would be beneficial. As for grades, perhaps better options such as reporting current GPA or coordinating with school-records.

Finally, one last limitation is that participant's pubertal status was not included. Future research may wish to include a measure surrounding the Tanner Stages to further explore how this variable plays a role in/mediates the relationship between weight status and the current variables under study.

Conclusions and Applications

Despite the limitations of this study, the results of this research contribute some to the existing body of research on adolescent intrapersonal functioning, parent and peer acceptance, academic and risk-taking behaviors and weight status. This study included a unique combination of predictors, theoretically and empirically grounded in existing literature. Among all of the variables selected, parent negative comments about others' weight, subjective weight (perceptions of one's own weight), and self-control for eating (restrained eating) were the variables that most consistently arose as important in explaining variance in weight status. It is interesting to note how accurately this group of adolescents perceived their weight statuses, but it is not a perfect association and thus there are still many who are not accurate. Thus, in practice when working with youth who are overweight or obese, or preventively for those who are not, it will be important to educate them about how important it is to have accurate self-perceptions of one's weight.

Similarly, the ability to control one's eating patterns was appropriately related to weight status, which, although not surprising, is reinforcing of efforts to teach children such behaviors as portion control and delayed gratification. Finally, the impact of parents' negative weight comments toward others can be addressed in prevention and intervention efforts. Adolescents can be taught to ignore such comments or can learn how to respond when comments such as those are made. These efforts can occur in the school context but they can conceivably include a family component as well. As obesity and health are not problems isolated to individuals and are instead typically systemic, it is fitting that interventions target multiple systems and contexts simultaneously.

APPENDIX A

Demographics

1. Gender/Sex: _____ male _____female
2. School Grade: _____9th _____ 10th _____11th _____12th

3. Age _____

4. What is your primary racial or ethnic background?

_____ Hispanic or Latino

_____ African-American/Black

_____ Caucasian/White

_____ Middle-Eastern

_____ Native American (Indian)

_____ Asian

_____ Indian, Pakistani, Afghani, or other Indian subcontinent origin

_____ Multi-racial (list both): _____

_____ Other: _____

5. Do you have siblings: _____ yes _____ no

6. a. Do you have older siblings? __ yes __ no How many? __What are their ages? ___

6. b. Do you have younger siblings? __ yes __ no How many? __What are their ages? ___

Academics

7. What grades do you most often receive? Circle the response that most accurately describes your grades overall.

Mostly As

Mostly As and Bs

Mostly Bs

Mostly Bs and Cs

Mostly Cs

Mostly Cs and Ds

Mostly Ds

Mostly Ds and Es.

Mostly Es

8. What were your most recent grades in each of the following classes (circle):

English/Language Arts:	A	B	C	D	E
Math:	A	B	C	D	E
Science:	A	B	C	D	E
Social Studies:	A	B	C	D	E

APPENDIX B

Four Factor Index of Social Status

1. Do you live with your mother or other female guardian? _____ yes _____ no (if no, skip to #12)

2. Does your mother/guardian work? _____ no _____ yes, she works as a _____

Please give a description of her job

_____

3. If she works, how much does she work? _____ Full-time _____ Part-time

4. Check the highest amount of education your mother/guardian completed?

_____ Some grade school
_____ Finished grade school
_____ Some high school
_____ Finished high school
_____ Some college
_____ Finished college
_____ Attended graduate school or professional school after college

5. Do you live with your father or other male guardian?
_____ yes _____ no (if no, go to next page)

6. Does your father/guardian work? _____ no _____ yes, he works as a _____

Please give a description of his job

_____

7. If he works, how much does he work? _____ Full-time _____ Part-time

APPENDIX C

Rosenberg Self Esteem Scale (RSE)

Please record the appropriate answer for each item, depending on whether you strongly agree, agree, disagree, or strongly disagree with it.

1=strongly agree
2= agree
3= disagree
4= strongly disagree

___1. On the whole, I am satisfied with myself.
___2. At times I think I am no good at all.
___3. I feel that I have a number of good qualities.
___4. I am able to do things as well as most other people.
___5. I feel I do not have much to be proud of.
___6. I certainly feel useless at times.
___7. I feel that I'm a person of worth.
___8. I wish I could have more respect for myself.
___9. All in all, I am inclined to think that I am a failure.
___10. I take a positive attitude toward myself.

APPENDIX D

Feelings and Emotions (PANAS-C-Short)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word.

How much have you felt each of these feelings?
Indicate to what extent you have felt this way during the past few weeks.

Feeling or Emotion	Very Slightly or Not at All	A Little	Medium/ Moderately	Quite a Bit	Very Much/ Extremely
Joyful	1	2	3	4	5
Miserable	1	2	3	4	5
Cheerful	1	2	3	4	5
Mad	1	2	3	4	5
Happy	1	2	3	4	5
Afraid	1	2	3	4	5
Lively	1	2	3	4	5
Scared	1	2	3	4	5
Proud	1	2	3	4	5
Sad	1	2	3	4	5

APPENDIX E

Multidimensional Body-Self Relations Questionnaire (MBSRQ)

The following pages contain a series of statements about how people might think, feel, or behave. You are asked to indicate the extent to which each statement pertains to you personally.

Your answers to the items in the questionnaire are anonymous, so please do not write your name on any of the materials. In order to complete the questionnaire, read each statement carefully and decide how much it pertains to you personally.

For items 1-3, using the scale below, indicate your answer by entering it to the left of the number of the statement.

1	2	3	4	5
Definitely Disagree	Mostly Disagree	Neither agree Nor disagree	Mostly Agree	Definitely Agree

There are no right or wrong answers. Just give the answer that is most accurate for you. Remember, your responses are anonymous, so please be *completely honest*. Please give an answer to all of the items.

___1. I constantly worry about being or becoming fat.
___2. I take my health for granted.
___3. I am on a weight-loss diet.

For the remainder of the items use the response scale given with the item, and enter your answer in the space beside the item.

___4. I have tried to lose weight by fasting or going on crash diets.

1. Never
2. Rarely
3. Sometimes
4. Often
5. Very often

5. I think I am:
    1. Very underweight
    2. Somewhat underweight
    3. Normal weight
    4. Somewhat overweight
    5. Very overweight

6. From looking at me, most other people would think I am:
    1. Very underweight
    2. Somewhat underweight
    3. Normal weight
    4. Somewhat overweight
    5. Very overweight

7.-14. Use this 1-5 scale to indicate how satisfied you are with each of the following areas of your body:

1	2	3	4	5
Very Dissatisfied	Mostly Dissatisfied	Neither Satisfied nor Dissatisfied	Mostly Satisfied	Very Satisfied

___7. Face (facial features, complexion)
___8. Hair (color, thickness, texture)
___9. Lower torso (buttocks, hips, thighs, legs)
___10. Mid torso (waist, stomach)
___11. Upper torso (chest or breasts, shoulders, arms)
___12. Muscle tone
___13. Weight
___14. Overall appearance

APPENDIX F

Dutch Eating Behavior Questionnaire (DEBQ)

Restrained Eating	Never	Seldom	Sometimes	Often	Very Often
1. When you have put on weight do you eat less than you usually do?	1	2	3	4	5
2. Do you try to eat less at mealtimes than you would like to eat?	1	2	3	4	5
3. How often do you refuse food or drink offered you because you are concerned about your weight?	1	2	3	4	5
4. Do you watch exactly what you eat?	1	2	3	4	5
5. Do you deliberately eat foods that are slimming?	1	2	3	4	5
6. When you have eaten too much do you eat less than usual the next day?	1	2	3	4	5
7. Do you deliberately eat less in order not to become heavier?	1	2	3	4	4
8. How often do you try not to eat between meals because you are watching your weight?	1	2	3	4	5
9. How often in the evenings do you try not to each because you are watching your weight?	1	2	3	4	5
10. Do you take your weight into account with what you eat?	1	2	3	4	5

Emotional Eating	Never	Seldom	Sometimes	Often	Very Often
1. Do you have a desire to eat when you are irritated?	1	2	3	4	5
2. Do you have a desire to eat when you have nothing to do?	1	2	3	4	5
3. Do you have a desire to eat when you are depressed or discouraged?	1	2	3	4	5
4. Do you have a desire to eat when you are feeling lonely?	1	2	3	4	5
5. Do you have a desire to eat when somebody lets you down?	1	2	3	4	5
6. Do you have a desire to eat when you are cross?	1	2	3	4	5

7.	Do you have a desire to eat when something unpleasant is about to happen?	1	2	3	4	4
8.	So you get the desire to eat when you are anxious, worried, or tense?	1	2	3	4	5
9.	Do you get the desire to eat when things are going against you or have gone wrong?	1	2	3	4	5
10.	Do you have a desire to eat when you are frightened?	1	2	3	4	5
11.	Do you have a desire to eat when you are disappointed?	1	2	3	4	5
12.	Do you have a desire to eat when you are emotionally upset?	1	2	3	4	5
13.	Do you have a desire to ear when you are bored or restless?	1	2	3	4	5

External eating		Never	Seldom	Sometimes	Often	Very Often
1.	If food tastes good to you do you eat more than usual?	1	2	3	4	5
2.	If food smells and looks good do you eat more than usual?	1	2	3	4	5
3.	If you see or smell something delicious do you have a desire to eat it?	1	2	3	4	5
4.	If you are having something delicious to eat do you usually eat it straight away?	1	2	3	4	5
5.	If you see others eating do you also want to eat?	1	2	3	4	5
6.	Do you eat more than usual when you see others eating?	1	2	3	4	5
7.	When preparing a meal are you inclined to eat something?	1	2	3	4	4
8.	If you walk past the baker do you have the desire to buy something delicious?	1	2	3	4	5
9.	If you walk past the snack bar or café do you have the desire to buy something delicious?	1	2	3	4	5
10.	Can you resist eating delicious food?	1	2	3	4	5

APPENDIX G

Perception of Teasing Scale (POTS)

The following should be answered with respect to the period of time when you were growing up (ages 5-16).
First, rate how often you think you have been the object of such behavior (using the scale provided, *never to very often*).
Second, unless you responded never to a particular question, rate how *upset* you were by the teasing (*not upset* to *very upset*).

1. Your parent/s made fun of you because you were heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
1a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
2. Your parent/s made jokes about you being too heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
2a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
3. Your parent/s laughed at you for trying out for sports because you were heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
3a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
4. Your parent/s called you names like “fatso”.	Never		Sometimes		Very Often
	1	2	3	4	5
4a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
5. Your parent/s pointed at you because you were overweight.	Never		Sometimes		Very Often
	1	2	3	4	5
5a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
6. Your parent/s snickered about your heaviness when you walked into a room alone.	Never		Sometimes		Very Often
	1	2	3	4	5

6a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
7. Peers made fun of you because you were heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
7a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
8. Peers made jokes about you being too heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
8a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
9. Peers laughed at you for trying out for sports because you were heavy.	Never		Sometimes		Very Often
	1	2	3	4	5
9a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
10. Peers called you names like “fatso”.	Never		Sometimes		Very Often
	1	2	3	4	5
10a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
11. Peers pointed at you because you were overweight.	Never		Sometimes		Very Often
	1	2	3	4	5
11a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5
12. Peers snickered about your heaviness when you walked into a room alone.	Never		Sometimes		Very Often
	1	2	3	4	5
12a. How upset were you?	Not Upset		Somewhat Upset		Very Upset
	1	2	3	4	5

APPENDIX H

PARENT AND PEER ACCEPTANCE OF OVERWEIGHT STATUS

These questions are about how others feel about people who are overweight. Please give your honest answers.	No	Sort of No	Not Sure	Sort of Yes	Yes
PARENTS					
1. Do your parents accept people who are overweight?					
2. Do you parents make negative comments about people who are overweight?					
3. Do your parents make negative comments about you being overweight?					
PEERS (in general/overall)					
1. Do your peers accept people who are overweight?					
2. Do you peers make negative comments about people who are overweight?					
3. Do your peers make negative comments about you being overweight?					

APPENDIX I

Adolescent Risk Questionnaire (ARQ)

Please estimate the frequency with which **you engage** in the following behaviors. (1)=never to (5) = very often.

	Never		Once in a while		Very Often
Underage drinking	1	2	3	4	5
Smoking	1	2	3	4	5
Getting drunk	1	2	3	4	5
Taking drugs	1	2	3	4	5
Staying out late	1	2	3	4	5
Drinking and driving	1	2	3	4	5
Stealing cars/going for joy rides	1	2	3	4	5
Having unprotected sex	1	2	3	4	5
Speeding	1	2	3	4	5
Driving without a license	1	2	3	4	5
Snow skiing	1	2	3	4	5
Tao Kwon Do fighting	1	2	3	4	5
Inline skating	1	2	3	4	5
Parachuting	1	2	3	4	5
Entering a competition	1	2	3	4	5
Flying a plane	1	2	3	4	5
Leaving school	1	2	3	4	5
Overeating	1	2	3	4	5
Teasing/ picking on people	1	2	3	4	5
Cheating	1	2	3	4	5
Talking to strangers	1	2	3	4	5
Sniffing gas or glue	1	2	3	4	5

APPENDIX J

WAYNE STATE UNIVERSITY

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://irb.wayne.edu

NOTICE OF EXPEDITED AMENDMENT APPROVAL

To: Kathryn Combs
College of Education

From: Dr. Deborah Ellis or designee C. Zolondek, PhD for
Chairperson, Behavioral Institutional Review Board (B3)

Date: December 08, 2015

RE: IRB #: 077615B3E

Protocol Title: A Study of High School Students' Physical Health, Academic Performance, Personal Choices, and Social-Emotional Characteristics

Funding Source:

Protocol #: 1508014233

Expiration Date: November 04, 2016

Risk Level / Category: 45 CFR 46.404 - Research not involving greater than minimal risk

The above-referenced protocol amendment, as itemized below, was reviewed by the Chairperson/designee of the Wayne State University Institutional Review Board (B3) and is APPROVED effective immediately.

- Protocol - data collection instruments: Addition of instruments to also measure self-esteem, academic self-concept, body image, peer and family acceptance of overweight status.

APPENDIX K

Warren Consolidated Schools

Creating Dynamic Futures through Student Achievement, High Expectations, and Strong Relationships

ADMINISTRATION BUILDING
31300 Anita
Warren, MI 48093
586.825.2400

1.888.4WCS.KIDS
www.wcskids.net
Text WCSKIDS to 57780

June 12, 2015

Kathryn Combs
1152 Devonshire Rd
Grosse Pointe Park, MI 48230-1419

Dear Kathryn:

Please consider this formal notification that your study at Warren Mott High School has been approved. We appreciate the opportunity to understand our students in new ways and are enthusiastic about your professional accomplishments.

Please let me know if you have any questions.

Sincerely,

Sharon Irvine, Ed.S., Esq.
Chief Human Resources Officer

APPENDIX L

Parent Supplemental Information Letter with "Decline to Participate" Option

Title of Study: *A Study of High School Students' Physical Health, Academic Performance, Personal Choices, Cultural Influences and Social-Emotional Characteristics*
Researcher's Name*: Kathryn Combs, Ed. S*

Purpose
You are being asked to allow your child to be in a research study at their school that is being conducted by Kathryn Combs, a doctoral student from Wayne State University to examine how student's weight status relates to individual, family, peer and cultural associations with academic, social-emotional and behavioral functioning. Your child has been selected because he or she is enrolled in physical education class during the 2015-2016 school year at Mott High School.

Study Procedures
If you decide to allow your child to take part in the study, your child will complete the standard height and weight measurements taken in the PE classes. This data will be provided to the researcher anonymously. Your child will be asked to complete demographical information regarding such things as gender, race and familial make-up as well as their perception of academic success, and asked to complete questionnaires about their current social-emotional functioning, risk taking behaviors and individual, family, peer, and cultural influence. All the aforementioned will be provided to the researcher anonymously. Students will have the option to discontinue their participation in the study at any time. It will take your child approximately 20 minutes to complete the questionnaires. This will all take place during one class period.

Once the survey is completed, no other information will be needed from your child. Copies of the above questionnaires may be requested by contacting Mrs. Combs at the contact listed below.

Benefits
There may be no direct benefits for your child; however, information from this study may benefit other people now or in the future.

Risks
- There are no known risks at this time to your child for participation in this study.

Costs
There are no costs to you or your child to participate in this study.

Compensation
You or your child will not be paid for taking part in this study.

Confidentiality
All information collected about your child during the course of this study will be kept confidential to the extent permitted by law.

- Your child will be identified in the research records by a coded number. Information that identifies your child personally will not be released without your written permission. However, the study sponsor (if applicable), the Institutional Review Board (IRB) at Wayne State University or federal agencies with appropriate regulatory oversight (Office for Human Research Protections [OHRP], Office of Civil Rights [OCR], etc.), may review your child's records.

Voluntary Participation /Withdrawal
Your child's participation in this study is voluntary. You may decide that your child can take part in this study and then change your mind. You are free to withdraw your child at any time. Your decision about enrolling your child in the study will not change any present or future relationships with Wayne State University or its affiliates, your child's school, your child's teacher, your child's grades or other services you or your child are entitled to receive.

Questions
If you have any questions about this study now or in the future, you may contact Kathryn Combs at the following phone number 248-421-0882. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Participation
If you do not contact the principal investigator (PI) within a 2-week period, to state that you do not give permission for your child to be included in this research, your child will be then be asked to complete an adolescent assent form, where he/she can decide on whether or not to be a part of the research study. You may contact the PI by phone (248-421-0882), email (Kathryn.combs@wayne.edu), or by returning the tear off form below.

If you do **not** wish to have your child participate in the study, you may fill out the form and return it to your child's teacher.

I do not allow my child _____to participate in this research study.

Name

_____
Printed Name of Parent

_____ _____
Signature of Parent Date

APPENDIX M

Good Morning/Afternoon, my name is Kathryn Combs and I am a doctoral student and research assistant at Wayne State University.

Today I am here to talk to you about a research project that I am working on. I am going to be collecting some information about your peer and family relationships, various activities you may or may not participate in, your physical health and your thoughts about how you perform academically. I am looking to see if these are related to your physical health. Answering all of the questions on the surveys should take approximately 20 minutes.

No one at school, including your teacher, will be able to see your answers to the questions. The information you are providing on the forms you are asked to complete do not include your name, so they cannot be tied to you. I will not have access to your names at all.

A form was mailed to your home that explained this to your parents also. Your parents have had the option to not have you participate. You do not have to complete the surveys if you do not want to. You can stop the survey at any time. Your completion of the survey will not affect the way are treated by any staff member or myself.

Please remember this is not a test and it will not be graded. It does not have an impact on your grades or school work whatsoever. It is just important that you are very honest. Please do not put your name on any of the surveys. Each packet is uniquely coded with a number that identifies the data only, not you as a person. Please raise your hand if you need help at any time. When you are finished please hand in your packet.

If anything makes you uncomfortable and want to talk to someone during, or after the study, please let me know. I will make myself available at a time convenient to you. Every reasonable effort will be made to keep your records (medical or other) and/or your information confidential; however we do have to let some people look at your study records.

We will keep your records private unless we are required by law to share any information. The law says we have to tell someone if you might hurt yourself or someone else. The study doctor can use the study results as long as you cannot be identified.

If you are not participating, you can complete course work as regularly scheduled.

It is very important that you do not discuss the survey or your answers with other students or staff. If you have any questions, please tell an adult at school. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Thank you very much

APPENDIX N

[Behavioral]Documentation of Adolescent Assent Form

(ages 13-19)

Title: A Study of High School Students' Physical Health, Academic Performance, Personal Choices, Societal Influence and Social-Emotional Characteristics

Study Investigator: Kathryn Combs

Why am I here?
This is a research study. Only people who choose to take part are included in research studies. You are being asked to take part in this study because of your participation in a physical education class at Mott High School. Please take time to make your decision. Talk to your family about it and be sure to ask questions about anything you don't understand.

Why are they doing this study?
This study is being done to find out information about your peer and family relationships, various activities you may or may not participate in, your physical health and your thoughts about how you perform academically. I am looking to see if these are related to your physical health.

What will happen to me?
There is nothing that will happen to you for taking part or refusing to take part in this study. There are no physical risks for taking part in this study. No one will know the information that you provide if you choose to participate, and there will not be any identifiable data to indicate you as a person.

How long will I be in the study?
You will be in the study for the 20 minutes it takes you to complete the forms.

Will the study help me?
You will not benefit from being in this study; however information from this study may help other people in the future in regard to understanding the relationship between physical health, peer and family influence, behavioral choices and academic and social-emotional functioning.

Will anything bad happen to me?
There are no known risks for participating in this study.

Do my parents or guardians know about this?
This study information has been given to your parents/guardian. You can talk this over with them before you decide.

What about confidentiality?
Every reasonable effort will be made to keep your records (medical or other) and/or your information confidential; however we do have to let some people look at your study records.

We will keep your records private unless we are required by law to share any information. The law says we have to tell someone if you might hurt yourself or someone else. The study doctor can use the study results as long as you cannot be identified.

What if I have any questions?

For questions about the study please call Kathryn Combs at (248) 421-0882. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Do I have to be in the study?

You don't have to be in this study if you don't want to or you can stop being in the study at any time. Please discuss your decision with your parents and researcher. No one will be angry if you decide to stop being in the study.

AGREEMENT TO BE IN THE STUDY

Your signature below means that you have read the above information about the study and have had a chance to ask questions to help you understand what you will do in this study. Your signature also means that you have been told that you can change your mind later and withdraw if you want to. By signing this assent form you are not giving up any of your legal rights. You will be given a copy of this form.

_____ _____

Signature of Participant (13 yrs & older) Date

_____

Printed name of Participant (13 yrs & older)

_____ _____

**Signature of Witness (When applicable) Date

_____

Printed Name of Witness

_____ _____

Signature of Person who explained this form Date

_____

Printed Name of Person who explained form

** Use when participant has had consent form read to them (i.e., illiterate, legally blind, translated into foreign language)

REFERENCES

Abraczinskas, M., Fisak, B., & Barnes, R. D. (2012). The relation between parental influence, body image, and eating behaviors in a nonclinical female sample. *Body Image*, *9*(1), 93-100.

Ackard, D. M., Neumark-Sztainer, D., Story, M., & Perry, C. (2003). Overeating among adolescents: prevalence and associations with weight-related characteristics and psychological health. *Pediatrics*, *111*(1), 67-74.

Akers, A. Y., Lynch, C. S., Gold, M., Chang, J. C., Doswell, W., Wiesenfeld, H. C., & Bost, J. E. (2008). 68: Exploring the relationship between obesity and sexual risk behaviors among female adolescents. *Journal of Adolescent Health*, *42*(2), 45-46.

Aliyev, B. & Türkmen, A. (2014). Parent, peer and media effect on the perception of body image in preadolescent girls and boys. *Universal Journal of Psychology*, *2*(7), 224-230.

Armstrong, B., Westen, S. C., & Janicke, D. M. (2014). The role of overweight perception and depressive symptoms in child and adolescent unhealthy weight control behaviors: A mediation model. *Journal of Pediatric Psychology*, *39*(3), 340-348.

Ata, R. N., Ludden, A. B., & Lally, M. M. (2007). The effects of gender and family, friend, and media influences on eating behaviors and body image during adolescence. *Journal of Youth and Adolescence*, *36*(8), 1024-1037.

Ball, G., Ambler, K., Keaschuk, R.A., Rosychuk, R.J., Holt, N.L., Spence, J.C., Jetha, M.M., Sharma, A.M., & Newton, A.S. (2012). Parents as Agents of Change (PAC) in pediatric weight management: The protocol for the PAC randomized clinical trial. *BMC Pediatrics* 12:114. http://www.biomedcentral.com/1471-2431/12/114

Bailly, N., Maitre, I., Amanda, M., Hervé, C., & Alaphilippe, D. (2012). The Dutch Eating Behaviour Questionnaire (DEBQ). Assessment of eating behaviour in an aging French population. *Appetite*, *59*(3), 853-858.

Bandura A. (1986). *Social foundations of thought and action. A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, *31*(2), 143-164.

Barlow, S. E. (2007). Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report, Pediatrics 120 Supplement (2007): S166.*pediatrics. aappublications. org/content/120/Supplement_4 S, 164*.

Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social and psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51(6),* 1173-1182.

Basch, C. E. (2011). Physical activity and the achievement gap among urban minority youth. *Journal of School Health*, *81*(10), 626-634.

Baumrind, D. (1967). Child care practices anteceding three patterns of preschool behavior. *Psychology Monographs*, *75*(1), 43-88.

Britz, B., Siegfried, W., Ziegler, A., Lamertz, C., Herpertz-Dahlmann, B. M., Remschmidt, H., & Hebebrand, J. (2000). Rates of psychiatric disorders in a clinical study group of adolescents with extreme obesity and in obese adolescents ascertained via a population based study. *International Journal of Obesity*, *24*(12), 1707-1714.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*(7), 513.

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist*, *34*(10), 844.

Bronfenbrenner, U. (2005). *Making human beings human: Bioecological perspectives on human development*. Sage.

Brown, T. A., Cash, T. F., & Mikulka, P. J. (1990). Attitudinal body-image assessment: Factor analysis of the Body-Self Relations Questionnaire. *Journal of Personality Assessment*, *55*(1-2), 135-144.

Brown, T. & Summerbell, C. (2009). Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: an update to the obesity guidance produced by the National Institute for Health and Clinical Excellence. *Obesity Reviews*. *10*(1), 110–141.

Cash, T. F. (2000). *The multidimensional body-self relations questionnaire*.

Cash, T. F., & Pruzinsky, T. E. (1990). *Body images: Development, deviance, and change*. Guilford Press.

Castelli, D. M., Centeio, E. E., Hwang, J., Barcelona, J. M., Glowacki, E. M., Calvert, H. G., & Nicksic, H.M. (2014). VII. The History of Physical Activity and Academic Performance Research: Informing The Future. *Monographs of the Society for Research in Child Development*, *79*(4), 119-148.

Centers for Disease Control and Prevention (CDC), & Centers for Disease Control and Prevention (CDC). (2009). Obesity and overweight. *National Center for Health Statistics*.

Cerin, E. Barnett, A., & Baranowski, T. (2009). Testing theories of dietary behavior change in youth using the mediating variable model with intervention programs. *Journal of Nutrition Education and Behavior, 41*(5), 309–318.

Cheng, Y. H. A. & Landale, N. S. (2010). Teen overweight, weight stigma, and intimate relationship development from adolescence to young adulthood. *Max Planck Institute for Demographic Research Working Paper*, (2010-008).

Ciarrochi, J. & Bilich, L. (2006). Process measures of potential relevance to ACT. *Measures Package*. University of Unpublished manuscript, University of Wollongong, Wollongong, Australia.

Cole, T.J., Bellizzi, M.C., Flegal, K.M., & Dietz, W.H. (2000). Establishing a standard definition For Child overweight and obesity worldwide: international survey. *British Medical Journal*. *320* (7244), 1240.

Connelly, J. B., Duaso, M. J., & Butler, G. (2007). A systematic review of controlled trials of interventions to prevent childhood obesity and overweight: a realistic synthesis of the evidence. *Public Health*, *121*(7), 510-517.

Curran, P. J., Stice, E., & Chassin, L. (1997). The relation between adolescent alcohol use and peer alcohol use: A longitudinal random coefficients model. *Journal of Consulting and Clinical Psychology*, *65*(1), 130.

Daniels SR. (2009). Complications of obesity in children and adolescents. *International Journal of Obesity*, *33,* 60-65.

Datar, A., Sturm, R., & Magnabosco, J. L. (2004). Childhood overweight and academic performance: national study of kindergartners and first-graders. *Obesity Research*, *12*(1), 58-68.

Datar, A. & Sturm, R. (2006). Childhood overweight and elementary school outcomes. *International Journal of Obesity*, *30*(9), 1449-1460.

Davison, K. K. & Birch, L. L. (2001). Weight status, parent reaction, and self-concept in five year-old girls. *Pediatrics*, *107*(1), 46-53.

Davison, K. K., & Birch, L. L. (2004). Predictors of fat stereotypes among 9-year-old girls and their parents. *Obesity Research*, *12*(1), 86-94.

Dishion, T. J., Spracklen, K. M., Andrews, D. W., & Patterson, G. R. (1996). Deviancy training in male adolescent friendships. *Behavior Therapy*, *27*(3), 373-390.

Duckworth, A. L., Tsukayama, E., & Geier, A. (2010). Self-controlled children stay leaner in the transition to adolescence. *Appetite*, *54*(2), 304-308.

Dunkley, T. L., Wertheim, E. H., & Paxton, S. J. (2001). Examination of a model of multiple sociocultural influences on adolescent girls' body dissatisfaction and dietary restraint. *Adolescence*, *36*(142), 265.

Ebesutani, C., Regan, J., Smith, A., Reise, S., Higa-McMillan, C., & Chorpita, B. F. (2012). The 10-item positive and negative affect schedule for children, child and parent shortened versions: application of Item Response Theory for more efficient assessment. *Journal of Psychopathology and Behavioral Assessment*, *34*(2), 191-203.

Ebbeling, C.B., Pawlak, D. B., & Ludwig, D.S. (2002). Childhood obesity: public-health crisis, common sense cure. *Lancet*, 360: 473–82

Eisenberg, M. E. & Neumark-Sztainer, D. (2010). Friends' dieting and disordered eating behaviors among adolescents five years later: findings from Project EAT. *Journal of Adolescent Health*, *47*(1), 67-73.

Eisenberg, M. E., Neumark-Sztainer, D., & Story, M. (2003). Associations of weight-based teasing and emotional well-being among adolescents. *Archives of Pediatrics & Adolescent Medicine*, *157*(8), 733-738.

Eisenberg, M. E., Neumark-Sztainer, D., Haines, J., & Wall, M. (2006). Weight-teasing and emotional well-being in adolescents: Longitudinal findings from Project EAT. *Journal of Adolescent Health*, *38*(6), 675-683.

Farhat, T., Iannotti, R. J., & Simons-Morton, B. G. (2010). Overweight, obesity, youth, and health-risk behaviors. *American Journal of Preventive Medicine*, *38*(3), 258-267.

Fitzgerald, A., Heary, C., Kelly, C., Nixon, E., & Shevlin, M. (2013). Self-efficacy for healthy eating and peer support for unhealthy eating are associated with adolescents' food intake patterns. *Appetite*, *63*, 48-58.

Fitzgibbon, M.L., Stolley, M.R. Schiffer, L., Van Horn, L., KauferChristoffel, K., Dyer, A. (2005). Two-year follow-up results for Hip-Hop to Health Jr.: A randomized controlled trial for overweight prevention in preschool minority children. *The Journal of Pediatrics*. *146*(5), 618-625.

Ford, E. S. (2005). The epidemiology of obesity and asthma. *Journal of Allergy and Clinical Immunology*, *115*(5), 897-909.

Francis, L. A. & Birch, L. L. (2005). Maternal influences on daughters' restrained eating behavior. *Health Psychology*, *24*(6), 548.

Friedman, M. A. & Brownell, K. D. (1995). Psychological correlates of obesity: moving to the next research generation. *Psychological Bulletin*, *117*(1), 3.

Fryar, C. D., Carroll, M. D., & Ogden, C. L. (2014). Prevalence of overweight and obesity among children and adolescents: United States, 1963-1965 through 2011 2012. *Atlanta, GA: National Center for Health Statistics*.

Glanz, K., Rimer, B. K., & Lewis, F. M. (2002). Health Behavior and Health Education. *Theory, Research and Practice.* San Francisco: Wiley & Sons.

Goodman, E. & Whitaker, R. C. (2002). A prospective study of the role of depression in the development and persistence of adolescent obesity. *Pediatrics*, *110*(3), 497-504.

Gortmaker, S.L., Peterson, K., Wiecha, J., Sobol, A.M., Dixit, S., Fox, M.K., & Laird, N. (1999). Reducing Obesity via a school-based interdisciplinary intervention among youth. Planet Health. *Archives of Pediatrics & Adolescent Medicine*, *153*(4), 409-418.

Griffiths, L.J., Dezateux, C. & Hill, A. (2011). Is obesity associated with emotional and behavioural problems in children? Findings from the Millennium Cohort Study. *International Journal of Pediatric Obesity*, *6*(sup3), e423–e432.

Griffiths, L.J., Parsons, T.J., & Hill, A.J. (2010). Self-esteem and quality of life in obese children and adolescents: a systematic review. *International Journal of Pediatric Obesity*. *5*(4), 282–304.

Gullone, E., Moore, S., Moss, S., & Boyd, C. (2000). The Adolescent Risk-Taking Questionnaire Development and Psychometric Evaluation. *Journal of Adolescent Research*, *15*(2), 231-250.

Han, J. C., Lawlor, D. A., & Kimm, S. Y. (2010). Childhood obesity. *The Lancet*, *375*(9727), 1737-1748.

Heitzler, C. D., Martin, S. L., Duke, J., & Huhman, M. (2006). Correlates of physical activity in a national sample of children aged 9–13 years. *Preventive medicine*, *42*(4), 254-260.

Hesketh, K., Wake, M., & Waters, E. (2004). Body mass index and parent-reported self-esteem in elementary school children: evidence for a causal relationship. *International Journal of Obesity*, *28*(10), 1233-1237.

Hochbaum, G. M. (1958). *Public participation in medical screening programs: A socio psychological study*. US Department of Health, Education, and Welfare, Public Health Service, Bureau of State Services, Division of Special Health Services, Tuberculosis Program.

Huang, D. Y., Lanza, H. I., Wright-Volel, K., & Anglin, M. D. (2013). Developmental trajectories of childhood obesity and risk behaviors in adolescence. *Journal of Adolescence*, *36*(1), 139-148.

Hutchinson, D. M. & Rapee, R. M. (2007). Do friends share similar body image and eating problems? The role of social networks and peer influences in early adolescence. *Behaviour Research and Therapy*, *45*(7), 1557-1577.

Janz, N. K., & Champion, V. L. (86). Strecher, VJ (2002). The health belief model. *K. Glanz, BK Rimer*, *86*, 45-67.

Hutchinson, D. M. & Rapee, R. M. (2007). Do friends share similar body image and eating problems? The role of social networks and peer influences in early adolescence. *Behaviour Research and Therapy*, *45*(7), 1557-1577.

Israel, A. C. & Ivanova, M. Y. (2002). Global and dimensional self-esteem in preadolescent and early adolescent children who are overweight: Age and gender differences. *International Journal of Eating Disorders*, *31*(4), 424-429.

Jones, D. C. (2004). Body image among adolescent girls and boys: a longitudinal study. *Developmental Psychology*, *40*(5), 823.

Kamath, C.C., Vickers, K.S., Ehrlich, A., McGovern, L., Johnson, J., Singhal, V., Paulo, R., Hettinger, A., Erwin, P.J. & Montori, V.M. (2008). Behavioral interventions to prevent childhood obesity: a systematic review and metaanalyses of randomized trials. *Journal of Clinical Endocrinology & Metabolism, 93(12):* 4606-4615.

Kanakis, D. M. & Thelen, M. H. (1995). Parental variables associated with bulimia nervosa. *Addictive Behaviors*, *20*(4), 491-500.

Kater, K. J., Rohwer, J., & Londre, K. (2002). Evaluation of an upper elementary school program to prevent body image, eating, and weight concerns. *Journal of School Health*, *72*(5), 199-204.

Katzmarzyk, P. T., Reeder, B. A., Elliott, S., Joffres, M. R., Pahwa, P., Raine, K. D., ... & Paradis, G. (2012). Body mass index and risk of cardiovascular disease, cancer and all-cause mortality. *Canadian Journal of Public Health/Revue Canadienne de Sante'e Publique*, 147-151.

Keery, H., Van den Berg, P., & Thompson, J. K. (2004). An evaluation of the tripartite influence model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image*, *1*(3), 237-251.

Knauss, C., Paxton, S. J., & Alsaker, F. D. (2007). Relationships amongst body dissatisfaction, internalization of the media body ideal and perceived pressure from media in adolescent girls and boys. *Body Image*, *4*(4), 353-360.

Krukowski, R.A., West, D.S., Perez, A.P., Bursas, Z., Phillips, M.M., & Raczynski, J.M. (2009). Overweight children, weight-based teasing and academic performance. *International Journal of Pediatric Obesity*. *4*(4), 274-280.

Kuczmarski, R. J., Ogden, C. L., Grummer-Strawn, L. M., Flegal, K. M., Guo, S. S., Wei, R., ... & Johnson, C. L. (2000). CDC growth charts: United States. *Advance Data*, (314), 1-27.

Lakshman, R., Elks, C. E., & Ong, K. K. (2012). Childhood obesity. *Circulation*, *126*(14), 1770 1779.

Lamb, M. M., Dabelea, D., Yin, X., Ogden, L. G., Klingensmith, G. J., Rewers, M., & Norris, J. M. (2010). Early-life predictors of higher body mass index in healthy children. *Annals of Nutrition and Metabolism*, *56*(1), 16-22.

Latzer, Y. & Stein, D. (2013). A review of the psychological and familial perspectives of childhood obesity. *Journal of Eating Disorders, 1,* 1-13

Lawler, M. & Nixon, E. (2011). Body dissatisfaction among adolescent boys and girls: the effects of body mass, peer appearance culture and internalization of appearance ideals. *Journal of Youth and Adolescence*, *40*(1), 59-71.

Lee, W. W. (2007). An overview of pediatric obesity. *Pediatric diabetes*, *8*(s9), 76-87.

Leech, T. G. & Dias, J. J. (2012). Risky sexual behavior: a race-specific social consequence of obesity. *Journal of Youth and Adolescence*, *41*(1), 41-52.

Levine, M. P., Smolak, L., Moodey, A. F., Shuman, M. D., & Hessen, L. D. (1994). Normative developmental challenges and dieting and eating disturbances in middle school girls. *International Journal of Eating Disorders*, *15*(1), 11-20.

Lewy, V. D., Danadian, K., Witchel, S. F., & Arslanian, S. (2001). Early metabolic abnormalities in adolescent girls with polycystic ovarian syndrome. *The Journal of Pediatrics*, *138*(1), 38-44.

Lowry, R., Robin, L., Kann, L., & Galuska, D. A. (2014). Associations of body mass index with sexual risk-taking and injection drug use among US high school students. *Journal of Obesity*, *2014*.

Mamun, A. A., Hayatbakhsh, M. R., O'Callaghan, M., Williams, G., & Najman, J. (2009). Early overweight and pubertal maturation—pathways of association with young adults' overweight: a longitudinal study. *International Journal of Obesity*, *33*(1), 14-20.

Marsh, H. W., Hau, K. T., Sung, R. Y. T., & Yu, C. W. (2007). Childhood obesity, gender, actual-ideal body image discrepancies, and physical self-concept in Hong Kong children: cultural differences in the value of moderation. *Developmental Psychology*, *43*(3), 647.

Martyn-Nemeth, P., Penckofer, S., Gulanick, M., Velsor-Friedrich, B., & Bryant, F.B. (2009). The relationships among self-esteem, stress, coping, eating behavior, and depressive mood in adolescents. *Research in Nursing & Health*, *32*(1), 96-109.

Mason, T. B. & Lewis, R. J. (2014). Profiles of binge eating: The interaction of depressive symptoms, eating styles, and body mass index. *Eating disorders*, *22*(5), 450-460.

Metcalf, B., Henley, W., & Wilkin, T. (2012). Effectiveness of intervention on physical activity of children: systematic review and meta-analysis of controlled trials with objectively measured outcomes (Early Bird 54).

Michael, S. L., Wentzel, K., Elliott, M. N., Dittus, P. J., Kanouse, D. E., Wallander, J. L., ... & Schuster, M. A. (2014). Parental and peer factors associated with body image discrepancy among fifth-grade boys and girls. *Journal of Youth and Adolescence*, *43*(1), 15-29.

National Center for Health Statistics. Prevalence of overweight among children and adolescents: United States, 1999. http://www.cdc.gov.proxy.lib.wayne.edu/nchs/products/pubs/pubd/hestats/overwght99.htm (accessed Jan 29, 2002).

National Center for Health Statistics. (2012). *Center for Disease Control*. Retrieved March 31, 2012, from www.cdc.gove/nchs.

Neumark-Sztainer, D.R., Wall, M.M., Haines, J.I., Story, M.T., Sherwood, N.E., & Van Den Berg, P.A. (2007). Shared risk and protective factors for overweight and disordered eating in adolescents. *American Journal of Preventative Medicine. 33*(5), 359-369.

Nowicka, P., Höglund, P., Birgerstam, P., Lissau, I., Pietrobelli, A., & Flodmark, C. E. (2009). Self-esteem in a clinical sample of morbidly obese children and adolescents. *Acta Paediatrica*, *98*(1), 153-158.

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association*, *295*(13), 1549-1555.

Ogden C.L., Carroll, M.D., Kit, B.K., & Flegal, K.M. (2012). Prevalence of obesity in the United States, 2009–2010. *NCHS Data Brief*, no 82. Hyattsville, MD: National Center for Health Statistics.

Ogden C.L., Carroll M.D., Kit B.K., Flegal K.M. (2012). Prevalence of obesity and trends in Body mass index among US children and adolescents, 1999-200. (2012). *Journal of the American Medical Association*, *307*(5), 483-490.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association*, *311*(8), 806-814.

Ogden, C.L., Lamb, M.M., Carroll, M.D., & Flegal, K.M. (2010). Obesity and socioeconomic status in children and adolescents: United States, 2005–2008. NCHS Data Brief. Number 51. *National Center for Health Statistics*.

Pate, R.R., O'Neill, J.R., Liese, A.D., Janz, K.F., Granberg, E. M., Colabianchi, N., Ross, T. (2013). Factors associated with development of excessive fatness in children and adolescents: a review of prospective studies. *Obesity Review, 14*(8), 645–658.

Paxton, S. J., Schutz, H. K., Wertheim, E. H., & Muir, S. L. (1999). Friendship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviors, and binge eating in adolescent girls. *Journal of Abnormal Psychology*, *108*(2), 255.

Pesa, J. A., Syre, T. R., & Jones, E. (2000). Psychosocial differences associated with body weight among female adolescents: the importance of body image. *Journal of Adolescent Health*, *26*(5), 330-337.

Phillips, R. G., & Hill, A. J. (1998). Fat, plain, but not friendless: self-esteem and peer acceptance of obese pre-adolescent girls. *International Journal of Obesity and Related Metabolic Disorders, 22*(4).

Polfuss, M., Liebhart, J., & Greenley, R. (2011). Relationship between overweight/obesity and risk-taking in adolescents. *American Journal of Nurse Practitioners*, *15*, 10-18.

Prentice-Dunn, H. & Prentice-Dunn, S. (2012). Physical activity, sedentary behavior, and childhood obesity: A review of cross-sectional studies. *Psychology, Health & Medicine 17*(3), 255-273.

Puhl, R. M. & Latner, J.D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin, 133*(4), 557-580.

Ratcliff, M. B., Jenkins, T. M., Reiter-Purtill, J., Noll, J. G., & Zeller, M. H. (2011). Risk-taking behaviors of adolescents with extreme obesity: normative or not?. *Pediatrics*, *127*(5), 827-834.

Rayner, K. E., Schniering, C. A., Rapee, R. M., Taylor, A., & Hutchinson, D. M. (2013). Adolescent girls' friendship networks, body dissatisfaction, and disordered eating: Examining selection and socialization processes. *Journal of Abnormal Psychology*, *122*(1), 93.

Reilly, J.J., Armstrong, J., Dorosty, A.R., Emmett, P.M., Ness, A., Rogers, I., Steer, C. & Sherriff, A. (2005). Early life risk factors for obesity in childhood: Cohort study. *British Medical Journal, 330*(11), 1357-1359.

Renman, C., Engström, I., Silfverdal, S. A., & Åman, J. (1999). Mental health and psychosocial characteristics in adolescent obesity: a population-based case-control study. *Acta Paediatrica*, *88*(9), 998-1003.

Rieves, L. & Cash, T. F. (1996). Social developmental factors and women's body-image attitudes. *Journal of Social Behavior & Personality*, *11*(1), 63.

Robinson, TN. (1999). Reducing children's television viewing to prevent obesity: a randomized controlled trial. *Journal of American Medical Association; 282*(16), 1561-1567.

Rosenberg, M. (1979). Concerning the self. *NY: Basic through challenge. In: E. Cole*.

Rosenfield, R. L., Lipton, R. B., & Drum, M. L. (2009). Thelarche, pubarche, and menarche attainment in children with normal and elevated body mass index. *Pediatrics*, *123*(1), 84-88.

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education and Behavior, 2*(4), 328-335.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education & Behavior*, *15*(2), 175-183.

Sahota, P., Rudolph, M.C.J., Dixey, R., Hill, A.J., Barth, J.H., & Cade, J. (2001) Randomized controlled trial of primary school based intervention to reduce risk factors for obesity. *British Medical Journal*, *323*(7320), 1029.

Sallis, J.F., Carlson, M.A., Mignano, A.M., & Lemes, A. Wagner, N. (2013). Trends in presentation of environmental and policy studies related to physical activity, nutrition, and obesity at society of behavioral medicine, 1995-2010: a commentary to accompany the active living research supplement to annals of behavioral medicine. *Annals of Behavioral Medicine*, 1-4.

Schreier, H. & Chen, E. (2013). Socioeconomic status and the health of youth: A multilevel, multidomain approach to conceptualizing pathways. *Psychological Bulletin*, *139*(3), 606.

Schwimmer, J. B., Burwinkle, T. M., & Varni, J. W. (2003). Health-related quality of life of severely obese children and adolescents. *Journal of the American Medical Association*, *289*(14), 1813-1819.

Sharma, M. (2006) School-based interventions for childhood and adolescent obesity. *Obesity Reviews* 7(3), 261–269.

Schutz, H. K., Paxton, S. J., & Wertheim, E. H. (2002). Investigation of body comparison among adolescent girls1. *Journal of Applied Social Psychology*, *32*(9), 1906-1937.

Shin, N. Y., & Shin, M. S. (2008). Body dissatisfaction, self-esteem, and depression in obese Korean children. *The Journal of Pediatrics*, *152*(4), 502-506.

Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Rising social inequalities in US childhood obesity, 2003–2007. *Annals of Epidemiology*, *20*(1), 40-52.

Shroff, H. & Thompson, K. (2006). The tripartite influence model of body image and eating disturbance: A replication with adolescent girls. *Body Image 3*(1), 17-23.

Stein, R. I., Epstein, L. H., Raynor, H. A., Kilanowski, C. K., & Paluch, R. A. (2005). The influence of parenting change on pediatric weight control. *Obesity Research*, *13*(10), 1749–1755.

Stice, E., Presnell, K. Rhode, P., & Shaw, H. (2005). Psychological and behavioral risk factors for obesity onset in adolescent girls: a prospective study. *Journal of Counseling and Clinical Psychology*, *73*(2), 195-202.

Stice, E. & Shaw, H.E. (2002). Role of body dissatisfaction in the onset and maintenance of eating pathology : A synthesis of research findings. *Journal of Psychosomatic Research, 53*(5), 985-993.

Stice, E., Shaw, H. & Marti, C.N. (2006). A meta-analytic review of obesity prevention programs for children and adolescents: the skinny on interventions that work. *Psychological Bulletin*, *132*(5): 667–691.

Story, M. (1999). School-based approaches for preventing and treating obesity. *International Journal of Obesity*, *23*, S43-S51.

Stradmeijer, M., Bosch, J., Koops, W., & Seidell, J. (2000). Family functioning and psychosocial adjustment in overweight youngsters. *International Journal of Eating Disorders*, *27*(1), 110-114.

Strauss, R. S. (2000). Childhood obesity and self-esteem. *Pediatrics*, *105*(1), e15-e15.

Taskforce, I. O. (2010). Childhood obesity.

Tanofsky-Kraff, M., Goossens, L., Eddy, K. T., Ringham, R., Goldschmidt, A., Yanovski, S. Z., & ... Yanovski, J. A. (2007). A multisite investigation of binge eating behaviors in children and adolescents. *Journal of Consulting and Clinical Psychology*, *75*(6), 901-913.

Taras, H. & Potts-Datema, W. (2005). Obesity and Student Performance at School. *Journal of School Health. 75*(8), 291-295.

Taylor, R. W., Grant, A. M., Goulding, A., & Williams, S. M. (2005). Early adiposity rebound: review of papers linking this to subsequent obesity in children and adults. *Current Opinion in Clinical Nutrition & Metabolic Care*, *8*(6), 607-612.

Thompson, J. K., Cattarin, J., Fowler, B., & Fisher, E. (1995). The perception of teasing scale (POTS): A revision and extension of the physical appearance related teasing scale (PARTS). *Journal of Personality Assessment*, *65*(1), 146-157.

Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff Dunn, S. (1999). *Exacting beauty. Theory, assessment, and treatment of body image disturbance.* Washington, DC: American Psychological Association.

Thompson, J. K., Shroff, H., Herbozo, S., Cafri, G., Rodriguez, J., & Rodriguez, M. (2007). Relations among multiple peer influences, body dissatisfaction, eating disturbance, and self-esteem: A comparison of average weight, at risk of overweight, and overweight adolescent girls. *Journal of Pediatric Psychology*, *32*(1), 24-29.

Thompson, J. K. & Smolak, L. (2001). *Body image, eating disorders, and obesity in youth: Assessment, prevention, and treatment*. Taylor & Francis.

Tsukayama E, Toomey SL, Faith MS, & Duckworth A. (2010). Self-control as a protective factor against overweight status in the transition from childhood to adolescence. *Archives of Pediatric Adolescent Medicine 164*(7), 631-635.

US Department of Health and Human Services. Centers for Disease Control and Prevention Division of Nutrition, Physical Activity, and Obesity. *Implementing a Tobacco-Free Campus Initiative in Your Workplace Available online: http://www. cdc.*

gov/nccdphp/dnpa/hwi/toolkits/tobacco/index. htm (accessed August 19, 2009).

Van den Berg, P., Thompson, J. K., Obremski-Brandon, K., & Coovert, M. (2002). The Tripartite Influence model of body image and eating disturbance: A covariance structure modeling investigation testing the mediational role of appearance comparison. *Journal of Psychosomatic Research*, *53*(5), 1007-1020.

Van Strien, T., Frijters, J. E., Bergers, G., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, *5*(2), 295-315.

Van Strien, T., Herman, C. P., & Verheijden, M. W. (2012). Eating style, overeating and weight gain. A prospective 2-year follow-up study in a representative Dutch sample. *Appetite*, *59*(3), 782-789.

Wang, Y. (2002). Is obesity associated with early sexual maturation? A comparison of the association in American boys versus girls. *Pediatrics*, *110*(5), 903-910.

Wang, Y. & Beydoun, M. A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiologic Reviews*, *29*(1), 6-28.

Wang, F. & Veugelers, P. J. (2008). Self-esteem and cognitive development in the era of the childhood obesity epidemic. *Obesity Reviews*, *9*(6), 615-623.

Wang, Y. & Zhang, Q. (2006). Are American children and adolescents of low socioeconomic status at increased risk of obesity? Changes in the association between overweight and family income between 1971 and 2002. *The American Journal of Clinical Nutrition*, *84*(4), 707-716.

Wardle, J. (1987). Eating style: a validation study of the Dutch Eating Behaviour Questionnaire in normal subjects and women with eating disorders. *Journal of psychosomatic research*, *31*(2), 161-169.

Wen, M., Simpson, J. M., Baur, L. A., Rissel, C., & Flood, V. M. (2011). Family functioning and obesity risk behaviors: implications for early obesity intervention. *Obesity*, *19*(6), 1252-1258.

World Health Organization. (2002). *The world health report 2002: reducing risks, promoting healthy life*. World Health Organization.

Wofford, L. G. (2008). Systematic review of childhood obesity prevention. *Journal of Pediatric Nursing*, *23*(1), 5-19.

Worrell, A. & Trevino, C. (2007). *Assessment of body image, appearance management, and psychosocial functioning among Hispanic collegiate females.* Retrieved August 28, 2007, from http://counselingoutfitters.com/vistas/vistas07/Worrell.htm

Zhang, Q. & Wang, Y. (2004). Trends in the association between obesity and socioeconomic status in US adults: 1971 to 2000. *Obesity Research*, *12*(10), 1622-1632.

ABSTRACT

HIGH SCHOOL STUDENTS' PHYSICAL HEALTH: ASSOCIATIONS WITH INTRAPERSONAL, FAMILY, PEER, ACADEMIC, AND RISK BEHAVIOR FACTORS

by

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Major: Educational Psychology

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A significant body of research and literature supports the need to address the obesity epidemic as it pertains to children and adolescents. Research has suggested that a multitude of factors are associated with overweight status. This study explored the relationships among weight status (represented in the current study by BMI), key environmental contexts that adolescents are concurrently exposed to, including family and peer relationships, and intrapersonal variables, including self-esteem, body image, mood, and self-control for eating, peer and parent acceptance, along with risk taking behavior and academic achievement among high school age students. This research was conducted in order to obtain a better understanding of the relationship and strength between such variables.

Participants were 201 high school students (136 males, 65 females) from a large, suburban school district. Several themes surfaced, including that subjective weight was what above all was most strongly associated with weight status, and both adolescents' own body satisfaction and their perceptions of their parents' negative comments about others' weight

emerged as consistently significant factors as well in explaining variance in adolescents' own weight status. Males and females differed on a number of different variables including, weight worry, restrained eating, emotional eating, PANAS negative and self-esteem. Implications for applied contexts and future research surrounding adolescent weight status are discussed.

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